

IN THE SUPREME COURT OF BRITISH COLUMBIA

Citation: *Huang v. Canadian National Railway
Company,*
2018 BCSC 1235

Date: 20180724
Docket: S150260
Registry: Vancouver

Between:

Jane Huang also known as Jian Hui Huang

Plaintiff

And

**Canadian National Railway Company, Canadian Pacific Railway Company,
Jeffrey Wormsbecker, Joseph Lachance and Township of Langley**

Defendants

And

**Canadian National Railway Company, Canadian Pacific Railway Company,
Jeffrey Wormsbecker and Joseph Lachance**

Third Parties

Before: The Honourable Madam Justice Fleming

Reasons for Judgment

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I. INTRODUCTION

[1] On May 8, 2014, a train owned and operated by the Canadian National Railway (“CNR”) struck the passenger side of Jane Huang’s vehicle as she was crossing railway tracks on Smith Crescent close to Glover Road in Langley, BC (“Smith Crossing”) (“Collision”).

[2] Ms. Huang was seriously injured in the Collision. Her most significant injuries include an incomplete spinal cord injury and a traumatic brain injury. After the Collision, Ms. Huang began to suffer from depression which has not resolved. Fortunately, she regained the ability to walk, assisted for the most part by a four-wheeled walker. Ms. Huang alleges the ongoing effects of her injuries have profoundly impaired her physical, cognitive and psychological functioning and she faces a substantial risk of further deterioration as she ages. Highly educated with a graduate degree in engineering, an MBA, and other professional training including certification in project management, Ms. Huang has been unable to return to work. The defendants concede she is no longer competitively employable. She seeks damages of approximately \$4.8 million, including \$2.5 million for the cost of future care. The defendants deny liability, but if they are found liable, argue a total award of \$2 million is appropriate.

[3] Smith Crossing is one of a series of railway crossings adjacent to Glover Road, forming part of what is called the Page railway subdivision (“PSD”). The Canadian Pacific Railway (“CPR”) owns the railway track and has a right of way or an easement over the land underlying the PSD. There is a stop sign about 5 metres west of Smith Crossing on Smith Crescent (“First Stop Sign”). Just east of Smith Crossing is a second stop sign on Smith Crescent where it intersects with Glover Road.

[4] On April 22, 2014, Ms. Huang started a new job as a project scheduler with Britco LP (“Britco”), a business that designed, constructed and rented modular buildings, located at the southwest corner of Smith Crossing. On May 8, 2014, Ms. Huang left the office shortly after 5:00 p.m., planning to drive home to

Vancouver. She has no memory of what happened in the moments leading up to the Collision. On previous days, however, she had driven east on Smith Crescent and south along Glover Road, without stopping at the First Stop Sign because she believed the railway tracks had been abandoned.

[5] Ms. Huang accepts she likely did not stop at the First Stop Sign before being hit by the train. She acknowledges that failing to stop was negligent, but asserts the Collision was also caused by the negligence of the defendants.

[6] Her primary allegation of negligence is against the CPR for failing to maintain adequate sightlines at Smith Crossing. She asserts an overgrowth of vegetation, mainly Himalayan blackberry bushes, prevented her from seeing the approaching train. Consequently, she entered Smith Crossing when the train, travelling at about 35 mph, was too close to avoid.

[7] Ms. Huang also alleges the CPR was negligent for failing to install automated gates and other warning devices at Smith Crossing before the Collision, knowing it was dangerous because the distance between the western edge of the railway track and the second stop sign at Glover Road, or “storage space”, was not long enough to accommodate a regular size vehicle.

[8] Ms. Huang claims the CNR and the train’s conductor and engineer were negligent for failing to warn her of the approaching train by activating the horn properly and for failing to observe and take action in response to the obvious sightline deficiencies at Smith Crossing before the Collision.

[9] The defendants agree both railways owed Ms. Huang a duty of care but argue she alone is liable for the Collision because she had no intention of stopping at the First Stop Sign and looking for a train. In other words, they say her conduct was the sole cause of the Collision.

[10] In addition, the defendants take the position the CPR complied with the standard of care regarding sightlines through its “rigorous” track inspection and

vegetation management programs, and a lack of storage space at Smith Crossing played no role in the Collision.

[11] At the time, sightlines at railway crossings such as Smith Crescent were subject to Transport Canada (“TC”) guidelines, one of which the CPR had expressly adopted as mandatory. The parties dispute how the sightline guidelines ought to be interpreted and their significance in determining the requisite standard of care.

[12] Regarding the allegations of negligence against the CNR and its employees, the defendants assert there is no evidence the train’s horn and bell were improperly maintained, equipped, inspected or operated at the time of the Collision and the train crew was under no obligation to assess and report on problems with sightlines.

[13] The Province of British Columbia (“Province”) and the Township of Langley (“Langley”) are the road authorities for Glover Road and Smith Crescent respectively. They, along with Britco, were, but are no longer, defendants in the action. The remaining defendants suggest if any of them are found liable, Ms. Huang’s contributory negligence should be assessed at 80%, and Britco, Langley and the Province should be found equally at fault for the remaining portion.

II. PRELIMINARY COMMENTS

[14] The trial of this action took over six weeks to complete. More than 60 witnesses, including many expert witnesses, testified. In addition to a multitude of expert reports, many documents, photographs and some audio and visual recordings were admitted into evidence.

[15] Although many facts are in dispute, the parties raised relatively few issues about the credibility of witnesses, which I have identified and addressed at different points in these reasons.

[16] In general, I have assessed the truthfulness and accuracy of the testimony of witnesses applying the test articulated many years ago in *Faryna v. Chorny*, [1952] 2 D.L.R. 354 (B.C.C.A.) at 357:

...In short, the real test of the truth of the story of a witness in such a case must be its harmony with the preponderance of the probabilities which a practical and informed person would readily recognize as reasonable in that place and in those conditions....

[17] I have also considered the factors identified by Justice Dillon in *Bradshaw v. Stenner*, 2010 BCSC 1398, aff'd 2012 BCCA 296, including:

- the capacity and opportunity of the witness to observe the events at issue;
- his or her ability to remember those events;
- the ability of the witness to resist being influenced by his or her interest in recalling those events;
- the internal and external consistency of the witness's evidence;
- whether the witness's evidence harmonizes with or is contradicted by other evidence, particularly independent or undisputed evidence;
- whether his or her evidence seems unreasonable, improbable or unlikely, bearing in mind the probabilities affecting the case; and
- the witness's demeanour, meaning the way he or she presents while testifying.

[18] I note at this stage, the defendants' primary complaint about the accuracy of Ms. Huang's testimony relates to its reliability based on some problems with her memory.

III. LIABILITY

A. Discussion of the Evidence

[19] During the analysis of the evidence that follows, some circumstances are set out as facts. Those facts reflect findings made because they were not in dispute or the underlying evidence was uncontradicted.

1. Smith Crossing

[20] Smith Crescent intersects Glover Road, also called Provincial Highway 10, on the east and west in two branches that do not align. On the west side of Glover Road, Smith Crescent is a quiet street that allows for two lanes of travel but there is no marked centreline. About 145 metres west of Smith Crossing on the south side of Smith Crescent is the entrance to Britco. There is an empty field on the north side. The speed limit, which is not posted, is 50 kph.

[21] Glover Road is a two-lane highway with paved shoulders marked by solid white fog lines. A double, solid, yellow centreline separates the north and southbound lanes. The posted speed limit is 70 kph. There are no traffic controls on Glover Road at its intersection with Smith Crescent.

[22] East of the Britco driveway and west of Smith Crossing is a street sign depicting no trucks. Immediately below it is another sign that reads: "No Exit to Trucks in Excess of 7 metres Via Railroad Crossing". Further south is a white "X", symbolizing a railway crossing, painted on the road surface. At the east edge of the X, on the south side of Smith Crescent, is a yellow diamond-shaped sign depicting a railway crossing ahead. A stop line is located about 5 metres from the western rail, along with the First Stop Sign. Above the First Stop Sign is a crossbucks sign and below it is a small sign stating: "No Stopping On Tracks". Another stop line and the second stop sign is located approximately 4.7 metres past the eastern rail at Smith Crossing on Smith Crescent at Glover Road. Ms. Huang's vehicle, a 2008 Mercedes-Benz E300, four door sedan was approximately 4.8 metres long.

[23] It is another 5.4 metres from the second stop sign to the fog line for the southbound lane on Glover Road.

[24] A large dirt berm located around the perimeter of the Britco property, which it leases, includes the east side adjacent to the railway tracks. A chain link fence runs along the property line on the outside of the berm.

[25] At Smith Crossing, also called Mile 18.58 of the PSD, trains travel in both directions. The maximum speed is 35 mph. The PSD itself is about seven miles long.

2. Storage Space

[26] Over the years, safety concerns were expressed about a lack of storage space at the public crossings within the PSD that run adjacent to Glover Road including Smith Crossing.

[27] In July 1990, following a safety evaluation of the crossings, which from south to north were Worrell, Crush, Smith and 216, TC wrote to the CPR, Langley and the Province about each crossing. Regarding Smith Crossing, also referred to as Mile 18.58, the letter reads:

The vehicle storage room is common with several of the crossings and is inadequate even for some cars. It is suggested that turn lanes plus entrance and exit lanes be constructed along Glover Road to ease the driver strain. Advance warning signs are warranted on Glover Road.

[28] The letter also stated more generally:

...The tracks which parallel Glover at a distance of approximately twenty feet from the edge of pavement often have vehicles stopped foul of the tracks which have no opportunity to escape when and if a 12000-ton train is approaching at 35 MPH....

[29] A reply addressing the identified concerns was requested.

[30] In February 1994, TC's chief engineer, Ivan A. Mann, sent a letter to the same parties regarding the crossing at 216, referring to three accidents in four years that involved trains hitting eastbound vehicles attempting to enter the Glover Road intersection located "only 8 metres east of the crossing". He wrote that two stop signs located in such close proximity were causing some confusion for eastbound motorists. He advised that TC would support an application for federal funding to make safety improvements, and suggested in the interim, substantially enlarging the signs advising motorists not to stop on the tracks. The letter also stated any future road improvements at the crossings should include the closing of Smith Crescent

and one other crossing, because increased traffic on those roads could cause similar safety problems.

[31] In or about 2001, TC initiated the Grade Crossing Improvement Program (“GCIP”). Its stated objective was to improve the safety of existing grade or level crossings with the highest risk, in order of priority of fatalities, injuries and accidents. The GCIP provided federal funding for eligible crossing improvement projects.

[32] In December 2002, a CNR train travelling northbound struck a gravel truck at Smith Crossing causing a derailment. The truck had been turning right from Glover Road onto Smith Crescent.

[33] In January 2003, in response to the collision, TC conducted a site inspection to address safety concerns. John Butterwick, the inspector, observed large vehicles and dump trucks coming in and out of the Britco property which was being redeveloped at the time. He noted trucks proceeding east over the crossing were not clear, or “foul”, of the tracks when stopped at the intersection with Glover Road. Viewing this as an immediate threat to safe railway operations, he issued a “Notice and Order” pursuant to s. 31 of the *Railway Safety Act*, which required Langley to erect the sign restricting eastbound vehicles over 7 metres from using Smith Crossing, which sign was present at the time of the Collision. The Notice along with a letter to Langley dated January 20, 2003 were also sent to the Superintendent of the CPR. The letter concluded with:

A permanent solution would be to design and install traffic signals on Glover Road inter-connected with railway crossing signals at the Smith Crescent crossing. The signals would allow traffic stopped on Smith Crescent at the junction of Glover Road to clear onto Glover Road on the approach of a train.

[34] The December 2002 derailment had spilled the train’s cargo onto the Britco property owned at that time by Britco Leasing Ltd. (“BLL”). Purchased in 1981 the land had been vacant for many years. Before the derailment, in 2002, BLL had submitted a plan to Langley for the development of a maintenance yard and head office building. Rather than remove the material stripped from the surface of the

land, BLL decided to use it to construct the berm. Before doing so, BLL notified Langley, the CNR as well as the CPR and obtained a permit from Langley to install and landscape the berm.

[35] A letter from Britco dated January 23, 2003 enclosed diagrams of the berm and specified that its height and width would vary, but along the “northern portion of the east side”, the intention was it would be as “high as possible” to decrease the sound from the railway and the traffic. There is no record of any response from the CPR. Douglas Younger who became the CPR’s manager of public works for BC and Alberta in mid-2003 testified Britco’s correspondence did not come to his attention but he did not recall any particular concern about the berm being constructed.

[36] In April 2006, another collision occurred at Smith Crossing. This time, a train hit a courier van attempting to turn onto Glover Road from Smith Crescent.

[37] The CPR, Langley, the Province (Ministry of Transportation), TC, the CPR and Britco began discussing the redevelopment of Smith Crossing and the intersection at Glover Road.

[38] Chris Gardner, then the director of strategic planning for Britco, testified the danger to drivers at Smith Crossing was raised at a number of meetings. A letter to the CPR dated June 27, 2006 from Britco appears to confirm this, referring to an earlier meeting where the need for immediate safety improvements to Smith Crossing and the intersection was discussed (“June 2006 Letter”).

[39] The June 2006 Letter also identified two alternative development proposals that had been made by then. The first involved closing Smith Crossing and upgrading another crossing. The second, which Britco attributed to the Province and the CPR, involved installing right-in and right-out turning lanes on Glover Road for traffic turning onto and off of Smith Crescent.

[40] Ron Mitchell, TC’s manager of railway safety at the time, received a copy of the June 2006 Letter. It was his understanding Smith Crossing was already on the

federal agency's "radar" by then. In any event, he confirmed that Smith Crossing was eligible for funding from the GCIP. Mr. Mitchell explained that because railways were responsible for installing automated warning systems at crossings, the first step in applying for GCIP funding was to obtain their estimate regarding that cost.

[41] On December 28, 2006 he wrote to CPR and the Province:

We are putting the project submitted for road design changes (survey and design of civil works) around Smith Crescent as our top of the list submission to go to the Minister at the end of January.

Would CPR generate an estimate and make a submission for a project to install FLBG; and would the Province also create a submission to install a TCS. Both can be just ballpark estimates for now. I will support for 80% funding. If these also go in at the end of January, then we will have a chance of getting all completed this coming year or two (once we figure out where the other 300 to 500 k will come from).

[42] In January 2007, Mr. Butterwick prepared an "Iris Report" based on his inspection of Smith Crossing, as part of the application process. His report recommended, "relocate and upgrade with automatic protection and pre-emptive traffic signals". He recalled Mr. Mitchell telling him Smith Crossing was a candidate for closure. Mr. Butterwick clarified his recommendation was to install gates, lights, and bells interconnected with a pre-empted traffic signal as a safety upgrade. He saw gates as an effective tool for preventing motorists from going over the crossing. Mr. Mitchell shared this view, indicating he recommended gates "all the time" when adding an automated warning system.

[43] On January 19, 2007, Mr. Younger wrote to Langley advising the estimated cost of installing an automated warning system at Smith Crossing that interconnected with new traffic signals on Glover Road was \$277,600. In the letter, he referred to the installation of the warning system as a "warranted safety improvement", although he testified that safety at Smith Crossing was being properly handled by the First Stop Sign and the restriction on vehicles over 7 metres. He also advised Langley that the CPR was prepared to apply for an 80% funding grant, subject to a commitment from Langley to pay over 60% of the balance. A subsequent email from the CPR to TC indicated Langley agreed to a different cost

sharing arrangement and the CPR would carry out the work after the grant was made, contributing 7.5% to the cost of installation, as well as 50% of the maintenance costs.

[44] A short time later, on January 22, 2007 the Province applied to TC for a grant of \$492,000, writing:

Consensus was reached on the best approach to resolve the safety issues at this railway crossing. The proposed works required to improve safety at this site include traffic signals pre-empted by railway crossing signals to ensure an orderly clearing of vehicles in the crossing area before the train arrives. To ensure a safe design for traffic signals this intersection requires improvements to delineate traffic movements, provide for channelization and vehicle storage to accommodate a queued vehicles in the intersection and to allow full movements of legal length road vehicles as they turn on and off of Smith Crescent.

[45] The next day, the CPR made its application for funding, advising it concurred with the Province's proposal, noting TC, the Province, Langley and the railway agreed the installation of a warning system consisting of flashing lights, bell, gates, and constant warning time control equipment interconnected with traffic signals at the adjacent intersection was a "warranted safety improvement".

[46] Despite the apparent focus on safety, the evidence establishes the Province became involved in the redevelopment project because Britco made a request of its MLA, Kevin Falcon, who was the Minister of Transportation at the time. It is also clear Britco was financially motivated to improve access to and from its property. The restriction imposed by Mr. Butterwick, preventing vehicles over 7 metres from using Smith Crossing, captured trucks with trailers moving modular buildings to and from Britco customers, and was therefore inconvenient and problematic for the business. Turning left from the Britco property onto Smith Crescent, which is a fairly narrow road, was difficult. In 2005, Britco had moved its lease fleet to the Britco property. With more employees at the head office and the growing fleet there, traffic in and out had certainly increased.

[47] Over time a number of proposals for redevelopment were discussed that included aligning the two Smith Crescents on either side of Glover Road, and various versions of installing right-in and right-out turning lanes on Glover Road, as well as closing Smith Crossing and upgrading another crossing.

[48] Mr. Gardner testified that Britco tried to push for a fairly quick response. Although there was consensus by early 2007 about not aligning Smith Crescent or upgrading another crossing, Britco wrote to Mr. Mitchell at TC in February concerned about the cost and complexity of some of the remaining proposals. Britco offered to fund up to \$125,000 for an earlier discussed “relatively straightforward” crossing upgrade, hoping to accelerate improvements.

[49] The challenge, however, as Mr. Gardner noted, was the competing interests of stakeholders.

[50] Britco wanted a right-in and right-out option and a flashing traffic light triggered by vehicles that would allow for left turn access. It is not clear what options Langley may have proposed or favoured. There was some suggestion however, that Smith Crescent was not a priority for Langley given the low traffic volume. Despite the proposed improvements described in its funding application, the Province came to prefer and support an option that involved right lane turning lanes without traffic lights and a barrier preventing left turns from or onto Smith Crescent. Its concern was traffic lights would interfere with the flow of traffic along Glover Road, and allowing left turns meant widening the road for left-turning slots and therefore purchasing private land.

[51] The GCIP awarded funding for the project but Smith Crossing and the intersection were never upgraded. In June 2008, Britco withdrew from the project because the final proposal did not allow for left turns, after which the Province stopped working on the project. Tracy Cooper, the regional manager for the Ministry of Transportation at the time, explained the Province had higher priorities and the project was not one it would have initiated absent Britco’s request of Mr. Falcon.

[52] Mr. Younger characterized the CPR's role throughout the negotiations as largely responsive. He said although the railway intended to proceed with automated upgrades to Smith Crossing interconnected to traffic lights on Glover, the railway was dependent on what the Province and Langley decided in terms of road design. He also testified the CPR needed concurrence, participation and support from the other stakeholders to install the infrastructure necessary for the upgrades, including for example, a signal bungalow, which houses all of the electronics related to a crossing's automated warning devices. Mr. Younger indicated the bungalow had to be located away from the track and the road, and there was not enough room within the "volumetric" easement of the railway, noting the CPR's right of way is quite narrow at Smith Crossing. The power lines were also a significant factor. Any work done outside of the easement would require the approval of BC Hydro.

[53] Mr. Younger said the CPR was surprised when the Province cancelled its portion of the project, but the railway could not proceed with the signal work because the road work was not going to be done.

[54] Mr. Cooper also gave evidence that it was not feasible for the CPR to upgrade Smith Crossing on its own. He suggested the railway needed to consult with both road authorities about installing crossing gates and lights because they would change how vehicles were stored both on Smith Crescent and Glover Road. The testimony of Richard Welfing, the manager of Langley's engineering services, was much the same.

[55] By the time of the Collision, Smith Crossing was the only crossing left along Glover Road without an automated warning system.

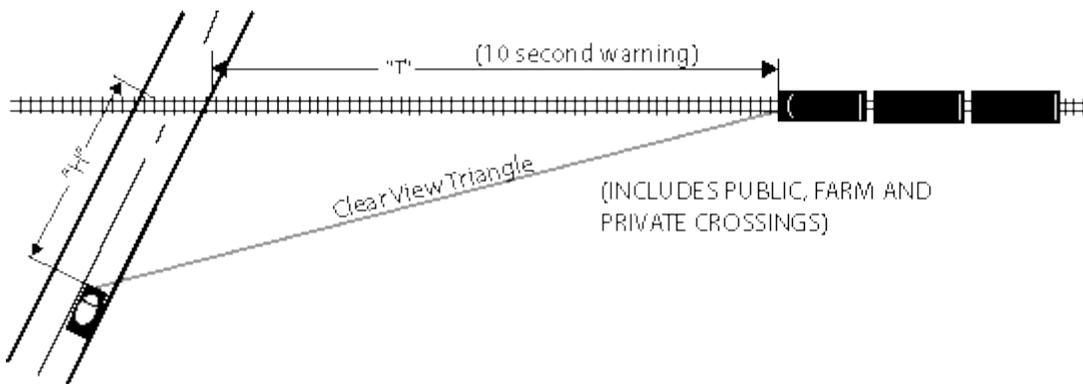
3. Sightline Guidelines for Railway Crossings Without Automated Warning Devices

[56] In or about the early 1990s, TC published sightline guidelines called "Minimum Railway/Road Crossing Sightline Requirements For All Grade Crossings Without Automatic Warning Devices G4-A" ("G4-A"), that were and continue to be

widely used by TC employees and the railway industry. There is no dispute the CPR’s responsibility for the safety of its track included the maintenance of sightlines at railway crossings in the PSD or that Smith Crossing, a level or grade crossing, unprotected by automatic warning devices fell within the scope of the G4-A.

[57] Under the G4-A, minimum sightlines are based on the maximum authorized road speeds in kilometres per hour, and train speeds in miles per hour. The guideline begins with a diagram that demonstrates a driver should have a clear view of the approaching train that provides a 10 second warning defined as “T” from a distance on the road defined as “H”. Directions regarding the use of the G4-A and non-compliance with its minimum sightlines appear under the heading: “To Established Required Clear View Area”.

MINIMUM RAILWAY/ROAD CROSSING SIGHTLINE REQUIREMENTS FOR ALL GRADE CROSSINGS WITHOUT AUTOMATIC WARNING DEVICES G4-A



Road (H value)

Maximum Speed (km/h) for vehicle	Distance* (H on above graph)	
	Desirable (metres)	Minimum (metres)
Stop	8	--
20	20	15
30	30	20
40	45	35
50	65	50
60	85	70
70	110	90
80	140	120
90	170	145
100	200	175

Rail (T value)

Maximum Train Speed (m/h)	Minimum* Distance <>	
	Feet	(metres)
Stop	100	(30)
20	300	(91)
30	450	(136)
40	600	(182)
50	750	(227)
60	900	(273)
70	1050	(318)
80	1200	(364)
90	1350	(409)
100	1500	(455)

* To be increased as required by Notes 3 and 4 below.

To Establish Required Clear View Area

1. Use maximum allowable train and vehicle speeds.
2. View between 1.1 m above road (eye level) to track level.
3. Where gradients within 8 m of rail exceed 5% **or** heavy or long vehicles regularly cross, clear view from a vehicle stopped at the crossing **must also** extend a minimum of 50% beyond “T”, and more if necessary, so stopped vehicles have sufficient time to start up and cross safely.
4. Where heavy vehicles operate on long descending approaches, increase “H” to ‘stopping sight distances’.
5. If clear view cannot be achieved for existing speeds, reduce speed of vehicles or trains until such time as an automatic warning system can be installed.

Date modified:
2009-12-17

(Minimum Railway/Road Crossing Sightline Requirements For All Grade Crossings Without Automatic Warning Devices G4-A, (Ottawa: Transport Canada, 2009) online: Government of Canada < <https://www.tc.gc.ca/eng/railsafety/guideline-280.htm>>)

[58] As can be seen, for stopped vehicles, the desirable measurement distance is 8 metres. The minimum is signified by a double dash. The minimum sightlines for trains travelling at maximum speeds of 30 and 40 mph are 450 feet (136 metres) and 600 feet (182 metres), respectively.

[59] In 2002, TC published a draft document regarding “technical” standards and inspection, testing and maintenance requirements for grade crossings which also included sightline requirements (“RTD-10”). The RTD-10 set out two methods for calculating sightline distances. One involved a series of equations with maximum train speed and the “departure” time, or the time required for a vehicle to clear the

track, as variables. The other method also required the departure time to be calculated, but similar to the G4-A used a table that specifies minimum sightlines based on the maximum train speed. The measurement position is based on the location of the driver with a vehicle stopped at the stop line 5 metres from the closest rail. For railway speeds of between 31 and 40 mph the minimum sightline is 180 metres for a departure time of up to 10 seconds.

[60] After the RTD-10, the G4-A continued to be widely used by the railway industry and TC personnel. Mr. Mitchell testified that over time the G4-A was accepted as the industry standard for assessing sightlines at railway crossings. The evidence of other witnesses essentially confirmed this.

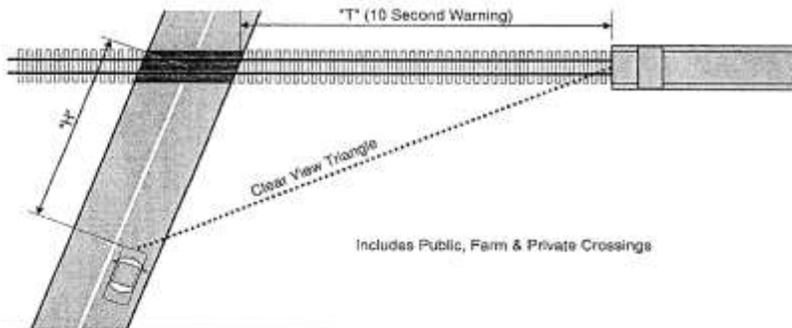
[61] The parties dispute the minimum sightlines required for railway crossings controlled by a stop sign under the G4-A, in light of the double dash under the minimum column and the maximum speed increments. Some witnesses interpreted the double dash as not allowing for anything less than a sightline established through a measurement taken from a distance of 8 metres from the track centreline to the front of a stopped vehicle (in other words only the desirable measuring distance is permitted). Others understood the double dash as permitting flexibility. Similarly, there was some uncertainty about whether the G4-A required minimum sightlines to be determined based on the minimum distance for the next highest speed increment where the maximum road or train speed fell in-between the increments. For Smith Crossing, where the maximum train speed is 35 mph, some witnesses interpreted the G4-A as requiring the minimum sightline of 600 feet (182 metres) for maximum train speeds of 40 mph based on the direction to use maximum allowable train and vehicle speeds. Others viewed 525 feet (160 metres) as the minimum, interpolating between 600 and 450 feet.

[62] On March 24, 2010, the CPR expressly adopted the G4-A as mandatory in a document called the Standard Practices Circular – 29 (“SPC-29”) stating at 4.0(g): “Minimum crossing sight lines must be preserved in accordance with the G4-A sight

line guidelines shown in the *Appendix, Figure 29-3*. Sightline requirements addressed at 6.0 and Figure 29-3 provide:

- a. Sight line requirements apply to all grade crossings: Public, Farm, Private, and Company Crossings.
- b. Sight lines are the lines of sight between a person on a grade crossing or its road approaches and
 - i. the grade crossings
 - ii. crossing warning sign signals.
 - iii. approaching trains.
- c. Assessment of sight lines requires an examination of the road, and knowledge of the types of vehicles using the road and the speed of the trains operating on the tracks.
- d. Minimum sight line requirements must be preserved. (See *Appendix, Figure 29-3*.)

10.0 Sight line Guidelines



RAILWAY		
Maximum Time Table Speed	Minimum ¹ Distance "T"	
mph	m	Feet
STOP	30	100
1 - 10	45	150
11 - 20	91	300
21 - 30	136	450
31 - 40	182	600
41 - 50	227	750
51 - 60	273	900
61 - 70	318	1050
71 - 80	364	1200
81 - 90	409	1350
91 - 100	455	1500

ROAD	
Maximum Permissible Road Speed	Distance ² "H"
Km/h	m
Pedestrian	5
Stopped Vehicle	8
5 - 20	20
21 - 30	30
31 - 40	45
41 - 50	65
51 - 60	85
61 - 70	110
71 - 80	140
81 - 90	170
91 - 100	200
101 - 110	220

To Establish Clear View Requirements

1. "T" to be increased where required by subsections 8.3 and 8.4.
2. "H" is to be increased where required by subsection 8.5.
3. View from 1.05 m above road to 12 m above track level.
4. If clear view cannot be achieved for existing speeds, reduce speed of vehicles or trains or both to the extent that required sightlines are achieved.

Figure 29-3

[63] As can be seen, Figure 29-3 sets out a single distance rather than desirable and minimum H distances for measuring sightlines. It also eliminates any gaps between vehicle and train speeds. For stopped vehicles the only measurement distance is 8 metres. For trains travelling at speeds of 31 to 40 mph the minimum sightline is 600 feet.

[64] The SPC-29's directions for establishing a clear view require the speed of vehicles or trains to be reduced if a clear view cannot be achieved for existing speeds to the "extent that required sightlines are achieved". The further direction in the G4-A to install an automated warning system is not included. The direction regarding the sightline viewer's perspective is also somewhat different. Under the SPC-29, the required view is from 1.05 metres, rather than 1.1 metres above the road to 12 metres above track level in the G4-A.

[65] In November 2014, regulations enacted under the *Railway Safety Act* came into force requiring the maintenance of minimum sightline requirements at grade crossings: *Grade Crossing Regulations, SOR/2014-275 ("GCR")*. Under the *GCR*, railways must ensure sightline compliance within their right of way and over land adjoining the right of way, including the removal of trees and brush that obstruct the sightlines. Road authorities have the same obligations in relation to land on which the road is situate and in the vicinity of the grade crossing. For existing crossings, the regulations prescribe a phased in approach over seven years. Minimum sightlines are determined through a formula accounting for variables such as the distance of the crossing user from the track and the distance and maximum permissible speed of a train travelling along the tracks, and are to be measured from a point 1.05 m above the road surface to a point 1.2 m above top of lowest rail.

4. Sightlines at Smith Crossing Prior to the Collision

[66] The parties dispute the extent to which an overgrowth of vegetation at Smith Crossing obstructed the sightline to the south for eastbound drivers, such as Ms. Huang, at the time of the Collision.

[67] After Britco constructed and landscaped its berm, Himalayan blackberry bushes, an invasive species, grew there. Britco regarded both the blackberry bushes and the chain link fence that bordered the property as providing useful security or protection against those who might attempt to break into the yard.

[68] In the Iris Report, Mr. Butterwick noted the sightline in “Quadrant 3” was screened by brush along the fence line, meaning Britco’s chain link fence bordering the berm and the CPR’s right of way. He determined the sightline, measured 8 metres west of the track and looking south or to the right, was 400 feet. Applying the G4-A he determined the required sightline was 600 feet, indicating TC inspectors were told to err on the side of caution. However, he did not view the 400 foot sightline as a threat to “railway” safety.

[69] Mr. Mitchell, Mr. Butterwick’s supervisor at the time, said he expected railways to pay attention to sightlines at their crossings. He remembers finding deficient sightlines when he worked as a TC inspector earlier on in his career, most often caused by bushes and trees including regrowth. He, along with other witnesses, pointed out that foliage grew rapidly if not very rapidly in the Lower Mainland, given the climate. Mr. Mitchell testified that he measured sightlines at crossings with a stop sign, 8 metres from the centre of the track. However, unlike Mr. Butterwick, he viewed the G4-A as allowing for 525 feet of sightline if the maximum train speed was 35 mph, based on the 10 second warning set out in the guideline’s diagram.

[70] Mr. Mitchell explained 10 seconds was considered a safe amount of time for drivers to view an oncoming train and make a decision about whether to proceed or not, which included a 2.5 second allowance for perception reaction time and 7.5 seconds to drive across and safely clear the tracks.

[71] Jay Reiger, the present chief engineer with TC’s Rail Safety Directorate, testified he understood the G4-A’s 10 second T value was viewed as a prudent minimum and was not aware of any resistance to it from the railways. He gave

similar evidence to Mr. Mitchell about the significance of the G4-A in the industry, describing it as the “rule of thumb” for the available sightlines, commenting if a particular railway’s procedures went above and beyond the guideline, then “so be it”. Unlike Mr. Mitchell, however, he viewed the G4-A as requiring a minimum sightline of 600 feet for crossings with a stop sign and train speed of 35 mph. Mr. Reiger testified that in the interest of safety, the minimum sightline for 40 mph should be used. He also said the sightline ought to be measured using the desirable distance of 8 metres from the near rail, acknowledging the diagram gives the impression the measurement should be taken from the centre of the track. In his view, the double dash under the minimum column for stopped vehicles meant there is no minimum, leaving only the desirable distance.

[72] There is no evidence regarding any TC sightline inspections that may have occurred at Smith Crossing following Mr. Butterwick’s Iris Report until after the Collision in October 2014. Mr. Reiger explained TC did not keep records of every past sightline inspection, in part due to capacity issues. Photographs of Smith Crossing taken in August 2011 depict much the same overgrowth of blackberry bushes that appears in those taken immediately after the Collision.

5. The CPR’s Management of Sightlines Prior to the Collision

[73] The defendants do not dispute that on the day of the Collision, vegetation growing on Britco’s berm encroached upon the sightline for eastbound drivers looking south at Smith Crossing. They also acknowledge the CPR was responsible for ensuring adequate sightlines at railway crossings in the PSD as part of its responsibility for track safety and maintenance. The defendants take the position the CPR assessed and maintained adequate sightlines at crossings including Smith Crossing through its vegetation management program and regular track inspections.

6. Vegetation Management

[74] Before the Collision, until March 15, 2014, David Spata was the manager of the CPR’s vegetation management program for Canada and the United States.

Despite his vast territory, Mr. Spata spent a great deal, approximately 25% of his time, in the Lower Mainland deploying crews. He described two main operational focuses for the program. One was controlling weeds in the rock structures under the railway, and the other was managing vegetation on the right of way by encouraging low-growing native plant species compatible with the railway, such as grasses.

[75] Mr. Spata explained that *ad hoc* vegetation issues such as a tree falling on the tracks were managed by the engineering department. He described a reporting relationship with the Chief Engineer and good communication with local staff. He also testified that contractors performed the majority of the vegetation management work for the CPR. Asplundh was one of two contractors hired in the Lower Mainland. Michael Kalivoda, an arborist and foreman with Asplundh at the time, was his “go to guy”.

[76] In the Lower Mainland, the focus of the vegetation management program was on changing the vegetation that grew on the right of way and eradicating Himalayan blackberries, an invasive species with a very rapid growth rate and no predators. Mr. Spata described a rotating schedule for managing blackberries in the PSD that involved the local track supervisor pruning them with a mower, usually in the spring, followed by an aggressive herbicide application on the right of way in late September every other year which he managed himself, in year one. Year two was a touch-up phase involving “hand crews” trimming whatever the mower was not able to cut or had been missed.

[77] According to Mr. Spata, the schedule was meeting the objective of eradication on the right of way. He indicated the PSD had gone through three or four cycles of the two-year rotation and the program was gaining better control of the vegetation, specifying that grasses were starting to grow in the right of way by the time he left the CPR.

[78] Referred to photographs of Smith Crossing taken shortly after the Collision, Mr. Spata said he was confident there had been no herbicide application in the fall of

2013. He explained that blackberry bushes are not vulnerable to herbicide in the spring when they are growing rapidly and regulations restrict their use before the berries drop at the end of the summer. He gave no evidence about when the bushes were last cut back or trimmed. Nor did anyone else from the CPR.

[79] Mr. Spata acknowledged that maintaining sightlines at crossings was part of his responsibility, stating he used the G4-A as a guide but assessed sightlines “qualitatively”. He testified that he never measured the sightlines at Smith Crossing or identified a sightline problem there, but generally instructed crews to go beyond the minimum sightlines. If an owner’s land or vegetation impeded sightlines, his focus was on managing what he could on the right of way. Mr. Spata viewed approaching owners about cutting back vegetation on their property as beyond his responsibility, also testifying, “We are not doing anything outside of our right of way.” At the same time he also suggested contractors were authorized to do so, if an owner was amenable.

[80] At some point after Christmas each year, when the blackberry bushes were dormant and without leaves, Mr. Spata and Mr. Kalivoda completed pre-seasonal inspections of three CPR subdivisions in the Lower Mainland, including PSD, to determine the scope of the vegetation management for the spring. Mr. Spata said he received his budget in February and then it was a question of putting crews in place. He would return to the Lower Mainland every couple of weeks in a typical year to check on the contractors, describing the area as a difficult place for them to work.

[81] Although Mr. Spata said he kept significant records at his home office, including a logbook and handwritten notes he took everywhere he went, he said no one from the CPR ever asked him for them.

[82] “Off memory”, he recalled that during an inspection in December 2013 with Mr. Kalivoda, the blackberry bushes were starting to encroach onto the right of way at Smith Crossing. Consequently, he directed Mr. Kalivoda to trim the bushes back, as part of the work list for the three subdivisions in the spring of 2014. Mr. Spata was

not prepared to acknowledge the purpose of cutting them back was to improve sightlines, describing the bushes as a potential issue down the road. He agreed he did not make cutbacks in the PSD a priority for Mr. Kalivoda. Mr. Spata also testified Mr. Kalivoda never told him about speaking with anyone at Britco about trimming the blackberries on the berm itself, nor did Mr. Spata do so himself before leaving the CPR in March 2014.

[83] Aspects of Mr. Spata's testimony are corroborated by detailed records created by Mr. Kalivoda including handwritten notes, which indicate that on December 2, 2013, the two men spent eight hours "look(ing) at work for crossing sightlines" on the PSD, as well as Mission, and another local subdivision. In a document listing PSD crossings that Mr. Kalivoda took with him that day, next to Smith Crossing he wrote: "minor brushing N-E-Q no chipping".

[84] In addition to working closely with Mr. Spata, Mr. Kalivoda was in frequent contact with Victor Tome, the CPR's roadmaster over a territory that included the PSD before and at the time of the Collision. Mr. Tome said Mr. Kalivoda attended safety briefings every morning and they spoke "pretty much every day". According to Mr. Tome, there was no discussion about blackberry bushes, a berm or a sightline issue at Smith Crossing before the Collision. Nor did Mr. Tome remember Mr. Kalivoda ever telling him a property owner refused permission to cut vegetation where it was needed. Similarly, Mr. Kalivoda indicated the CPR had never asked him to check on Britco's berm before the Collision. Nor was he told what sightlines the CPR required or how to evaluate them.

[85] Starting April 7, 2014, Mr. Kalivoda's handwritten notes include several entries for "slash blackberries" at various crossings in all three subdivisions but not Smith Crossing. Again, based on the photographs of Smith Crossing taken shortly after the Collision, Mr. Spata acknowledged the blackberry bushes had likely not yet been cut back. He also said it was possible they could have regrown to that extent if cut early in the season, an indication of the very rapid rate at which blackberry bushes grow in the Lower Mainland.

7. Track Inspections

[86] The CPR's representative Howie Soliman described the roadmaster or assistant roadmaster as being required to conduct inspections of their territory on foot every three years. In addition, track inspectors working under the roadmaster had to complete regular inspections by driving a "hi-rail" vehicle along the tracks twice each week.

[87] Mr. Soliman acknowledged that sightlines at crossings cannot be assessed from a vehicle on the tracks but overgrown bushes could be observed and then investigated further. He said as an inspector in the past, if he noticed vegetation growth during a track inspection, his practice was to meet the roadmaster at the crossing to take sightline measurements and try to mitigate an overgrowth as soon as possible. At the same time, he agreed it was important to inspect sightlines during track inspections because of the rapid growth of foliage, especially invasive blackberry bushes, during the growing season in the Lower Mainland.

[88] Prior to, and at the time of the Collision, Jason Ducharme was one of two assistant roadmasters to Mr. Tome, describing himself as a "supervisor track inspector". He, along with several other employees in Mr. Tome's department, conducted regular track inspections in the PSD including Smith Crossing.

[89] Mr. Tome, Mr. Ducharme, Parshotam Sehra, a foreman, and Mr. Soliman confirmed that checking sightlines at crossings was part of a regular track inspection.

[90] From 2012 onward, records of track inspections were kept electronically in a document called "Canadian Pacific TC Track Inspection Report" ("TIP"). Inspectors input the date and location of the inspection, the mode of inspection, as well as details related to any defects found and addressed under "defect comments", "corrective action", "corrected date", "immediate action" and "status".

[91] The TIP regarding track inspections of the PSD in 2014 up to the day of the Collision show a number of employees conducted inspections at Smith Crossing

during that time. Mr. Ducharme did several, including some that occurred shortly before the Collision (April 24 and 28, 2014), Mr. Tome did three with the last one being a special inspection on April 27, 2014, and Mr. Sehra did two of the three completed in May 2014 before the Collision.

[92] Mr. Ducharme was unsure if there was a way to record a concern about sightlines in the TIP, indicating it may be possible to make a note in the comment section. Mr. Sehra testified sightline issues could be noted in the form although he did not explain how or where.

[93] Mr. Ducharme could not recall having any concerns about sightlines before the Collision. Mr. Tome testified he had never had any concerns regarding Smith Crossing himself or been told of any. He had no recollection of what he saw there during the special inspection on April 27, 2014. He said he was not even aware of the berm on the Britco property until after the Collision. Consistent with the evidence of Mr. Ducharme and Mr. Tome, Mr. Soliman said he found no indication in the CPR's records that any employee had ever reported a sightline problem at Smith Crossing.

[94] Mr. Ducharme and Mr. Tome indicated walking inspections occurred every year in the PSD as opposed to every three, because Mr. Tome divided the territory in three. Mr. Ducharme testified to driving 10 to 15 mph in the hi-rail vehicle during regular track inspections to ensure nothing was missed. He indicated that at joints, switches and crossings he would get out of the truck to inspect them at a walking pace. Mr. Sehra testified that he had stopped at crossings other than Smith Crossing, but only got out of the truck if there was "something wrong" such as a bush or tree on the tracks and checking sightlines from the stop sign or stop line.

[95] Mr. Soliman agreed that the CPR staff doing inspections should be familiar with the G4-A and the SPC-29 and in fact they were trained to use the SPC-29. He, Mr. Tome and Mr. Ducharme confirmed the SPC-29 was the CPR's standard for evaluating sightlines at crossings before the Collision. Similarly, Mr. Tome indicated

the SPC-29 was reviewed during a training program for CPR employees. Mr. Ducharme said he learned about the G4-A and the SPC-29 during track inspection training from a CPR trainer. Mr. Sehra, however, did not receive any training about how to conduct a sightline evaluation, and was unaware of the SPC-29 and the G4-A. When asked to describe how he examined sightlines at crossings or identified a problem with a sightline, his lack of knowledge was obvious. In direct examination he said:

- Q. And how do you look at sightlines at crossings?
- A. Well, you look at it from the crossing, a hundred feet away, see if it's clear.
- Q. A hundred feet in which direction?
- A. Which direction we are travelling. ...
- Q. Do you get out of the truck to do that? The hi-rail?
- A. Sometimes if we see something in the way we get out of the truck and look at it.

[96] In cross examination the following exchanges occurred:

- Q. Okay. So you've had no training about how to conduct a sightline inspection; is that correct?
- A. Usually we, if a tree or something is in the way, we move it out.
- Q. So when you say "move a tree" you're only talking about an obstruction that is literally on the tracks; correct?
- A. A sightline or on the track, yeah.
- Q. Okay. Well, when you say "sightline", what do you mean by sightline?
- A. Sightline where the car stops, you can see clear. Well, a couple hundred feet, whatever.
-
- Q. In any of your inspections that you did at Smith Crescent, before the day of the collision on May 8, 2014, did you get out of your vehicle walk down Smith Crescent and conduct any kind of sightline evaluation?
- A. No
- ...
- Q. Sir you mentioned a sightline of 100 feet that you were looking for.
- A. Yeah
- ...

- Q. You get out and walk to the stop sign, or the stop line?
- A. Yeah.
- Q. And then you look to see if you have 100 feet of sightline?
- A. Under or whatever. How far the bushes are. Like the bushes are 100 feet, I will check 100 feet ...

[97] Mr. Tome was not able to explain Mr. Sehra's lack of knowledge of the SPC-29, but acknowledged he had not ensured his staff understood how to use it.

[98] Although Mr. Ducharme agreed the SPC-29 required sightlines to be measured 8 metres from the centre of the track, at crossings with a stop sign, and a minimum sightline of 600 feet, he too said it was common practice to stand right by the stop sign and look both ways down the track "to make sure there is a visual". Mr. Ducharme, unlike Mr. Sehra, did recall getting out of the hi-rail vehicle at Smith Crossing before the Collision and using this approach to check sightlines.

[99] Mr. Tome also indicated most sightline inspections were done visually, describing his own technique as "eyeballing". If someone told him about a sightline issue, then he would take the SPC-29 with him to the crossing and take measurements. When asked if he too stood at the stop sign and looked in both directions when inspecting sightlines at a crossing, Mr. Tome indicated he could not remember. He said it was rare for him and his inspectors to get out of the hi-rail vehicle to inspect sightlines at crossings because sightlines "were cut on a regular basis". He gave no indication however that he himself arranged for, or was aware of, any vegetation work at Smith Crossing before the Collision.

[100] Mr. Gardner testified that during the eight years he worked for Britco, he observed cutbacks being done along the side of the berm facing the CPR's right of way and Smith Crescent once or twice a year. He recalled somewhat uncertainly a tractor trailer type contraption with a very long extension and rotating blades that may have reached over the fence.

[101] Neither Mr. Spata nor Mr. Kalivoda described cutbacks to the vegetation on Britco's property inside the fence line before the Collision. Instead, Mr. Spata's

evidence was it was not possible for the “saw” used to trim the bushes to get any closer than six inches from the fence. The two year rotation he had implemented in the PSD involved trimmings or cutbacks to the vegetation encroaching on the right of way at Smith Crossing occurring no more than once a year.

8. Ms. Huang’s Circumstances Before the Collision

[102] Ms. Huang was 49 years old at the time of the Collision.

[103] Born in China and one of four siblings, Ms. Huang described a stable upbringing and a particularly close, warm relationship with her two older sisters. She was always a very capable student and qualified for university at a young age. In 1985, she completed an undergraduate degree in mining mechanical engineering. Later, in 1993, she received a master degree in engineering, followed by certification as a Microsoft system engineer. Ms. Huang married Oliver Lin, also highly educated, with a master degree in physics and an MBA. They had one child, Amy, who was 22 years old and attending the University of Toronto by the time of the trial.

[104] Highly independent, Ms. Huang moved to Canada on her own in or about 2002. Amy remained with Mr. Lin. Despite the distance, Ms. Huang and Mr. Lin described their marriage as very strong. Ms. Huang indicated it was quite common in the Chinese community for one spouse to live in Vancouver while the other remained in China. She and Mr. Lin kept in touch by phone almost if not every day and visited three or four times per year.

[105] Ms. Huang studied English both in high school and at university. In China, she had to communicate in English when she worked for a German company as a mechanical engineer. She described her English reading comprehension as very good and her work-related written communication as “totally okay” by the time she moved to Canada. She was however a little concerned about her ability to speak the language.

[106] To enhance her marketability in Canada, Ms. Huang completed an MBA at the University of New Brunswick in 2003, a certificate in CAD (computer assisted

design software) programming at British Columbia Institute of Technology in 2007, and a certificate in project management at the University of British Columbia in 2009. Although she found her English improved dramatically during the MBA program in particular, she joined Toastmasters to continue working on her language skills.

[107] After her MBA, Ms. Huang settled in Vancouver with Amy, buying a three-level townhome where she has continued to live. Mr. Lin remained in China working as a project manager. The plan was for him to join her once she had established her career. Ms. Huang loved to travel. She went on many trips alone, as well as with Mr. Lin or friends. She was also an avid reader, enjoyed spending time with friends and was physically active before the Collision, swimming regularly for exercise.

[108] Despite her qualifications, Ms. Huang experienced some difficulty finding and maintaining employment.

[109] After losing her previous job as a project scheduler in November 2013, Ms. Huang was hired as a project scheduler for Britco. She saw the position as an ideal fit.

9. Ms. Huang's Practice

[110] From April 22, 2014 until the Collision, Ms. Huang drove across Smith Crossing on her way to and from Britco each day.

[111] She drove home by heading east along Smith Crescent toward Smith Crossing, passing the various street signs and the large X painted on the roadway alerting drivers of the presence of a railway crossing, as well as the First Stop Sign topped by the crossbucks and the smaller sign underneath warning drivers not to stop on the tracks.

[112] Ms. Huang learned to drive in BC, receiving her first driver's licence in 2004. She was familiar with the meaning of the yellow diamond and crossbucks signs and understood when she approached a stop sign she was required to stop fully. Despite

the signs, Ms. Huang believed the railway tracks that ran through Smith Crossing had been abandoned.

[113] Her belief, she testified, was partly based on her familiarity with similarly configured crossings in Vancouver along the Arbutus corridor and in particular the crossing at 45th Avenue and West Boulevard. Much like Smith Crossing, it was an at-grade crossing controlled by a stop sign and crossbucks on 45th Avenue, followed by a second stop sign at the intersection of 45th Avenue and West Boulevard immediately after the crossing. At first, she stopped at the first stop sign on 45th Avenue, but other drivers honked at her. She drove through there regularly over several years and never saw anyone else stop at the stop sign before the crossing. Ms. Huang had also driven through other crossings in Vancouver protected by gates, bells, and traffic lights. She and her husband Mr. Lin testified that in China all railway crossings have automated warning devices and even a crossing guard.

[114] In addition, Ms. Huang said she observed half of the other vehicles not stopping before driving across Smith Crossing and some vehicles including farming trucks sitting on the tracks a couple of times. Her evidence on this point was corroborated by Mr. Lin. When he attended Smith Crossing on May 13, 2014, he saw, photographed and videotaped a vehicle hauling a trailer, clearly in breach of the 8 metre vehicle restriction, stopped at the second stop sign waiting to turn left onto Glover Road. The trailer not only straddled the tracks; its rear portion extended west beyond the First Stop Sign.

[115] Ms. Huang testified she could not see anything to the right as she approached the First Stop Sign, because the view was blocked by a “wall” of bushes. Her description is apt. Photographs taken shortly after the Collision show an overgrowth of blackberry bushes along the outside edge of the Britco berm, on Smith Crescent leading to the First Stop Sign and along the southern border of the CPR’s right of way on the west side of Smith Crossing. Britco’s berm and chain link fence were entirely obscured by blackberry bushes cascading over and growing through the fence well into the right of way.

[116] Ms. Huang also said she did not think that Smith Crossing could be a “real railway crossing”, because of the “unbelievable” layout or configuration, referring to the storage space between the railway tracks and the second stop sign at Glover Road as a “very dangerous distance”. She predicted her car would have been “blown away” if she had been stopped there as a train approached.

[117] Ms. Huang identified all of these circumstances, Smith Crossing’s similarity to the Arbutus Corridor crossing, her exposure to other, active crossings in Vancouver, the protections at railway crossings in China, the behaviour of other drivers at Smith Crossing, the dangerous storage space and the very obstructed sightline looking south, as contributing to her assumption there were no trains using the railway track.

[118] In cross examination Ms. Huang disagreed with the suggestion she had never stopped at the First Stop Sign, stating she *thought* she stopped there initially but after seeing “local people” drive through, she began to do the same. This testimony is inconsistent with evidence she gave at her examination for discovery. There Ms. Huang was asked to confirm that she had never stopped at the First Stop Sign before May 8, 2014, and responded: “Yeah it seems like I haven’t stopped because I thought that the – first stop sign was invalid.”

[119] In my view, the inconsistency about whether she ever stopped reflects an attempt to make sense of what happened rather than deliberately changing her account of how she navigated Smith Crossing before the Collision. As I have indicated, she has no memory of the Collision and the moments leading up to it, which she found extremely frustrating and demoralizing. She reported staying awake for six days after her discovery willing herself to remember, misperceiving it was simply a matter of trying hard enough. In general Ms. Huang was a reasonable and very sincere witness who readily acknowledged what she could not remember whether or not it aligned with her interest. At times, and largely in response to questions related to the issue of liability, she did conflate what she recalled with what she would have done based on what she typically did or considered logical. This

tendency to conflate was well exposed during cross examination. My findings of fact about the Collision, however, have been made bearing this in mind.

[120] In addition to never seeing a train on the railway tracks as she drove to and from work each day, Ms. Huang said she never heard one while she was working at Britco although trains travelled through Smith Crossing multiple times a day, sounding their horns or whistles. Other witnesses from Britco testified to hearing trains from inside the main office building, as well as actually feeling their approach from the yard. Some of those witnesses had offices with outside windows. Ms. Huang had an interior office space. Raymond Lu, another project scheduler, who worked next to Ms. Huang, described the sound of the trains as hard not to notice.

[121] I have no doubt that Ms. Huang was highly focused on her work in the days leading up to the Collision. Initially interviewed in January 2014, Ms. Huang was very happy about being hired for what she viewed as an ideal job. She spent most of her time at her desk on the computer developing schedules for two projects. Wanting to establish herself as quickly as possible, she worked through lunch.

[122] When RCMP Constable Schupp spoke to her at VGH on May 22, 2014, Ms. Huang said she did not hear the train coming before the Collision. She testified she could not remember whether or not she heard it which I accept.

[123] Ms. Huang also testified that although her practice had been not to stop at the First Stop Sign, she drove very slowly as she approached Smith Crossing because it was a short distance from the Britco driveway and the second stop sign at Glover Road was so close to the tracks. Concerned about preserving the brakes on her car, Ms. Huang said she tried to avoid braking too hard. She also described a “speed bump” on the tracks themselves that caused her to drive very, very slowly after the First Stop Sign, and rolling to a stop at the second stop sign.

[124] She indicated that on previous days she looked left but not right as she approached the First Stop Sign. She looked right after reaching the First Stop Sign,

because of the overgrowth of bushes. Ms. Huang acknowledged, however, that she was looking for traffic on Glover Road, not trains.

[125] I note there is no dispute Ms. Huang's vehicle, which she purchased second-hand from a friend, was in good mechanical condition at the time of the Collision.

[126] Ms. Huang remembered working until about 5:00 p.m. that day. It was raining when she left. She seemed to recall running to her car but not where it was parked. She remembered "fog" inside the car disappearing quickly and turning on the fan but not its setting. Ms. Huang indicated, however, if there was condensation, her habit was to turn the fan to maximum and leave it there. She could not recall whether music was playing but said she typically listened to classical music while driving.

[127] Ms. Huang has no further recollections until after the Collision.

10. Collision

[128] Britco's security camera footage shows Ms. Huang's Mercedes backing out of a parking spot and driving toward the exit at 17:08:25. The vehicle appears to slow but not stop at the edge of the driveway. Ms. Huang acknowledged she may not have stopped before turning right onto Smith Crescent, explaining there was a good sightline of any oncoming eastbound traffic and no stop sign.

[129] The CNR train involved in the Collision included a lead locomotive, a second locomotive and 49 cars including 127 "bodies". It was just over 8,000 feet long and weighed 8,915 tonnes. The train was equipped with a bell and a whistle, often called a horn, as well as headlights. The train crew included the locomotive engineer Jeffrey Wormsbecker and the conductor Joseph Lachance.

[130] The evidence of Mr. Wormsbecker, Mr. Lachance and two independent witnesses, Krista Dean and Clyde Barfett, confirms that Ms. Huang's vehicle was eastbound at Smith Crossing when it was struck by the train.

[131] Ms. Dean and Mr. Barfett were in separate vehicles travelling south along Glover Road, north of Smith Crescent, when the Collision occurred. Both were familiar, if not very familiar, with the area.

[132] Ms. Dean was in the front passenger seat of a car driven by her daughter. Describing traffic on Glover Road as heavy and the weather as cold and raining, Ms. Dean recalled the windows were up, the wipers and fan were on, and there was music playing or the radio was turned on. As the vehicle started to cross Smith Crescent, Ms. Dean remembered hearing a bang that sounded like a bomb and turning her head to the right toward the noise. Ms. Dean did not recall seeing Ms. Huang's vehicle before the Collision or the Collision itself but she described a car stopped "at that intersection" when she looked initially, which I infer was a reference to Smith Crossing. She said she did not hear the train before the impact but saw it coming.

[133] Mr. Barfett was driving his half-ton truck, with the windows part-way down because he had his dog with him. He said it was raining before, but not at the time of, the Collision. According to Mr. Barfett, there were no vehicles ahead of him as he drove southbound along Glover Road. He recalled hearing the train blow its horn for "72nd Street", an earlier crossing, before seeing it come towards him. Mr. Barfett wears hearing aids which he said make his hearing very acute.

[134] He testified that when his truck was about 300 to 400 feet north of the Smith Crescent intersection he caught a glimpse of a car driving eastbound on Smith Crescent. He described hearing one "quick blast" from the train when he was about 100 feet from the intersection, which hurt his ears. He saw the train hit the passenger door of the car, sending it "flying off" north into the ditch. Mr. Barfett readily acknowledged he could not judge the speed of the car because he was watching it and the train as well as concentrating on his driving all at the same time. He estimated however the car came up to the stop sign about three seconds before the impact without making a complete stop. He also described the car as driving fairly slowly and slowing down quite a bit for the First Stop Sign. In cross

examination, he agreed he could not say whether the car had stopped on the tracks before it was hit because the Collision happened so quickly. He did recall the train impacting “just to the front of the vehicle”. When referred to photographs of Smith Crossing looking south, Mr. Barfett estimated the train was about halfway between the first and second hydro poles located on the eastern side of the tracks as the car travelled across the stop line.

[135] Mr. Barfett also recalled seeing overgrown blackberry bushes at Smith Crossing that day and previously when crossing Smith Crossing himself. He noticed they were “cleaned up” after the Collision.

[136] Before the Collision, Mr. Wormsbecker had been operating trains travelling through the PSD about once per week or every two weeks where the maximum speed is 35 mph. He indicated CNR expected its trains to travel as close to the maximum speed as possible. As the engineer, he was responsible for using the horn and the bell, maintaining the speed of the train, as well as slowing and stopping it. Mr. Lachance’s duties included calling for signals, being on the lookout for danger, contacting the RTC when necessary, and monitoring the speed of the train.

[137] He and Mr. Lachance both testified Ms. Huang’s vehicle stopped on the tracks after driving through the First Stop Sign without stopping as the train approached Smith Crossing. The evidence of Mr. Lachance on this point was as follows:

- Q. Okay. Can you describe for the Court what happens as the train approaches Smith- Smith Crescent?
- A. As we approached Smith Crescent with the whistle blowing and the bell on, I noticed a car go through a stop sign and stop directly in front of us on the track.
- Q. All right. And what do you see the car do from the moment you see it?
- A. I see the car not make a stop at the stop sign, and then come to an abrupt stop on the tracks.

[138] He also testified the traffic on Glover Road was heavy but there were no cars stopped on the south side of Smith Crossing so he could not understand why

Ms. Huang did not pull up to the second stop sign. He was not aware her car would have been foul of the tracks had she done so without pulling ahead of the stop line.

[139] In cross examination, Mr. Lachance agreed the car came to a complete stop on the tracks about two seconds before impact. Mr. Wormsbecker described the car as at a complete “dead” stop when the Collision occurred but he was unsure how much time passed between it stopping and impact, stating, “I guess it was a few seconds.”

[140] Mr. Wormsbecker remembered first seeing the car about 5 feet before the stop sign, or approximately 10 feet from the tracks, describing its speed as “regular” and the stop as “normal”. He recalled applying the emergency brake “probably” a second or less before impact. Mr. Lachance estimated two or three seconds. He and Mr. Wormsbecker’s observations of the actual Collision were slightly different which is not surprising given their roles and their locations inside the locomotive.

Mr. Lachance said the train hit the car on the passenger side closer to the front whereas Mr. Wormsbecker indicated the car was straddling the tracks a little bit more at impact, meaning it was located a little bit further east. He also said that when the Collision occurred, the car started to move to the left but then he lost sight of it. Mr. Lachance, who was on the left-hand side of the locomotive, said he saw it fly into the ditch.

[141] According to both men, the train stopped about a quarter of a mile from Smith Crossing. Mr. Wormsbecker described it coming to rest at the next crossing.

Mr. Lachance said they did not make it quite that far. As the train was slowing to a stop, Mr. Lachance called the rail traffic controller. He reported the Collision and asked for an ambulance and police. Mr. Wormsbecker said he heard the call but he and Mr. Lachance never discussed the Collision, nor did he see Mr. Lachance’s statement to the police. Once the train stopped, Mr. Wormsbecker remained in the locomotive. Mr. Lachance walked back to Smith Crossing to “cut” the train, allowing emergency vehicles to get through. He explained cutting the train involves tying it down with hand brakes to prevent the cars from moving.

[142] Mr. Lachance and Mr. Wormsbecker were cross examined on the issue of sightlines. Mr. Wormsbecker agreed he probably had about 100 to 200 feet of sightline at Smith Crossing on the day of the Collision. Although he and Mr. Lachance confirmed they were required to report any conditions they observed that may affect the safe operation of the train, they were not concerned by the vegetation, if they noticed it at all. Mr. Wormsbecker said he had never been trained to look for potential problems with sightlines and he was not aware of the G4-A or other sightline guidelines. Similarly, although Mr. Lachance testified he would report a sightline problem to a superior and the RTC rail traffic controller, he also had not received any training about how to identify one.

11. Sightlines on the Day of the Collision

[143] Constable Sanford of the CP Railway Police (“CPRP”) attended the Collision scene at about 7:45 p.m. He took photographs of the approach to Smith Crossing and the eastbound sightline which he observed but did not measure. In his report Constable Sanford wrote: “There is no sightline possible in a southern direction due to the growth of blackberry bushes along the fence line on the west side of the right-of-way. The driver must proceed to within about a metre of the rail in order to see down the track.” The circumstances depicted in his photographs are entirely consistent with his observations. One taken facing south from the driver’s seat of his police vehicle, with its front end stopped at the stop line for the First Stop Sign and the passenger window down, shows a very significantly impaired sightline. The tracks and the space above are not visible beyond the half-way point between the first hydro poles on the southeast side and southwest sides of Smith Crossing.

[144] Constable Sanford provided his report and photographs to his inspector but he had no contact with the CPR staff.

[145] The next day, at the direction of John Cummings, the CPR’s Division Manager, Wilson Wong, a “technical specialist” with the engineering department and a co-worker, attended Smith Crossing to measure the sightlines. Mr. Wong remained in the pick-up truck with the front of the truck stopped first, at the First Stop Sign and

then, 8 metres or 26 feet, from the middle of the track. The first sightline measurement was 247 feet looking south. The second, from 8 metres, was 97 feet. Mr. Wong explained the measurements corresponded with the point at which his co-worker, who was on the railway track with a measuring wheel, disappeared from view. Mr. Wong also calculated the distance from the middle of the track to the front of the truck parked at the First Stop Sign and the stop line as 19 feet and 21 feet respectively. He testified to being familiar with the SPC-29 to a certain degree. At first he indicated he had completed a course but clarified he had not attended specific training about how to measure sightlines and had learned from experience over the years.

[146] Mr. Wong recorded his sightlines measurements in a standard form included in the SPC-29 called “12.0 Crossing Inspection Report”. He also completed a diagram of Smith Crossing that included other measurements, noting for example the distance of 142 feet between hydro poles, and took photographs of the vehicle and the sightlines from the two measuring distances. His photograph of the 97 foot sightline shows an overgrowth of blackberry bushes on the right of way.

[147] Mr. Soliman agreed the CPR’s SPC-29 required a full investigation whenever a collision occurred at a crossing to determine if the required sightlines were in place. Identifying Mr. Cummings as his predecessor, Mr. Soliman referred to Mr. Wong’s attendance at Smith Crossing as part of the investigation although he also testified there was no investigation as far as his office was concerned. Nor is there any evidence to suggest additional investigative steps were ever taken. He said he was not able to reach any conclusions based on Mr. Wong’s sightline measurements because he could not make sense of the numbers. Mr. Soliman also described being “thrown” by the photos taken from inside the truck because in his view the guidelines require sightlines to be measured while standing 8 metres from the track in the middle of the lane. For this reason, in cross examination he would not agree the sightlines were as measured by Mr. Wong or depicted in his photos, although he agreed 97 feet of sightline was well short of what the G4-A and the SPC-29 required at Smith Crossing. When asked to assume the 97 feet of sightline

shown in one photograph had been correctly measured, Mr. Soliman still would not concede the sightline was obviously deficient. He acknowledged he never tried to speak to Mr. Wong about his findings, and was not aware if Mr. Cummings had done so.

[148] Mr. Tome gave similar evidence regarding the sightline depicted in the photograph taken by Mr. Wong:

- Q. now, based on your knowledge of the SPC-29 or the G4-A –
- A. I'm not familiar with the G4-A.
- Q. So with the SPC-29, assuming you're facing a stop sign and the train is travelling at 35 miles an hour, even just doing an eyeball assessment, which is what you did in your day-to-day practice, would you agree that this would not be compliant, not even close?
- A. That if they were stopped at the stop sign you would see the train. Because the train is very big and you would hear the whistles.
- Q. Well, sir, if I were to tell you that this is taken from 8 metres away from the centre of the track, which is the SPC-29 guideline, what would you say about that sightline that we're looking at?
- A. It would be due for a cutting. But I still say if you are stopped at a stop sign you would see the train. And I wouldn't panic about it, in my training that I've had over the years. You stop at the stop sign, you would see the train and you would hear the train.
- Q. Sir, if you had a 247 –foot sightline from the stop sign you agree with me that would not be even close to compliant with the SPC-29; correct?
- A. I can't visualize that.
- ...

[149] Contained within the records of Mr. Kalivoda and Asplundh was an email sent from the CPRP to Mr. Tome and Mr. Ducharme dated May 9, 2014 that reads in part:

...Vic, as per our discussion, here are the photos of the sight lines at Smith Crescent crossing. Photo three shows our concern ... Our concern is that the driver of the vehicle may not have had a clear view of the train approaching from the south. Can you look at this and improve those sight lines as necessary ... Please let me know what you find when you can.

[150] The documents indicate Mr. Tome forwarded the email to Mr. Kalivoda about four minutes later and wrote: "Mike ... please comment Is this the crossing that you mentioned that black berries were not cut account (sic) private property?"

Mr. Tome and Mr. Kalivoda gave no evidence about the email or their email exchange. Although Mr. Tome also worked for Mr. Cummings, he was not aware Mr. Wong was asked to measure the sightlines at Smith Crossing the day after the Collision, nor his findings.

[151] Mr. Kalivoda testified Mr. Tome contacted him on May 11, 2014 about Smith Crossing needing to be cut urgently and instructing him to approach Britco about cutting back the blackberry bushes on the berm or moving the berm back.

Mr. Kalivoda cut the blackberry bushes to the outside of Britco's fence that same day and said he spoke to Tom Matkin, the operations manager for Britco Leasing, the next day. Later, in cross examination, he described Mr. Matkin as reluctant to allow him access to the berm because the bushes provided security from break-ins.

[152] Mr. Kalivoda appeared to change his evidence regarding the timing and scope of his discussion with Mr. Matkin. During cross examination he said he spoke to Mr. Matkin about cutting the blackberry bushes on Britco's property to improve sightlines, before the Collision in March or April 2014, which I firmly reject. In December 2016, Mr. Kalivoda left Asplundh to establish his own business. Almost all, 90% of his current business, is with the CPR, an influence I cannot ignore. More importantly, his initial testimony is consistent with the evidence of all of the other witnesses regarding the timing of the CPR's requests to Britco. That timing aligns entirely with the evidence demonstrating the CPR had not identified any issue with sightlines at Smith Crossing prior to the Collision.

[153] Mr. Kalivoda also testified that he told Mr. Tome about his discussion with Mr. Matkin. Mr. Tome and Mr. Ducharme said they spoke with Britco after the Collision. According to Mr. Tome the discussion was about cutting back the blackberry bushes. According to Mr. Ducharme they also talked about pushing back the berm.

[154] Mr. Matkin gave evidence that any requests to do vegetation or other work on the berm would have come to him, because he was in charge of Britco's yard. He made it clear he would have, and did, relay requests to the owners of the property, Richard McClymont and David Taft, because he himself had no authority to make decisions. Mr. Matkin denied speaking to Mr. Kalivoda and was not aware of any requests from the CPR or a contractor before the Collision. Consistent with Mr. Kalivoda's direct testimony, Mr. Matkin did recall that a couple of days after the Collision, "Asplundh" came to the yard to talk about "doing something with the berm" and wanting to bulldoze it right down to the ground. He referred "them" to the owners.

[155] Similarly, Mr. McClymont testified that he heard nothing from Mr. Matkin until after the Collision about the CPR wanting to cut back the blackberry bushes to the fence line which he knew did not require his permission. While there is no other indication Britco was approached about the initial cutback to the fence line, Mr. McClymont recalled Mr. Matkin approached him again later about a request to cut back the blackberry bushes on the berm which he refused because of the security they provided. After a third or fourth conversation with Mr. Matkin and "the fellow from Asplundh", Mr. McClymont agreed they could come onto the property with a small grader and remove the bushes from the top of the berm, as long as they did not damage the berm. Mr. McClymont also recalled refusing a request to cut into the berm and move it further west, away from the railway tracks.

[156] Jeff Gordon replaced Mr. Spata starting April 21, 2014. He testified that he did not ask Asplundh to do any work at Smith Crossing before the Collision. In July 2014, he arranged for vegetation management on Britco's berm but had no communication with Britco himself. Mr. Gordon said he did not direct Mr. Kalivoda to speak to Britco until later in the summer. It was Mr. Kalivoda who applied a herbicide to the blackberries on the berm on July 29, 2014 at a time when Mr. Spata had indicated its use was prohibited.

12. Sightlines after the Collision

[157] There is no evidence of sightline measurement or evaluations at Smith Crossing after Mr. Kalivoda cut the blackberry bushes back to the fence line on May 11, 2014, or after they had been cut back on the berm and the herbicide applied in late July 2014, although some photographs depict those circumstances.

[158] Anna Coady, a railway works engineer with TC, inspected Smith Crossing on October 28, 2014. Rather than measure the sightlines, she made observations about whether or not the distance required under the guidelines appeared to be available. Her recollection was limited. The results of her inspection were recorded however in an electronic form, which states the sightlines in all four quadrants were 600 feet, assessed at seven and 8 metres from the track.

[159] Ms. Coady said she used 7 metres because it approximates the distance from the track to a driver stopped at the First Stop Sign. Relying on the G4-A as a reference when conducting inspections, she interpreted the two dashes under the minimum column for the stopped position as referring to site specific circumstances such as a stop sign, hence the 7 metre distance. Although she agreed in direct examination she had the discretion to allow a stop sign to cure sightline deficiencies, given her other testimony, I did not understand her to be suggesting a stop sign may be viewed as a substitute for adequate sightlines.

13. The Slow Order

[160] Both the G4-A and the SPC-29 required the speed of vehicles or trains to be reduced if a minimum sightline could not be established.

[161] Railways have the power to reduce the maximum speed on their tracks by imposing temporary or permanent slow orders. The process is simple. According to Mr. Soliman it involves a phone call to the rail traffic controller advising of the speed reduction and its location, completing a form, and placing flags on the railway tracks. Mr. Tome explained yellow flags are placed 3,000 feet before the beginning of the slow order area and green flags at the end of the area.

[162] Although the details are unclear and the CPR kept no records about a slow order at Smith Crossing, I accept that in response to the Collision, a CPR employee implemented a temporary slow order that required trains using the PSD to slow their speed before Smith Crossing.

[163] Mr. Soliman testified the CPR had not imposed a slow order there before the Collision. Photographs taken by Mr. Lin when he attended Smith Crossing on May 13, 2014 show a green flag on the north side of Smith Crossing indicating the end of a slow order area. Mr. Sehra said he was aware of a slow order at Smith Crossing after the Collision, because of the presence of the green flag. Mr. Tome said he was “pretty sure” either he or Mr. Ducharme instituted the slow order. Mr. Ducharme denied doing so or knowing who did. Despite indicating that he had no concerns about the sightlines at Smith Crossing, Mr. Tome agreed a sightline issue was the only reason to implement the slow order because the track condition was fine. Mr. Soliman also agreed that a sightline issue was the most likely explanation. Mr. Tome could not remember the speed to which trains were required to slow. His impression was the slow order was no longer in place by the time he retired in September 2014.

[164] It is apparent there is an economic incentive for railways to ensure their trains travel at the maximum allowable speed. Mr. Wormsbecker testified the CNR expected its train to stay as close as possible to the posted speed to meet efficiency goals.

[165] Mr. Younger refused to agree that placing a slow order was the only option under the G4-A or the SPC-29 if an adequate sightline could not be achieved and it was impractical to install automated warning devices. He expressed the view that closing a crossing would be an easier option, suggesting the ramifications of a slow order are significant given the additional time which affects the overall system. Assuming a reduction in speed from 35 to 20 mph for the whole of the PSD (seven miles) the additional time is about seven minutes per train. Mr. Younger also

indicated that at the CPR, those responsible for imposing slow orders “got heat” from senior managers.

14. Collision Scene

[166] Witnesses who attended the scene after the Collision said little about their observations. Photographs are therefore the primary source of evidence.

[167] Some of those photographs show Ms. Huang’s vehicle facing north in a narrow ditch located on the northwest side of Smith Crossing. The vehicle is resting at an angle with the passenger side at the bottom of the ditch, leaning against its eastern bank.

[168] Photographs also show gravel and or rock shoulders on the northwest side of the railway track east of the ditch. A portion of a wood border that runs between the top of the eastern bank and the shoulder is missing above the vehicle. The eastern slope of the ditch appears to be a mixture of dirt or mud and grassy vegetation. The western slope is covered in vegetation.

[169] There is no evidence of the measurements I understand RCMP officers took at the scene including the rest position of the vehicle relative to Smith Crossing. Apparently, the rest location of the locomotive was never documented.

[170] The report of Kurt Ising, a professional engineer with a Master of Applied Science retained by Ms. Huang, sets out his direct observations of her vehicle after the Collision. His report, along with photographs of the vehicle at the scene and after it was removed, establish there was very severe damage to the front and passenger or right side of the vehicle. Both bumpers are gone. The whole of the front windshield is smashed. The upper right portion is pulled away from its frame. Inside the vehicle the roof appears to be touching the driver’s head rest. The right front on the passenger door is severely deformed. There is a sharp vertical crease in the right front fender above the front wheel centreline and another down the centre of the front door.

[171] A data recorder located on the lead locomotive recorded the train's speed to the nearest mile per hour, distance to the nearest 0.01 mile, throttle position, application of the emergency brake, and use of the horn and the bell.

[172] William Barber, a senior manager with Engine Service Operations at the CNR, prepared an expert report dated December 22, 2016 regarding the download data. His report indicates a train speed of 35 mph was last recorded about 53 seconds before the emergency brake was applied.

15. Opinion Evidence Regarding Liability

[173] Ms. Huang and the defendants rely upon conflicting expert opinion evidence regarding the circumstances that led to the Collision. In addition to Mr. Ising, whose report dated December 15, 2016 focused on the available sightline and some of the human factors for Ms. Huang and the train crew, Ms. Huang also retained Dr. Matthew Yanko, a human factors expert. His report dated December 22, 2016 considered Ms. Huang's belief Smith Crossing was inactive and human factors related to train detection and the perception response time of drivers. He also relied upon the expert opinion evidence of Douglas Kennedy, a professional engineer with a bachelor degree in mechanical engineering and expertise in the field of acoustical consulting, regarding the audibility of the train horn. The defendants' liability experts included Dr. Potma, also a professional engineer with a Ph.D in mechanical engineering, and Dr. Farheen Khan, who holds a Ph.D in industrial and systems engineering. Dr. Potma's report dated December 29, 2016 includes an accident reconstruction, and some analysis of the sightlines available to Ms. Huang. Dr. Khan provided opinion evidence regarding the audibility of the train horn largely from a human factors perspective.

[174] Dr. Yanko opined that perception response time involves four stages: the presence of a detectable stimulus, detection by the brain, deciding on a response, and executing that response. He testified the most intuitive response for a driver who detects any unexpected hazard is to hit the brakes, even when the correct response would be to swerve. Mr. Ising and Dr. Potma agreed. Dr. Yanko also expressed the

opinion the similarities between the Arbutus Corridor and Smith Crossing could cause a driver in Ms. Huang's circumstances to dismiss the 'controlled' processing involved in detecting a stop sign and to rely on a more automatic processing.

[175] Both Mr. Ising and Dr. Potma examined Smith Crossing, and reviewed largely the same materials including photographs of the scene and the vehicle, video recordings, the train's download data, and a range of documents including transcripts of discovery evidence. Only Dr. Potma received and relied upon the train diary. Only Mr. Ising examined the vehicle and the lead locomotive in person. Both Mr. Ising and Dr. Potma conducted and relied upon simulations in forming their opinions, which included reconstructions of the vegetation that interfered with the southbound sightline on the day of the Collision. Dr. Potma also relied upon computer-generated simulations to determine the trajectory and speed of the car before coming to rest in the ditch, after the Collision.

[176] Dr. Potma's report, unlike Mr. Ising's, does not include, as it should, a list of the factual assumptions that form the bases for her opinions. It is clear from the defendants' retainer letter and her testimony that she was not instructed to make assumptions. Instead she was permitted if not encouraged to investigate the facts. Consequently, some of Dr. Potma's opinions rest on her own findings based on her own view of circumstances that I am not able to accept and were not established by other evidence. For example, she relies on photographs some, but not all, of which are in evidence to find there were fresh gouges in the wood at Smith Crossing caused by Ms. Huang's vehicle during the Collision, which I cannot see, to determine the impact location. Similarly, she relies on photographs to find deposits of glass at the top of the eastern side of the ditch, which again I cannot see, to draw conclusions about the vehicle's post-Collision dynamics and pathway to its rest position. Witnesses including the police officers who attended the scene and took some of the photographs were not asked about any of these particulars.

[177] Mr. Ising and Dr. Potma also prepared responding reports dated February 2, 2017 and February 8, 2017, respectively. In those reports and their testimony, they are critical of one another's findings, methodologies, analysis, and conclusions.

[178] In summary, Mr. Ising concluded:

Ms. Huang's vehicle had likely been stopped partially across the track for about 2 to 3 seconds prior to impact;

The train operator likely had a sightline of Ms. Huang's vehicle for about 4.5 to 5.4 seconds prior to impact. At that moment the vehicle was just before the first stop line and likely travelling about 21 to 22 kph and slowing.

The train's bell had been on for about 79 to 80 seconds prior to impact and the whistle was sounded about 6 to 7 seconds before impact.

Ms. Huang's vehicle would not have been visible when the train engineer first sounded the whistle.

There was a likely sightline between Ms. Huang and the locomotive for about 4.2 to 5.2 seconds prior to impact. When it appeared, the train was about 85 to 86 degrees to Ms. Huang's right. It is unlikely Ms. Huang would have perceived its presence unless she glanced in that direction.

At the moment Ms. Huang had a sightline of the train, her vehicle was likely travelling about 20 kph and slowing and the train was about 65 to 82 meters away (213 to 269 feet).

Ms. Huang's view of the approaching train was limited by the overgrown vegetation, and the dirt berm around the Britco Property.

Drivers approaching Glover Road with the intention of turning right need to scan southbound traffic for a suitable gap. This scan takes their attention away from a train approaching from the right and increases the angle to any train approaching from the right.

In order to stop before entering the train's path, Ms. Huang needed to start braking harder within 0.4 seconds of her available sightline to the train, which is too short a time to achieve.

Research shows that flashing lights and gates are more effective at reducing grade crossing accidents than stop signs.

[179] In contrast, Dr. Potma's conclusions included the following:

At impact the front of Ms. Huang's vehicle was completely within the tracks and had not passed the eastern rail.

The train was travelling approximately 36 mph prior to impact.

The emergency brake was applied within approximately +/- 0.005 miles of the point of impact.

Collision simulations indicate Ms. Huang's vehicle was moving at impact consistent with physical evidence and Ms. Huang's testimony regarding her normal practice.

The engine data indicates her vehicle entered onto the track after the final whistle started, but does not allow the precise timing of the collision to be established.

Ms. Huang failed to stop, as required, at the stop sign on Smith Crescent and entered into the path of the CN train, causing the collision.

There was sufficient visibility from the west side of the crossing for a reasonable driver to assess whether the path was clear and to proceed safely across the track.

The collision could have been avoided had Ms. Huang stopped at the stop sign in advance of the crossing and proceeded across when the path was clear.

[180] Underlying their opinions is some common ground:

- The train data did not establish when or where the impact occurred.
- The speed of Ms. Huang's vehicle as she drove along Smith Crescent could not be precisely determined.
- The sharp vertical creases above the front wheel and the front door on the passenger side of her vehicle were caused by the pilot that protrudes from the front of the locomotive during impact.
- The impact caused Ms. Huang's vehicle to rotate counter clockwise. As a result of the impact and the typography, including significantly, the ditch, the vehicle rotated and rolled or flipped before coming to rest facing north at the bottom of the ditch.

[181] Both experts also assumed Ms. Huang did not detect the train before the Collision.

[182] In his first report and his testimony, Mr. Ising made the important point that reconstructing the Collision was necessarily imprecise, given the limits of the available evidence and some of the circumstances. For example, there is no data

regarding Ms. Huang's vehicle speed as she drove along Smith Crescent and there is no reason to assume the time stamp shown on Britco's surveillance video is synchronized to the time stamp in the train data. Further, the train speed of 35 mph included in the train data is not precisely accurate because its speed is recorded to the nearest mph. As I have indicated, the same is true for distance and time, which are recorded to the nearest 0.01 mile and second. In addition to the train data being somewhat coarse, the train's rest position was not measured or documented. Without any data about the time or location of the impact, the data did not provide a basis for determining precisely how much time passed between impact and when the train stopped.

[183] Mr. Ising and Dr. Potma disagreed most significantly about the available sightlines and whether Ms. Huang's vehicle was stopped or moving when the impact occurred.

a) Sightline Calculations

[184] Mr. Ising and Dr. Potma used different techniques to simulate the vegetation at Smith Crossing on the day of the Collision to determine the sightlines available to Ms. Huang. Each was critical of the other's reconstruction. I am satisfied that Mr. Ising's methodology produced a more accurate depiction, although Dr. Potma described herself as having a lot of experience with photo reconstruction. Mr. Ising attended the Collision location with a 3-D scanner which he used to scan the environment from the Britco driveway to Smith Crossing and then along the railway, documenting the fixed geometry such as hydro poles, the power lines, the Britco sign, the First Stop Sign, the markings on the roadway and the vegetation at that time. He then inserted photographs taken shortly after the Collision into the background of the three dimensional virtual environment and aligned all the fixed points allowing him to determine precisely where the photographs were taken from and how much further the vegetation extended on the day of the Collision.

[185] Based on his re-creation of the vegetation in the virtual environment, just as Mr. Wong had, Mr. Ising determined Ms. Huang had an available southbound

sightline at 97 feet or roughly 30 metres, when the front of her vehicle was 8 metres from the centre of the tracks. Measured from the western or near rail, the sightline was about 27 metres. At that distance, a train travelling at 35 mph would be 1.7 seconds away. With Ms. Huang herself positioned 8 metres from the near rail and the front of her vehicle therefore 5.7 metres away, almost at the stop line, Mr. Ising determined the sightline was 54 metres. At that distance, a train travelling at 35 mph would be 3.5 seconds away.

[186] In his first report, Mr. Ising assessed the available sightline based on the requirements of the G4-A, the RTD-10 and the SPC-29, as well as the BC TAC supplement, and determined the extent to which it did not comply with each of these standards. He interpreted the G4-A as requiring the use of a maximum train speed of 40 mph and an H distance of 8 metres from the track centreline to the front of the stopped vehicle and therefore a minimum sightline of 600 feet or 182 metres.

[187] Noting the SPC-29 also required a 600 foot sightline but at the track level, measured from the same distance at 1.1 metres above the road, Mr. Ising positioned a camera in the virtual environment at that distance and height and calculated the available sightline with a view of the track at 23 metres or 75 feet.

[188] Using the table method, and the requirement that sightlines be assessed from the driver's eye position with the front of the vehicle at the marked stop position and the driver able to see 1.2 metres above the track, Mr. Ising determined the minimum sightline under the RTD-10 was 180 metres.

[189] Based on her simulation of the vegetation, assessed from inside a sedan stopped at the stop line or 5 metres away, Dr. Potma determined the available southbound sightline to be approximately 150 metres, which she concluded was sufficient for a vehicle to proceed safely across the tracks if no train was visible. Photographs in her first report depict the sedan stopped at the stop line and pulled ahead of the stop line, as well as the re-created sightlines from both of those positions. Significantly, the photograph taken from inside the car at the stop line

depicts a much better sightline than Constable Sandford's photograph from approximately the same position. Dr. Potma did not assess the sightlines available at 8 metres from the centre of the track or the near rail.

[190] In her reply report, Dr. Potma concluded the minimum sightline required under the G4-A was 160 metres from a position slightly ahead of the stop line, by interpreting the absence of a minimum distance for stopped vehicles as allowing for an H distance of 5 metres or less, and interpolating between the T distances of 136 and 182 metres (450 and 600 feet) for maximum train speeds of 30 to 40 mph.

[191] Dr. Potma did not assess the available sightline under the CPR's own SPC-29. Apparently conflating what she called the "stop distance" with the measuring distance for vehicles, she testified it was not clear to her how the standard should be applied, or if it even did apply to Smith Crossing, given the stop line was 5 and not 8 metres away. She also indicated however that she generally agreed with Mr. Ising that the sightline condition at 8 metres from the tracks would not have complied with the SPC-29.

[192] Applying the RTD-10, using a departure time (time required for a vehicle to clear the tracks) of eight seconds, she concluded the required sightline measured at 5 metres from the track was 126 metres, based on the equation method. In cross examination she agreed the RTD-10 contemplated a driver picking up a sightline well before they actually stopped at the stop line. She also acknowledged Mr. Ising's sightline of 180 metres was correct, based on the table method under the RTD-10 which includes a departure time of up to 10 seconds for stopped vehicles, consistent with the G4-A.

b) Was Ms. Huang's Vehicle Stopped or Moving?

[193] Although Mr. Ising assumed Ms. Huang's vehicle was stopped at impact, he testified that he would not have made the assumption if it was inconsistent with his analysis.

[194] His conclusion that she was at a stop for two to three seconds before impact is based largely upon Mr. Wormsbecker's discovery evidence and the time stamp of 17:09:20 in the train data for the emergency brake application. Consistent with his testimony at trial, Mr. Wormsbecker described braking "just right before impact" at his discovery. When asked how long Ms. Huang's vehicle had been stopped, he said he was "not sure exactly" and "maybe a few seconds". Based on this evidence and the timing of the emergency brake application, Mr. Ising considered two scenarios. The first involves the impact occurring two seconds after Mr. Wormsbecker applied the emergency brake and three seconds after Ms. Huang stopped on the tracks (17:09:22). In the second scenario, the impact occurs one second after the emergency brake application and two seconds after Ms. Huang stopped on the tracks (17:09:21).

[195] Mr. Ising also assumed Ms. Huang's vehicle reached 50 kph as she drove along Smith Crescent, before slowing in preparation for stopping at the second stop sign, although he said the top speed was not relevant to his analysis. In addition he assumed Ms. Huang simply chose to stop on the tracks, and that her vehicle slowed at 0.2g, a typical braking deceleration on approach to a stop sign. His report indicated the maximum braking rate on a wet road is approximately 0.58g but the uphill grade of about 5% before the track meant the available braking would be slightly higher.

[196] Mr. Ising identified the distinctive, vertical creases on the passenger side of Ms. Huang's vehicle left by the front of the locomotive as consistent with the vehicle being stopped or moving very slowly at the moment of impact, because the markings were very sharp and there was no smearing or peeling of the metal to indicate movement. In contrast, Dr. Potma testified the creases were consistent with the vehicle moving at 20 kph. She concluded the first point of contact during impact was between the vehicle's front fender and the square-shaped coupler that protruded six inches beyond the front of the locomotive. As the train and the vehicle moved into one another, the first vertical imprint above the right front tire was made and then as the train and vehicle started to disengage and the vehicle began to rotate counter-

clockwise, the second crease occurred. It is not clear, however, how the creases and these initial dynamics would suggest the vehicle was moving as opposed to being stopped.

[197] Based on the two scenarios and his simulations, Mr. Ising determined the train was about 80 and 90 metres (262 and 295 feet) away when Ms. Huang was near the stop line (5 metres and 8 metres away respectively), and therefore not within the available sightlines.

[198] In his first report, Mr. Ising concluded that Ms. Huang was driving at 20 kph and slowing “at a normal rate” when she likely first had an available sightline of the train, which again, based on the two scenarios, was 4.2 to 5.2 seconds before impact. In order for Ms. Huang to stop without encroaching into the train’s path, under scenario one, she needed to start braking hard about 3.4 metres before the track centreline or 4.8 seconds before impact, but there was no sightline available until 5.2 seconds, leaving her 0.4 seconds to respond. The same amount of time was available to her under scenario two. She needed to start braking hard 3.8 seconds before impact but she only had a sightline at 4.2 seconds.

[199] In reaching their conclusions, Mr. Ising and Dr. Potma applied average perception reaction times and brake response times drawn from different research studies.

[200] Relying on a study involving hazards approaching laterally from a five degree angle in which 95% of subjects responded within 0.8 to 2.2 seconds, Mr. Ising wrote in his first report that Ms. Huang likely could have responded in 1.2 seconds if her foot was already on the brake pedal and she was looking to her right. He testified her response could have been as fast as 0.8 of a second.

[201] Dr. Potma opined that Mr. Ising’s original analysis supported the conclusion Ms. Huang was moving at impact, stating that based on a perception reaction time of one second (during which she would have travelled at least 5.3 metres), and a deceleration rate of 0.2g, Ms. Huang would have reached the point of impact before

initiating a brake response. She did not indicate whether she took into account the slight slope in the road up to Smith Crossing.

[202] In any event, Mr. Ising also testified that if Ms. Huang's vehicle was travelling at 20 kph or less, 8 metres from the track, with a sightline of the oncoming train, she would have had enough time to stop before encroaching on the track, assuming her foot was on the brake and she was looking to the right. He did not specify what braking response time he used in making that calculation, but the calculation itself was not challenged in cross examination, or by Dr. Potma in her evidence.

[203] In reaching her own conclusion that Ms. Huang's vehicle was moving at impact, Dr. Potma rejected the discovery evidence of both Mr. Lachance and Mr. Wormsbecker that it was stopped on the tracks. Her reply report states: "It should be cautioned that witness testimony, even in the case of multiple witnesses may be unreliable.... Collision reconstruction should always be based on physical evidence when available." The report also referenced a human factors study that examined the "misinformation effect" that arises when witnesses contaminate one another's evidence. Dr. Potma testified that witness testimony is viewed as the lowest form of evidence and is only used in collision reconstruction when physical evidence is not available.

[204] Although Dr. Potma identified several factors that prevented an accurate determination of the speed of Ms. Huang's vehicle at impact, she would estimate the speed at 20 kph "if I have to put a number on it". Assuming that Ms. Huang's intention was to stop at the second stop sign on Glover Road rather than on the tracks, and applying average deceleration rates for vehicles approaching a stop sign found by Wang et al. (2005), Dr. Potma also determined Ms. Huang's speed at impact was 17 kph.

[205] Dr. Potma relied upon computer simulations of the vehicle trajectories at various speeds in two not three dimensions. The program modelled the train as a moveable barrier. The model vehicle was also different from Ms. Huang's. Although

Dr. Potma said she modified the model to match its dimensions and specifications, Mr. Ising suggested the model vehicle remained shorter.

[206] Dr. Potma found the simulations that involved the model vehicle travelling at 24 kph best matched the departure trajectory to its rest position. When the vehicle was stopped, it rotated to face south, inconsistent with the rest position. The departure trajectory was near the southern edge of the ditch, where, she observed, there was no physical evidence of disturbance and away from the location of the glass deposits.

[207] Based upon a review of her first report and her simulations files, Mr. Ising was very critical of Dr. Potma's use of the program and her results to reach conclusions about the speed of the vehicle. He noted she modelled the impact area as a flat plane, despite the uneven topography, including for example the slope up to Smith Crossing from Smith Crescent, as well as the ditch. In cross examination Dr. Potma agreed she had not accounted for the loss of energy the vehicle was exposed to when it encountered the ditch.

[208] Describing the simulation results as creating an inaccurate depiction of the Collision scene, Mr. Ising indicated there was no other evidence that would allow for her conclusion about the speed of the vehicle at impact, including evidence about the vehicle's incoming momentum, which would have been negligible, given the overwhelming mass of the train.

[209] Based on her analysis of the train diary and photographs of the scene showing the number and location of the train car on the south side of Smith Crossing, after the train was broken or uncoupled, Dr. Potma concluded it came to rest 1,487 feet north of the impact location. Based on the train data showing the train travelled 0.28 plus or minus 0.005 miles after the emergency brake was applied, she concluded the application occurred within plus or minus 0.005 miles (plus or minus 8 metres) of the point of impact.

[210] Despite the absence of evidence about the speed of Ms. Huang's vehicle as she drove along Smith Crescent and her precise departure time, Dr. Potma estimated the vehicle was in "pre-impact motion" for 13 to 16 seconds. Relying upon Britco's surveillance video, she estimated Ms. Huang was driving 20 kph when she merged onto Smith Crescent. Dr. Potma opined the train was about half-way between the previous crossing and Smith Crescent as Ms. Huang began to accelerate. Determining the maximum attainable speed in the short distance between the driveway and Smith Crossing was 70 kph, much like Mr. Ising, Dr. Potma assumed Ms. Huang reached a speed of 50 to 55 kph before decelerating. Of course neither she nor Mr. Ising had the benefit of Ms. Huang's testimony at trial which was that she never drove that fast and in fact she drove very slowly as she approached Smith Crossing, and then very, very slowly over the crossing itself before coming to a stop at the second stop sign.

[211] Ultimately I am left with some concerns about Dr. Potma's opinion evidence regarding the circumstances of the Collision, partly because she imposed an overly precise analysis on imprecise evidence. Although she was critical of Mr. Ising's failure to engage in many of the usual aspects of a collision reconstruction, I found his approach more realistic given the limits of the available evidence. In addition to accepting his criticisms of Dr. Potma's simulation results which informed her conclusion about Ms. Huang's speed at the moment of impact, as I have already indicated, aspects of her opinion are undermined by her reliance on "physical evidence" that has not been proven.

16. Use of the Train Horn

[212] Consistent with the requirements under the Canadian Rail Operating Rules ("CROR"), Mr. Wormsbecker testified the train horn must be sounded either at the whistle post located one-quarter mile before each crossing, or at a distance that provides a 20 second warning, for train speeds of less than 45 mph. He also correctly identified the horn pattern or whistle signal required by the CROR prior to crossings as two longs, one short and one long. Use of the bell is not required when

the horn is being sounded. Mr. Wormsbecker indicated, however, it was his practice to sound the horn at the whistle post whenever a train is travelling over 20 mph. Given the short distance between the crossings adjacent to Glover Road, he said he started whistling the horn before the first crossing and then continued through the “first four” while also using the bell. Mr. Wormsbecker testified the horn was sounding and the bell was on as the train approached Smith Crossing which is located somewhat farther away, about one-half mile from the previous crossing. He estimated the horn remained on for nine seconds leading up to the Collision.

[213] Neither Mr. Lachance nor Mr. Wormsbecker were cross examined on his use of the horn including his compliance with the requisite horn sequence.

[214] Mr. Wormsbecker confirmed that prior to their trip, the horn was inspected to ensure it was working. He explained there is no testing to ensure the quality of the sound. He recalled, however, when he blew the horn just before Crush Crossing, people at a bus stop covered their ears and gave him “dirty looks”. Mr. Lachance said he had no concerns about the way the horn was operating that day, stating: “[E]verything seemed normal.”

[215] Although the CNR did not test the sound level produced by the horn after the Collision, its magnet valves and flutes, which must be replaced annually, had been replaced about six months prior to the Collision on November 18, 2013. The locomotive’s bell was repaired shortly before the Collision.

[216] Mr. Barber’s findings are consistent with Mr. Wormsbecker’s testimony regarding the sounding of the whistle and bell. At p. 4 of his report, Mr. Barber wrote:

A review of the event recorder download for the lead (controlling) locomotive CN 5790 shows that the whistle was in fact sounded (turned on and then off) a total of 12 times with the bell on continuously throughout the same period from 17:08:02 to 17:09:20 (the time of the emergency brake application and collision), over a period of 1 minute, 18 seconds travelling over approximately 4000 ft. (3/4 of a mile).

The last whistle sequence started at 17:09:15 and lasted for a period of 9 seconds including during the emergency application of the train brakes (17:09:20) ...

[217] He concluded Mr. Wormsbecker had complied with the CROR regarding whistle and bell requirements. Dr. Potma reached the same conclusion based on her own review of the data which included an examination of the sequence and precise timing of the whistle pattern prior to Worrell and Crush, as well as Smith Crescent. She found the whistle was sounded for approximately 23 seconds in advance of Crush, with the pattern being: 3 seconds on, 4 off, 3 on, 5 off, 2 on, 3 off, and 3 on (long, long, short, long). Approaching Smith Crossing, the whistle was sounded for approximately 21 seconds. The pattern was: 3 seconds on, 3 off, 4 on, 4 off, 1 on, 2 off, 9 on, during which time the impact occurred. Based on her opinion about the application of the emergency brake plus or minus 0.5 of a second from the moment of impact, Dr. Potma concluded the final sounding of the horn started approximately five seconds earlier, whereas Mr. Ising estimated the timing was six to seven seconds before impact, based on scenarios one and two. Dr. Potma also concluded Ms. Huang's vehicle was not yet visible during the first three soundings of the horn before Smith Crossing, and Ms. Huang's vehicle entered the tracks sometime during the five seconds before impact while the last horn blast was sounding.

17. Opinion Evidence Regarding Audibility of the Train Horn

[218] Douglas Kennedy and Dr. Farheen Khan provided conflicting expert opinion evidence regarding the audibility of the train horn prior to the Collision. Much like Mr. Ising and Dr. Potma, in addition to their first reports, Mr. Kennedy and Dr. Khan provided responding reports critical of one another. Just as Mr. Kennedy's assumptions about the timing and location of the vehicle and the train are derived from Mr. Ising's analysis, Dr. Khan's depend upon Dr. Potma's.

[219] Given the only allegation of negligence related to the use of the horn was the one second length of the short signal, after two long signals, during the approach to Smith Crossing, I have concluded Ms. Huang cannot prove this particular negligence claim. The standard of care requires reasonableness not perfection. In my view the regulatory standard is an important external indicator of reasonable conduct. Rule 14 of the CROR does not specify the length of time required for each sounding of the

horn or the gaps between, in relation to the long, long, short, long pattern but it is mandatory:

(ii) Engine whistle must be sounded as prescribed by this rule, and should be distinct, with intensity and duration proportionate to the distance the signal is to be conveyed. Unnecessary use of the whistle is prohibited.

[220] The evidence shows Mr. Wormsbecker complied. Suggesting a breach of the standard of care based on the difference between a short signal of one as opposed to two seconds attempts to impose a standard that is well beyond what would be expected of the ordinary, reasonable and prudent person in the same circumstances. In any event, although the speed of the train indicates a two second signal would have meant the horn was sounded about 50 feet closer to Smith Crossing, Mr. Kennedy and Dr. Khan only considered the audibility of the horn after that, during its last sounding.

[221] Accordingly, I have examined the opinion evidence of Mr. Kennedy and Dr. Khan with a view to determining the practical question: is it more probable than not that Ms. Huang heard the train horn when it sounded for the last time before the Collision.

[222] Ultimately, Dr. Khan's criticisms of Mr. Kennedy's sound recording technology and his methodology caused me to doubt the accuracy of his findings about the signal to noise ratio ("SNR"), audibility of the train horn, and the probability of it being detected by Ms. Huang before the Collision. His use of "research" also struck me as less than rigorous. At the same time, Dr. Khan's reports did not include the details of her sound level testing results and calculations, and on occasion, she displayed a surprising tendency to moralize about human factors.

[223] Fundamentally, their reports and testimony highlighted the complexity and uncertainty involved in trying to replicate the sound level available to Ms. Huang inside her vehicle as she approached Smith Crossing.

[224] Mr. Kennedy investigated the audibility of the train horn inside Ms. Huang's vehicle based upon Mr. Ising's scenarios one and two. Under scenario one, the horn was sounded for the last time seven seconds before impact when the train was estimated to be 109 metres (357.6 feet) away. Under scenario two, the horn was sounded six seconds before impact when the train was 94 metres away.

[225] Mr. Kennedy identified various factors that attenuate or "decay" sound over distance including the ground, sound reflections, and obstacles such as the dirt berm at Smith Crossing.

[226] According to Mr. Kennedy, the audibility of a sound is measured according to detection, recognition and alerting thresholds, which he acknowledged were not well defined. Based on research, he opined the recognition threshold ranges from three to nine decibels above the detection threshold. He suggested in order to be alerted to a sound or a "danger signal", it has to be nine or 10 decibels higher than the recognition threshold. His point was undermined by his use of similar terms – detectability, audibility and attention or attentiveness – somewhat interchangeably.

[227] Both Mr. Kennedy and Dr. Khan identified the SNR as an important measure of audibility, the signal here being the sound of the horn and the noise being the background noise within the vehicle. The SNR is the amount in decibels by which the signal is greater or less than the noise. There is no dispute that when the SNR is positive, the sound is audible.

[228] Mr. Kennedy opined a sound may or may not be audible with a negative ratio although pure tones are more detectable, even when their level or loudness is well below the level of the background noise. Both he and Dr. Kahn remarked that train horns are designed to be highly detectable by producing a number of pure tones within the frequency range of greatest sensitivity for human listeners.

[229] Again based on research, both experts indicated a driver's attentiveness to a train horn is influenced by the level of expectation a train will be encountered at a crossing. Similarly, Dr. Yanko testified that a driver's expectation about the

frequency of oncoming trains is one of a number of factors that determine detectability.

[230] Dr. Khan also stated however that research shows humans process auditory cues, especially those that are well understood, more quickly than visual ones. According to Dr. Khan, even when a driver expects no trains, a train horn, much like a fire alarm or a siren on an emergency vehicle, is immediately or easily recognizable as a warning that a train is approaching.

[231] Mr. Kennedy and Dr. Khan used very different approaches to measure the sound of the horn and the background noise in determining the SNR.

[232] Mr. Kennedy measured the sound output from the horn on a CPR locomotive travelling northbound through Smith Crossing, using microphones placed at the height of a seated driver at various distances from the track, which fed into sound and vibration analyzers. Mr. Kennedy commented the direction of travel was important because the berm could very significantly attenuate sound. In cross examination, Dr. Khan agreed an earth berm could block some of the sound waves produced by the horn but suggested extensive modelling would be required to quantify to what extent. She emphasized the actual berm did not seem all that high when she attended the Collision location.

[233] Based on video footage of the CPR locomotive and internet photographs, Mr. Kennedy suggested the location of the horn on the CPR locomotive was “generally consistent” with its location on the Collision locomotive. Relying upon a “research study” by TC regarding the effect of train speed on horn effectiveness, he emphasized the sound level produced by horns located mid cab behind the exhaust outlet is lower when they are in motion, in the range of 10 to 12 decibels. Dr. Khan correctly pointed out the TC “research study” was in fact a literature review prepared for TC. Further, there is no evidence the horn on the Collision locomotive was behind an exhaust outlet.

[234] To replicate the SNR that existed in Ms. Huang's vehicle, Mr. Kennedy calculated the reduction in sound from the outside to the inside of the car, or insertion loss, using a similar but not identical vehicle. He measured the background noise inside the vehicle using a microphone at the driver's ear position and all possible combinations of fan speeds and air distribution settings. Rather than test how the radio actually affected sound levels, he assumed it would be four decibels, based on research, which concerned me.

[235] Mr. Kennedy calculated the SNR inside the vehicle with the radio on at -2.8 to -14.3 depending on the position of the car, the train sound level, and scenarios one and two. With the radio off, the range was 1.2 to -10.3.

[236] Among other things, Mr. Kennedy determined that when the train was 94 metres from Smith Crossing the sound level of the horn was 87.2 decibels (scenario one) and at 78 metres away it was 88.8 decibels (scenario two). Because he measured the horn's sound level outside the vehicle, at some but not all of these distances, he made "theoretical" adjustments using what he described as a standard distance attenuation factor which again I question.

[237] His ultimate conclusion, that it was very unlikely Ms. Huang would have been alerted to the train horn in time to avoid the Collision, relied heavily on a study by Rapoza that examined the probabilities of a train horn being detected based on SNR and the perceived probability of encountering a train at a crossing ("PPET"). Rapoza found an SNR of minus five decibels is required for a 50% probability of train horn detection at crossings where a driver perceives train traffic to be high and just above plus five for crossings where that perception is low. Using his "radio on" SNR calculations and PPETs of 10 and 15%, based on low, average and high driver response times, vehicle positions that ranged from 16.5 to 6.2 metres from Smith Crossing, and scenarios one and two, Mr. Kennedy concluded the probability was less than 20%, regardless of the PPET.

[238] During cross examination, Dr. Khan indicated Rapoza's findings were inconsistent with those obtained in another study by Rainey and Dolan.

[239] The whole of the Rainey and Dolan study, unlike the Rapoza study, is in evidence. Noting Rapoza's predictions were not verified, the authors explained their research was prompted by the need for behaviour data regarding the audibility of train horns to determine the level at which horns should be sounded at crossings. Their methodology included measuring the sound level of the train horn inside test vehicles, with a test locomotive passing through a private crossing repeatedly in controlled circumstances. The recorded horn sounds were presented to participants with normal hearing in 12 noise conditions involving different levels and combinations of background noises including quiet, the engine idling, the vehicle moving at specific speeds, and the fan on. The study found the mean horn thresholds for all 12 noise conditions were more than 10 decibels below the overall level of the noise inside the vehicle. The SNRs required for horn detection in those various conditions ranged from minus 28.2 to minus 10.8 decibels. The authors commented their octave data indicated the participants could detect horn sounds at much lower SNRs than were found in the Rapoza study. Participants were instructed to listen for horn sounds, however. In other words, the study did not assess the impact of expectation on a person's response to the sound of a train horn.

[240] Although Mr. Kennedy's reply report states that many scientific and national studies consistently report a positive SNR is necessary, he did not identify them.

[241] Dr. Khan conducted two inspections, one at a train yard with the Collision locomotive stationary and the other at Smith Crescent, using a very different methodology than Mr. Kennedy and binaural recording technology, which she described as most representative of human hearing, to evaluate whether Ms. Huang would have been able to hear the train horn. Although Mr. Kennedy opined the binaural technology was neither necessary nor typically used in these circumstances, I am satisfied it provides a much more robust way of re-creating what Dr. Khan described as the auditory perceptual environment.

[242] Dr. Khan began by testing the sound level produced by the Collision locomotive in the train yard based on the prescribed regulatory procedure. She found that it met the minimum sound level requirements. In cross examination she acknowledged there is no way of knowing the horn's sound level at the time of the Collision, but noted correctly there was no evidence suggesting it was non-compliant. Dr. Khan then measured the ambient sound from the environment and the noise inside the vehicle with the engine, fan and radio on using various fan settings in combination with the radio play music at low, medium and high volumes. After that, she introduced the sound of the train horn.

[243] In the train yard, Dr. Khan measured the sound of the horn and most of the other sound levels, with the exemplar vehicle and the locomotive positioned at two distances from the point of impact. First the vehicle was 45.7 metres (150 feet) and the locomotive 78.3 metres (257 feet) from the point of impact, and second the vehicle was 6.4 metres (21 feet) and the locomotive 40.2 metres (132 feet) from the point of impact.

[244] Dr. Khan sat in the passenger seat of the exemplar vehicle and said she was able to hear the horn from both locations against the background sound of the vehicle (based on various combinations of fan settings and radio volumes).

[245] At Smith Crescent, Dr. Khan recorded the ambient and background noise inside the vehicle in the same way when it was positioned at 45.7 metres (150 feet) and 6.4 metres (21 feet). She did not attempt to record the sound level produced by a train horn on a locomotive passing through Smith Crossing because she was strongly of the view the results would not be valid. Again, she sat in the passenger seat when the vehicle was parked 150 metres away.

[246] She was not challenged on her conclusion the ambient and background noise levels inside the vehicles at the two locations were comparable.

[247] Based on her testing and calculations, Dr. Khan found the sound levels of the horn or signal exceeded the background noise levels at Smith Crossing, except

when the fan was on high, the radio volume was high, and the vehicle was positioned 150 feet away. She stated that at 21 feet away, the SNR calculations were “above one” for all combinations of fan settings and radio volumes. Although her specific calculations are not in evidence, they were provided to Mr. Kennedy. He was critical of Dr. Khan calculating insertion loss, without measuring the sound level of the train horn separately from the ambient and background noise, inside the vehicle. In other words, she calculated the SNR based on the sound of the horn plus the ambient and background noise, less the ambient and background noise. However, Mr. Kennedy did not measure the sound level produced by the CPR horn from inside the vehicle at all.

[248] In cross examination Dr. Khan was quite adamant, based on her testing results, that even if Ms. Huang had no expectation of encountering a train, the horn was loud and salient enough to be audible to her. Dr. Khan concluded that even if Ms. Huang was only 21 feet from the point of impact as she slowed and stopped in accordance with the posted stop sign (First Stop Sign), she would have heard the locomotive horn under the most stringent test condition: fan on high and the radio volume high.

B. Additional Findings of Fact

[249] In addition to the credibility and factual findings contained in the discussion of the liability evidence, my findings are as follows.

[250] It is clear the space between the railway tracks and the second stop sign on Smith Crescent at Glover Road was shorter than even the length of some regular sized vehicles including Ms. Huang’s. Given the lack of automated warning devices at Smith Crossing and the lack of storage space, eastbound drivers faced the grave risk of their vehicles being struck by a train while stopped at the second stop sign. Although the shoulder on Glover Road provided ample room to move forward safely, a driver needed sufficient warning of the oncoming train to be aware the rear of his or her vehicle was not clear of the tracks and the presence of mind to drive ahead in order to do so. Based on the evidence of Dr. Yanko, Mr. Ising and Dr. Potma, I am

satisfied that braking hard, not pulling forward, is the most intuitive if not automatic response for a driver faced with an unanticipated hazard including an oncoming train.

[251] It is also clear the CPR was aware of the risk posed to drivers using Smith Crossing. The project to install automated warning devices including gates, bells and lights and improve the Glover Road intersection, involving the CPR, the road authorities, Langley, the Province, and Britco was initiated at least in part in response to prior collisions and public safety concerns. Certainly, the CPR accepted that upgrades to Smith Crossing were a warranted safety improvement.

[252] I have already found Britco also had a strong financial motivation to improve access to its location and the Province was only involved because of Britco. Dissatisfied with what appeared to be the ultimate plan for the redevelopment of the intersection, Britco withdrew from the project, followed by the Province. There is no suggestion the project was a priority for Langley by that time. I accept the testimony of Mr. Younger, Mr. Cooper and Mr. Welfing on this point, and find it was not feasible for the CPR to carry on with the plan to install gates, bells and lights at Smith Crossing, without the ongoing participation and support of the Province most significantly, but also Langley as the road authorities for Glover Road and Smith Crescent.

[253] Based on Mr. Butterwick's Iris report, I find by in or about January 2007, Himalayan blackberry bushes, a rapid growing invasive species that had taken hold on Britco's berm, were encroaching on the right of way and intruding upon the southbound sightline.

[254] For many years before the Collision, the G4-A was widely accepted within the railway industry as the standard for evaluating and maintaining minimum sightlines at crossings without automated warning devices. Based on the double dash under the minimum H distance column for crossings controlled by stop signs, the G4-A was variably interpreted as permitting sightlines to be measured at 8 metres from the

centre of the track or near rail to the front of the vehicle to not less than the distance to a driver in a vehicle stopped at the stop line for crossings with a stop sign. I infer, however, the desirable measuring distance of 8 metres was predominantly viewed as the prudent if not required measuring distance under the G4-A, given the absence of a minimum and recognizing that sightlines should be available to drivers during their approach to the stop line.

[255] Dr. Potma's interpretation of the G4-A as permitting a measurement distance that involved pulling forward of the First Stop Sign is clearly an outlier and inconsistent with the purpose of minimum sightlines which can only be public safety and accident prevention.

[256] The G4-A was also interpreted as allowing for minimum sightlines of 525 and 600 feet, for crossings where the maximum railway speed was 35 mph. Based on the evidence of Mr. Mitchell and Mr. Reiger in particular, I am satisfied the railway industry accepted the ten second warning identified in the G4-A's diagram as the T value, as a reasonable estimate of the amount of time required for a motorists to safely detect and decide how to respond to an oncoming train.

[257] The CPR not only adopted the G4-A as its own mandatory standard, but an iteration that eliminated the ambiguity about the requirement for sightlines to be measured 8 metres from the track for stopped vehicles and a minimum sightline of 600 feet for maximum train speeds of 35 mph.

[258] The evidence clearly establishes however that maintaining sightlines was simply not a priority or focus for the CPR's track inspection or vegetation management programs. Although Mr. Soliman, Mr. Tome, and Mr. Ducharme identified the SPC-29 as its standard for evaluating sightline at crossings without automated warning devices prior to the Collision, it was not being used during track inspections of the PSD.

[259] The same is true of the G4-A which Mr. Spata identified as the guideline he referred to in his work as the manager of the vegetation management program.

Although the goal of his two year rotation was to eradicate Himalayan blackberry bushes from the railway's right of way, he did not pay much attention to sightlines at crossings. To the extent he considered them, Mr. Spata did so qualitatively, and I infer, without evaluating or measuring them from any particular distance. He never evaluated the sightlines at Smith Crossing during either his seasonal inspections of the PSD, or his visits to the area during the growing season.

[260] In December 2013, when Mr. Spata last visited Smith Crossing and the PSD to determine the need for vegetation management for the following spring, the blackberry bushes at Smith Crossing were dormant and leafless. Observing some encroachment onto the right of way, he included Smith Crossing on the work list for the spring of 2014 and directed Mr. Kalivoda to cut the blackberry bushes back to Britco's fence line. Not having considered their actual or potential impact on the available sightline once the growing season began, Mr. Spata never prioritized the cutbacks of vegetation at Smith Crossing before leaving the CPR in March 2014, nor did he direct Mr. Kalivoda to speak to Britco about addressing the blackberry bushes on the berm.

[261] Similarly, prior to the Collision, Mr. Tome and his staff took a casual approach during track inspections to the assessment of sightlines at crossings, that did not involve the application of a particular standard that would have enabled them to identify a deficient sightline and then remedy it. Although some employees had been trained in the use of the SPC-29 and or the G4-A, others such as Mr. Sehra received no training or direction about how to evaluate sightlines at railway crossings. Mr. Tome and his staff infrequently if not rarely got out of the hi-rail vehicle to check sightlines at crossings in the PSD. When they did, sightlines were simply observed, not measured, typically from the stop line and without any regard for the minimum sightlines set out in the SPC-29 or the G4-A. Only if a specific sightline issue was reported to him would Mr. Tome attend a crossing with the SPC-29 in hand.

[262] Although both Mr. Spata and Mr. Tome worked closely and were in frequent contact with Mr. Kalivoda who performed much of the vegetation management work

in the PSD and other CPR subdivisions in the Lower Mainland on behalf of Asplundh, the railway had not informed him about any requirements for sightlines at crossings. Nor was there any suggestion the issue had been discussed with Asplundh.

[263] Consistent with a lack of concern about ensuring adequate sightlines at passive crossings such as Smith Crossing before the Collision, the CPR had no record-keeping requirements regarding sightline evaluations that did occur. It is uncertain if the TIP used by staff regarding all track inspections would have even allowed for information about sightlines to be recorded before the Collision.

[264] No one within the CPR working in the PSD had identified a sightline issue at Smith Crossing.

[265] Based on the photographs, the evidence of Constable Sanford and Mr. Wong, and accepting the sightline calculations of Mr. Ising, I find that on the day of the Collision, the available southbound sightline was 88.6 feet (27 metres) when the front of Ms. Huang's vehicle was 8 metres from the near track, 97 feet (30 metres) from the centre of the track, and 177 feet (54 metres) when she herself was 8 metres from the near track (and the front of her car was 5.7 metres).

[266] A driver approaching Smith Crossing and the First Stop Sign, attempting to look south for a train or traffic on Glover Road, faced a mass of vegetation or the "wall of bushes" Ms. Huang described. Blackberry bushes originating from Britco's large berm were growing over top of and through the chain link fence, rendering the fence itself invisible, extending well into the railway's right of way, thereby obscuring the southbound view of the tracks. Based on the testimony of Ms. Huang and Mr. Barfett, and the fact that Mr. Kalivoda began slashing blackberry bushes at other crossings in early April of 2014, I infer the southbound sightline at Smith Crossing was similarly obstructed before Ms. Huang began working at Brito on April 22, 2014.

[267] I am entirely satisfied that Ms. Huang honestly believed there were no trains using the railway at Smith Crossing, despite the frequency with which they travelled

past Britco and the automated warning devices at other crossings adjacent to Glover Road. I accept that she formed that belief for the reasons she stated including her observations of other eastbound motorists crossing Smith Crossing without stopping at the First Stop Sign and some vehicles stopping on the tracks themselves. Her evidence was consistent with what Mr. Lin saw when he attended Smith Crossing after the Collision and the opinion evidence of Dr. Yanko regarding drivers' tendency to rely on automatic processes in relatively familiar situations. I infer therefore that many motorists using Smith Crossing, aside from Ms. Huang, failed to stop at the First Stop Sign.

[268] In any event, it is simply implausible that Ms. Huang was aware she might encounter a train at Smith Crossing and ignored the risk by driving through the First Stop Sign. There is no indication she was ever deliberately reckless. Her frame of mind was positive. In addition to being very pleased with her new job, she was a highly responsible, confident, professional person, with a happy marriage, and a daughter approaching adulthood who was thriving. I also accept that as she drove east along Smith Crescent after work each day, her practice had been to look left before the First Stop Sign and then right once she could see past the overgrowth of vegetation, focused on Glover Road.

[269] It is clear Ms. Huang did not stop at the First Stop Sign before her vehicle was struck by the CNR train at Smith Crossing. I am satisfied that had she come to a complete stop before entering Smith Crossing, the Collision would not have occurred.

[270] Significantly, unlike Dr. Potma, I accept rather than reject the testimony of Mr. Wormsbecker and Mr. Lachance regarding Ms. Huang's vehicle stopping on the tracks before the Collision. Nothing suggests their accounts were influenced by exposure to one another. Importantly, both provided clear and unwavering evidence about Ms. Huang being fully stopped prior to impact. Each observed her vehicle coming to and being stopped directly in front of them without their attention being divided as it was for Mr. Barfett. Furthermore, although Mr. Wormsbecker and

Mr. Lachance were not independent witnesses, their interest does not align with their evidence on this point.

[271] For several reasons, I also find that Ms. Huang stopped where she did in response to detecting the train. Dr. Yanko testified, and Mr. Ising and Dr. Potma agreed, that braking hard was the most intuitive response for a driver faced with an unexpected hazard. The evidence of Mr. Lachance and to some extent Mr. Barfett and Ms. Dean establishes there was no car ahead of Ms. Huang at the second stop sign. It strikes me as unusual for a driver to stop in the middle of a crossing, particularly in that circumstance. Further, despite her belief the tracks were abandoned, there is no suggestion Ms. Huang had done so before.

[272] Based again on her evidence, I accept that in the days leading up to the Collision, Ms. Huang drove very slowly down Smith Crescent and particularly slowly over Smith Crossing before essentially rolling to a stop at the second stop sign, given the short distance from Britco to Smith Crossing, the speed bump effect of crossing the tracks, and their very close proximity to the second stop sign. Given this practice, but also bearing in mind the evidence of Mr. Barfett, I infer this is how she proceeded toward Smith Crossing on the day of the Collision. I am satisfied therefore that the maximum speed she reached on Smith Crescent was slower, if not significantly slower, than the speeds assumed by Mr. Ising and Dr. Potma, and she was driving close to 20 kph with her foot on the brake by the time the front of her vehicle was 8 metres from Smith Crossing.

[273] Bearing in mind Dr. Potma's calculation of the timing of the emergency brake application of plus or minus 0.005 miles from the point of impact, the recollections of the train crew, and the coarse nature of the train data, I can be no more precise than to find that Mr. Wormsbecker applied the brake slightly before or at about the same time the Collision occurred.

[274] Similarly, given the limits of human perception, I place little weight on any of the estimates about how many seconds Ms. Huang's vehicle may have been

stopped on the tracks before impact. Mr. Wormsbecker needed enough time to perceive, decide and respond once he saw her emerge from behind the blackberry bushes before the stop line. Again, I can be no more precise than to find her vehicle was stopped very briefly before the Collision.

[275] Consequently, I also largely accept Dr. Potma's and Mr. Ising's conclusions about the timing of the final horn blast and find it started approximately seven to five seconds before the Collision. Travelling at a speed of 35 mph, the train was about 355 to 255 feet away from Smith Crossing at that time.

[276] Relying to some extent on Dr. Khan's conclusions about the audibility of the train horn and its detectability as a familiar warning sound, accepting the horn's sound level was compliant with the regulatory requirements, and based on the evidence of the train crew, I am satisfied it was audible inside Ms. Huang's vehicle even with the fan on and music playing. I therefore draw the inference she heard the train horn when it last sounded although she has no memory of this. I also infer Ms. Huang's attention was drawn toward the sound of the horn but she was unable to see the train at that point due to the obstructed sightline. I expect the confusion and alarm she would have experienced in response to hearing the unexpected warning sound turned to panic once she crossed the stop line and it became visible to her at so close a distance. Any thoughts she may have had about the inadequate storage space between the eastern rail and the second stop sign before the Collision would have only intensified that distress. Consequently, I am satisfied that although Ms. Huang planned to stop at the second stop sign, she stopped only partially across Smith Crossing with the rear portion of her vehicle still west of the western rail, in response to hearing the train and then seeing it.

[277] I accept Mr. Ising's opinion that she could have stopped before entering Smith Crossing, if she had been travelling at no more than 20 kph when her vehicle was 8 metres from the track, with her foot on the brake, a sightline to the oncoming train, if she was looking to the right.

[278] Having found or inferred she was driving that speed and her foot was on the brake when her vehicle was eight metres from Smith Crossing, I am also satisfied the train horn had started its final sounding by then, causing her to look in the direction of the oncoming train. With a sightline to the train at the same time, a distance of approximately 355 feet, I am satisfied she would have stopped in time to avoid the Collision. The reality is, given the length of her vehicle, she needed to stop no more than three metres west of where she did. Furthermore, accepting Ms. Huang's evidence, without the mass of vegetation and therefore a better southbound sightline from the outset of her employment at Britco, I am certain her practice would have been to look right as well as left before she reached the First Stop Sign as opposed to after, in the days leading up to the Collision.

[279] Notified by the CPRP about the presence of an obstructed sightline at Smith Crossing shortly after the Collision, the only investigative step the CPR took was to arrange for Mr. Wong to evaluate the sightlines at Smith Crossing and complete a standard form report, the results of which were not acted upon or disseminated. Mr. Tome was entirely unaware of Mr. Wong's sightline evaluation and had not completed his own when he instructed Mr. Kalivoda to urgently cut back the vegetation to Britco's fence line after the Collision.

[280] Around the same time, either Mr. Tome or another CPR employee ordered a temporary slow order based on a concern about the southbound sightline at Smith Crossing which was lifted after the further cutbacks on Britco's berm and the herbicide application in or about July 29, 2014. I place very limited weight on Mr. Butterwick's testimony that temporary slow orders can increase risk once cancelled as an indication of the industry's view. The only other evidence on this point was that motorists have a hard time assessing how fast oncoming trains are travelling. Of course, neither opinion is admissible for its truth.

[281] No one within the CPR assessed the southbound sightline following Mr. Kalivoda's initial cutback on May 11, 2014. Given the extent of the overgrowth at the time of the Collision, and the photographs in evidence, I am satisfied the

southbound sightline was significantly improved as a result, although the extent to which is not determinable. I am satisfied the available sightline would have allowed Ms. Huang to see the oncoming train as the front of her vehicle approached 8 metres from Smith Crossing. Based on Ms. Coady's evidence, I infer that after the further work done on Britco's berm, the sightline was at least 600 feet.

C. Analysis

1. Legal Framework

[282] There is no dispute about what Ms. Huang must prove to establish each of her claims in negligence: (1) the defendant owed her a duty of care; (2) the defendant breached the standard of care; (3) she sustained damage; and (4) that damage was caused, in fact and in law, by the defendant's breach (*Mustapha v. Culligan of Canada Ltd.*, 2008 SCC 27 at para. 3).

[283] *Ryan v. Victoria (City)*, [1999] 1 S.C.R. 201, is the leading authority on the liability of railways. The decision expressly abolished a long-standing common law rule limiting the standard of care for railways to compliance with statutory obligations and administrative orders, absent extraordinary circumstances. A unanimous court concluded that railways should not enjoy special protection when their acts or omissions cause harm to members of society. Applying the "ordinary" principles of negligence, Justice Major held the standard of care owed by a railway is that of a prudent and reasonable person in the circumstances, having regard to all the relevant factors.

[284] As a motorist, Ms. Huang had a common law duty of care to drive with care and attention. She also faced statutory obligations.

[285] Under s. 185(3) of the *Motor Vehicle Act*, R.S.B.C. 1996, c. 318 [MVA], a driver approaching a railway crossing at which a stop sign is erected:

...

- (a) must stop his or her vehicle
 - (i) no closer than 5 meters, and

(ii) no farther than 15 meters from the nearest rail of the railway, and

(b) must not proceed until he or she can do so safely.

[286] Similarly, s. 185(6) of the *MVA* requires every driver to proceed with caution when approaching a railway track to avoid a collision between the vehicle and an approaching train.

[287] Section 26.2 of the *Railway Safety Act*, R.S.C. 1985, c. 32 (4th Supp.), also requires all motorists to give way to trains at a railway crossing provided adequate warning of the train's approach was given.

[288] A key issue here is factual causation or cause in fact.

[289] The primary test for determining cause in fact is the "but for" test. The plaintiff bears the burden of proving on a balance of probabilities that "but for" each defendant's negligence, her injury would not have occurred: *Athey v. Leonati*, [1996] 3 S.C.R. 458 at para. 14. In other words, to meet the "but for" test, a plaintiff must show a defendant's negligence was necessary to bring about her injury (*Borgfjord v. Boizard*, 2016 BCCA 317 at para. 54). However, the negligent conduct is not required to be the sole or predominant cause of the plaintiff's injury. So long as a substantial connection beyond the "*de minimus*" range is established, the negligent conduct will be a cause and the defendant will be liable: *Farrant v. Laktin*, 2011 BCCA 336 at paras. 9 and 11; *Athey* at paras. 13-17.

[290] It is well established and must be remembered that factual causation is determined in a "robust common sense fashion". Scientific proof is not required. Inferences drawn from proven facts may suffice: *Clements v. Clements*, 2012 SCC 32 at para. 9; *Athey* at para. 16.

[291] Although the defendants suggest Ms. Huang cannot establish a causal link between any breach of the standard of care that applies to the CPR regarding sightlines and her injuries, because she never intended to stop at the First Stop

Sign, in the event of such a breach, the question becomes: was the negligent sightline part of the cause of Ms. Huang's injury?: see *Athey* at para. 17.

2. The CPR

a) Constructing an Active Crossing

[292] As indicated, the defendants concede the CPR owed Ms. Huang a duty of care. Without addressing any of the other necessary elements of a negligence claim, Ms. Huang appears to assert the CPR was negligent for failing to cause an active crossing to be installed at Smith Crossing, based on the risk posed by the inadequate storage space and inadequate sightlines and the railway's responsibility for installing automated warning devices at crossings. She points to evidence regarding the need for an active crossing, starting as early as 1994 with cars foul of the tracks being struck at crossings in the PSD, culminating in GCIP funding to improve safety at Smith Crossing in or about 2008 that was never used all of which I have accepted. She also points to Mr. Ising's review of the literature confirming that active crossings are much safer than those with a stop sign, which I also accept. Clearly, motorists fail to stop signs located at crossings and an automated gate will prevent them from entering a crossing when activated. But I have also found it was not feasible for the CPR to install gates, lights and bells at Smith Crossing without the participation and support of the Province and Langley. In other words, Ms. Huang has not established the CPR breached the applicable standard of care. Accordingly, I dismiss any claim in negligence on this ground.

b) Maintaining Adequate Sightlines

[293] Ms. Huang's main allegation of negligence is the CPR failed to maintain an adequate southbound sightline at Smith Crossing. In addition to factual causation, the parties dispute the standard of care and whether the CPR breached that standard.

[294] Ms. Huang argues the standard of care required the CPR to comply with its own mandatory sightline standard in the SPC-29. Based on the minimum sightline of 600 feet measured 8 metres from the tracks, she describes the available sightline of

97 feet as grossly insufficient and submits the CPR was obligated to issue a slow train order until the minimum sightline could be achieved.

[295] The defendants assert the CPR's "rigorous" track inspection and vegetation management programs met the requirement for reasonableness, describing the sightline encroachment caused by the vegetation along the berm at the time of the Collision as an intermittent "state of affairs" resulting from the growing season and the timing of the vegetation management program, not a breach of the standard of care.

[296] The defendants made no submissions about the role of the SPC-29 in determining the standard of care but they did argue TC's sightline guidelines and the G4-A in particular should carry much less weight than a statutory or regulatory standard, bearing in mind the federal government's legislative authority with respect to railways. They further suggest the G4-A should not be considered all that persuasive because of the flexibility with which it was applied. In any event, they take the position the southbound sightline as calculated by Dr. Potma from the stop line at Smith Crossing complied with the G4-A because it does not require a minimum distance from which sightlines must be measured for stopped vehicles. In other words, the CPR met its obligation because drivers who pulled forward to that position had an adequate sightline with which to observe and decide whether it was safe to proceed across Smith Crossing.

[297] The standard of care defines the degree or content of the duty of care. It guides the court in determining whether a defendant's particular act or omission breached that duty: *Ryan* at para. 25. Again, the standard of care owed by a railway is that of a prudent and reasonable person in the circumstances, having regard to all the relevant factors.

[298] In *Ryan*, Justice Major summarised how to determine the applicable standard of care at para. 28:

... To avoid liability, a person must exercise the standard of care that would be expected of an ordinary, reasonable and prudent person in the same circumstances. The measure of what is reasonable depends on the facts of each case, including the likelihood of a known or foreseeable harm, the gravity of that harm, and the burden or cost which would be incurred to prevent the injury. In addition one may look to external indicators of reasonable conduct, such as custom, industry practice, and statutory or regulatory standards.

[299] To be foreseeable, it is not necessary for a risk to be more likely than not; nor is it required to reach a particular degree of statistical probability. In *Mustapha v. Culligan of Canada Ltd.*, 2008 SCC 27 at para. 13, Chief Justice McLachlin described the correct approach:

[1] Much has been written on how probable or likely a harm needs to be in order to be considered reasonably foreseeable. The parties raise the question of whether a reasonably foreseeable harm is one whose occurrence is probable or merely possible. In my view, these terms are misleading. Any harm which has actually occurred is “possible”; it is therefore clear that possibility alone does not provide a meaningful standard for the application of reasonable foreseeability. The degree of probability that would satisfy the reasonable foreseeability requirement was described in *The Wagon Mound (No. 2)* as a “real risk”, i.e. “one which would occur to the mind of a reasonable man in the position of the defendant[t] . . . and which he would not brush aside as far-fetched” (*Overseas Tankship (U.K.) Ltd. v. Miller Steamship Co. Pty.*, [1967] A.C. 617 (P.C.), at p. 643). [Emphasis in original.]

[300] *Ryan* also discussed at some length the relevance of statutory or regulatory standards to the standard of care, the central issue being whether to uphold the common law rule that limited the standard owed by railways to the discharge of statutory duties:

[29] Legislative standards are relevant to the common law standard of care, but the two are not necessarily co-extensive. The fact that a statute prescribes or prohibits certain activities may constitute evidence of reasonable conduct in a given situation, but it does not extinguish the underlying obligation of reasonableness. Thus, a statutory breach does not automatically give rise to civil liability; it is merely some evidence of negligence. By the same token, mere compliance with a statute does not, in and of itself, preclude a finding of civil liability. Statutory standards can, however, be highly relevant to the assessment of reasonable conduct in a particular case, and in fact may render reasonable an act or omission which would otherwise appear to be negligent. This allows courts to consider the legislative framework in which people and companies must operate, while at

the same time recognizing that one cannot avoid the underlying obligation of reasonable care simply by discharging statutory duties.

[Citations omitted.]

[301] I have been provided with no authority that suggests conclusions should be drawn about the applicable standard based on the absence of a legislative standard. Leaving aside the relative weight to be given to a federal guideline standard, *Ryan* identified industry practice as a relevant external indicator of reasonable conduct.

[302] *ter Neuzen v. Korn*, [1995] 3 S.C.R. 674, considered conformity with standard practice in determining compliance with the standard of care. Justice Sopinka adopted Professor Fleming's observations in *The Law of Torts*, 7th ed. (Sydney: Law Book Co., 1987) at 109:

Conformity with the general practice, on the other hand, usually dispels a charge of negligence. It tends to show what others in the same "business" considered sufficient, that the defendant could not have learnt to avoid the accident by the example of others, that most probably no other practical precautions could have been taken, and that the impact of an adverse judgement (especially in cases involving industry or a profession) will be industry-wide and thus assume the function of a "test case". Finally, it underlines the need for caution against passing too cavalierly upon the conduct and decision of experts.

All the same, even a common practice may itself be condemned as negligent if fraught with obvious risks. [Emphasis added in *ter Neuzen*].

[303] I have already found the G4-A was the industry standard for evaluating and maintaining minimum sightlines at crossings without automated warning devices, interpreted and applied somewhat flexibly. Arguably, the SPC-29's sightline requirements reflect what the CPR viewed as reasonable for itself. To the extent aspects of those requirements imposed a higher standard than the G4-A, in light of its flexible application, they may exceed the reasonableness standard.

[304] Conduct is negligent if it creates an unreasonable risk of harm (*Ryan* at para. 28). As I have indicated, the purpose of adequate sightlines at railway crossings like Smith Crossing is accident prevention. Simply put, adequate sightlines enable motorists to see and respond safely to oncoming trains, thereby reducing the

very grave risk of a collision. Given the presence of rapidly growing Himalayan blackberry bushes on Britco's berm encroaching onto the CPR's right of way, with the collapse of the project to install automated warning devices at Smith Crossing in 2008, adequate sightlines at Smith Crossing became particularly important to preventing accidents.

[305] I have already found the CPR was aware that motorists using Smith Crossing faced the risk of a collision because of the inadequate storage space between the tracks and the second stop sign, and the absence of automated gates, lights and bells. I have also found it was not uncommon for motorists, aside from Ms. Huang, to fail to stop at the First Stop Sign; negligent conduct, in my view, that was reasonably foreseeable. The CPR's obligation was to maintain adequate sightlines at Smith Crossing to prevent accidents generally and to mitigate the impact of these risks. Determining what is adequate is the key issue here. As the defendants emphasized, the standard of care does not require perfection or as they put it, "perfectly clear sightlines at all times".

[306] While the CPR's post-Collision conduct cannot be viewed as an admission of liability, it does demonstrate the ease with which the risk arising from the deficient southbound sightline might have been avoided: *O'Leary v. Rupert*, 2010 BCSC 240 at paras. 47-48. The evidence establishes the CPR was able to evaluate and improve the sightline at Smith Crossing without any difficulty. Mr. Wong attended Smith Crossing and measured the available sightline using the SPC-29 on May 9, 2014, the day after the Collision. On May 11, 2014, the same day Mr. Tome made an urgent request, Mr. Kalivoda cut back the blackberry bushes to Britco's fence line, work that he had already been contracted to do, which substantially improved the available sightline. A CPR staff member implemented a temporary slow order over some portion of the PSD.

[307] In addition, somewhat later, after obtaining the consent of the Britco property owner, the CPR arranged for Mr. Kalivoda to remove blackberry bushes from the

berm and apply herbicide, eliminating, at least in the near term, any interference with the southbound sightline, after which the slow order was cancelled.

[308] Assuming a slow order that applied to the whole of the PSD, as opposed to some portion encompassing Smith Crossing, Mr. Younger suggested such orders would result in considerable cost by delaying the transportation of goods. However no evidence was adduced supporting or quantifying such an increase.

[309] Bearing in mind the particular risks of a collision at Smith Crossing, I conclude the applicable standard of care required the CPR to maintain a sightline consistent with the 10 second warning, the T value contained in both the G4-A and the SPC-29, which translates to a sightline of 525 feet, absent exceptional circumstances. In the event that this sightline could not be achieved by trimming the encroaching blackberry bushes back to the fence line, the CPR's obligation was to implement a slow order, thereby increasing the time available to motorists to respond to an oncoming train, and to approach the owners of the Britco property much as they did after the Collision. In the event of a refusal to allow further cutbacks on the berm, the CPR would be obligated to consider taking additional steps depending on the extent to which the sightline remained significantly below 525 feet. I regard repeated cutbacks to the fence line to address the impact of regrowth on adequate sightlines as well within the standard of reasonableness, absent other options.

[310] I am also strongly of the view the standard of care required the sightline of 525 feet to be available to a motorist before reaching the stop line, when the front of the vehicle was 8 metres from Smith Crossing. To ameliorate the grave risk of harm from a collision and the particular risks at Smith Crossing, including the storage space problem, motorists such as Ms. Huang needed an adequate sightline of the railway tracks before reaching the First Stop Sign. The task for motorists approaching Smith Crossing is complex. They have to look in both directions for oncoming trains, as well as traffic on Glover Road, and determine not only if they have time to cross the tracks, but also to turn left or right onto Glover Road.

[311] The CPR should have been monitoring and evaluating the southbound sightline at Smith Crossing regularly each and every spring and summer, including the spring of 2014 given the very rapid growth rate for blackberry bushes and their long-term presence on the Britco berm and the CPR's right of way, resulting in previous cutbacks or trimmings. While I accept it is not possible for track inspectors to evaluate sightlines at each crossing during every inspection, properly trained and supervised, they could and should have been identifying potential sightline problems from the hi-rail and then evaluating or arranging for some one else to evaluate those potential problems promptly.

[312] The reality is the CPR's approach to maintaining sightlines at Smith Crossing was careless. As a result, the sightline available to Ms. Huang on May 8, 2014 and in the preceding days, significantly breached the standard of care.

[313] I am also certain that had the CPR complied with the standard of care, an initial cutback to Britco's fence line, if not a second cutback due to regrowth, would have occurred before Ms. Huang started working at Britco and the Collision.

[314] As I indicated earlier, even a southbound sightline of less than 400 feet, would have enabled and caused her to look right for traffic on Glover Road before reaching the First Stop Sign from April 22, 2014 onward.

[315] I have already determined that Ms. Huang heard the train when the horn was last sounded (five to seven seconds before impact) and the train was about 355 to 255 feet away. As I have said, even with a corresponding southbound sightline, Ms. Huang would have seen, as well as heard the train and stopped in time to avoid the Collision. Consequently, I am satisfied that but for the CPR's breach of the standard of care, the Collision and therefore Ms. Huang's injuries and losses would not have occurred. Accordingly, I find the CPR liable in negligence.

3. The CNR

[316] Ms. Huang's allegations of negligence against the CNR and the train crew include a breach of the duty to warn the CPR about deficient sightlines at Smith

Crossing, failing to slow the speed of its trains in light of the sightline issue, and failing to activate the train horn properly. I have already dismissed her claim based on the train horn. The evidence establishes that only the CPR had the power to slow the maximum train speed in the PSD so that claim is also dismissed.

[317] Regarding the duty to warn, Ms. Huang argued the CNR's duty of care to users of Smith Crossing gave rise to an obligation to observe and report problems with sightlines to CPR, relying significantly on a provision in the CROR that states:

Every employee in any services connected with movements, handling of main track switches and protection of track work and track units shall: ... communicate by the quickest available means to the proper authority any condition which may affect the safe operation of a movement and be alert to the company's interest and join forces to protect it.

[318] The defendants argue the duty of the CNR's crew members to report anything they see that constitutes a danger to the safe operation of a railroad does not include sightline issues.

[319] I largely agree. I accept the CNR's train crews were not in a position to assess and identify sightline deficiencies from the vantage point of a locomotive, while operating a train travelling at 35 mph. Without deciding whether this is a duty of care or standard of care issue, I am not persuaded the deficient sightline at Smith Crossing prior to the Collision, from the perspective of Mr. Wormsbecker or Mr. Lachance and any other train crew operating a CNR train, was an unsafe condition they should have noticed and reported.

4. Contributory Negligence

[320] Ms. Huang admits her negligence for failing to stop at the First Stop Sign. In my view her negligence included failing to pull forward to look for an oncoming train. Clearly, she breached her common law duty to drive with care and attention. Generally, a motorist's breach of the provisions of the *MVA* will constitute a breach of the standard of care: *Ormiston v. Insurance Corporation of British Columbia*, 2014 BCCA 276 at para. 14. I find that she breached s. 185(3) and (6) of the *MVA*.

Given the negligent sightline, I am not satisfied she also breached s. 26.2 of the *Railway Safety Act*.

5. Apportioning Liability

[321] The defendants argue that in the event the CPR is found liable for either sightlines or the design of Smith crossing, the Province and Langley as the road authorities, and Britco LP and or the owners of the Britco property should also be found at fault. Langley, the Province and Britco LP were defendants in this action. Prior to trial Ms. Huang consented to an order dismissing her claim against Britco LP and filed a Notice of Discontinuance against the Province. Right before the trial began, she reached a settlement with Langley, pursuant to a *BC Ferries* agreement (named after *British Columbia Ferry Corp. v. T&N plc* (1995), 16 B.C.L.R. (3d) 115 (C.A.)).

[322] Pursuant to ss. 1 and 4 of the of the *Negligence Act*, R.S.B.C. 1996, c. 333, the liability of multiple tortfeasors is several if a plaintiff is contributorily negligent and joint and several if the plaintiff is not: *Henry v. British Columbia*, 2016 BCSC 1038, aff'd 2017 BCCA 420. As the defendants noted, this is so whether all tortfeasors are sued as defendants or not: *Leischner v. West Kootenay Power & Light Co.* (1986), 24 DLR (4th) 641 (B.C.C.A.) at 174. Similarly, under a *BC Ferries* agreement, a plaintiff settles with one or some but not all of the defendants and agrees to sever joint and several liability among the settling and non-settling defendants. The plaintiff is only entitled to recover against the non-settling defendants the portion of damages attributable to the fault apportioned to them by the trial judge.

[323] Liability is apportioned based on the degree to which each person was at fault, not the degree to which each person's fault caused the damage. Fault means blameworthiness: *Cempel v. Harrison Hot Springs Hotel Ltd.* (1997), 43 B.C.L.R. (3d) 219 (C.A.), *Bradley v. Bath*, 2010 BCCA 10 at para. 24. Evaluating relative blameworthiness involves assessing the relative degree to which each tortfeasor departed from the standard of reasonable care: *Aberdeen v. Township of Langley*

et al, 2007 BCSC 993 at paras. 62–63, rev'd on other grounds 2008 BCCA 420.

A number of factors are considered relevant:

- The nature of the duty owed by the tortfeasor to the injured person;
- The number of acts of fault or negligence committed by a person at fault;
- The timing of the various negligent acts (with the person whose acts occur first typically being found more at fault than the person whose negligence occurs as a result of the initial fault);
- The nature of the conduct held to amount to fault (with indifference to the results of the conduct or deliberate misconduct generally being more blameworthy than an imperfect reaction to a crisis);
- The extent to which the conduct breaches statutory requirements;
- The gravity of the risk created;
- The extent of the opportunity to avoid or prevent the harm;
- Whether the conduct was deliberate, or unusual or unexpected; and
- The knowledge one person had or should have had of the conduct of another person at fault.

[324] The plaintiff argues that all of the *Aberdeen* factors strongly militate in favour of the defendants being apportioned 90% of the fault with the CPR being mostly at fault, and 10% to herself. She opposes other tortfeasors being apportioned any fault.

[325] The defendants take the position that if the CPR is found liable, Ms. Huang should be apportioned 80% of the fault, and the rest apportioned equally to the CPR and the former defendants, mentioned above.

[326] The defendants made few if any submissions about how the evidence supported findings of negligence against Langley, the Province, Britco LP or the owners of the Britco property.

[327] The defendants argued for apportioning fault to Langley in the event the CPR was found negligent for failing to install an active crossing at Smith Crossing, a claim I have dismissed, but Ms. Huang made the broader submission that Langley was immune from liability in negligence related to sightlines based on a policy defence. Although it may be unnecessary, I accept that Langley had a policy requiring it to clear vegetation along roadways such as Smith Crescent to ensure road signs and markings were visible, but not with respect to vegetation on the railway's right of way. Nor did it have a policy adopting the G4-A. Leaving aside the policy defence, I accept it would not be reasonable to impose an obligation on Langley that required it to monitor or intrude upon the CPR's right of way to maintain sightlines at Smith Crossing.

[328] In any event and to be clear, having dismissed Ms. Huang's claim of negligence related to Smith Crossing's upgrade project, I reject the suggestion that Langley should be found at fault. For this same reason, I can see no potential basis for imposing any portion of the liability on the Province.

[329] Regarding Britco and or the owners of the Britco property, the defendants rely upon *Reid v. Linnell*, [1923] S.C.R. 594 (S.C.C.), to suggest either or both of them owed a duty to protect Ms. Huang from any danger arising from the intrusion of the berm's blackberry bushes onto the CPR's right of way. In *Linnell*, the Supreme Court of Canada upheld a finding of liability against a private land owner for injuries the plaintiff suffered after falling into a pit on an adjacent lot that resulted from excavation on the land owner's property. In concurring reasons, Justice Idington stated at 599:

The fundamental principle upon which the cases holding that those passing along a highway are entitled to recover by reason of the owner of adjacent land having, either by excavation or by structural erection on his land, created a source of danger to such person as used the highway, is that they have an absolute right to be where they are, the landowner must not, in the use of his land, disregard their right to pass in safety.

[330] The defendants argue the principle applies here, given the berm constructed on the Britco property was the source of the risk and Britco's employees and

contractors were the primary users of Smith Crossing. Despite taking this position, the defendants did not question the past and current employees or Mr. McClymont, an owner at the time of the Collision, about any circumstances that might relate to an obligation to address the blackberry bushes encroaching on the CPR's right of way before the Collision. Instead, the defendants focused on the timing and nature of any requests made by the CPR to cut back the berm and the blackberry bushes on the berm.

[331] It is clear that Britco notified the CPR about its plan to construct the berm and there is no indication the railway ever responded, or in fact had a concern. Britco also sought and obtained the necessary approvals from Langley. At no time prior to the Collision did the CPR or its agents ever approach Britco about sightline issues or its blackberry bushes. Although Ms. Huang crossed Smith Crossing, the evidence indicates that other employees did not and many of those travelling to and from Britco were required to access the property using the other route due to the 7 metres restriction.

[332] More importantly, I question the ongoing authority of *Linnell*, decided as it was before the modern law of negligence began with the foundational case of *Donoghue v. Stevenson*, [1932] UKHL 100 in 1932. Many years later in *Kamloops v. Nielsen*, [1984] 2 S.C.R. 2, the Supreme Court of Canada adopted the two step test articulated by Lord Wilberforce in *Anns v. Merton London Borough Council*, [1978] A.C. 728 for establishing a duty of care. The *Anns* test required not only a relationship of proximity between the parties that made damage reasonably foreseeable but also consideration of the policy reasons that might negate or limit the scope of the duty or the class of person to whom it might be owed. At the second step the existence of a duty had to be considered in light of all relevant circumstances, including any applicable statutes or regulations.

[333] Not long after *Ryan*, the test was reformulated in *Cooper v. Hobart*, 2001 SCC 79 making it necessary to consider firstly, whether the case falls within or is closely analogous to a previously recognized category of relationships, where a

duty of care had been recognized. For novel cases, a three-stage test is applied. At stage one the foreseeability of damage remains essential but insufficient to establish a *prima facie* duty of care. The second stage requires a relationship of proximity between the parties. Analyzing proximity includes a focus on broad policy factors. The third stage considers residual policy factors. See also: Philip H. Osborne, *The Law of Torts*, 4th ed. (Irwin Law Inc., 2011) at 70-71. Arguably, the effect of the *Anns/Cooper* test has been to limit the expansion of negligence claims in favour of an incremental approach.

[334] Apart from *Linnell*, the defendants did not discuss the legal framework. I note that in *Green v. Allen*, 2016 ONSC 4454, the issue of whether private property owners owe a duty of care to motorists on adjacent roadways, to avoid hazardous obstructions of visibility, was viewed as novel with potentially far reaching implications. Although I recognize that Ms. Huang's relationship to Britco and the owners of the Britco property was not simply that of a motorist, in light of the limited submissions I received, the evolution of negligence law, and the absence of an adequate evidentiary record, I am not able to find Britco and or Britco's property owners liable.

a) Ms. Huang and the CPR

[335] The parties rely upon a number of authorities in support of their conflicting positions on the relative degree of fault of Ms. Huang and the railways.

[336] The defendants' cases include *Salaam v. Abramovic*, 2010 BCCA 212, in which the plaintiff was found, on appeal, to be 75% contributorily negligent after she failed to stop at a stop sign or look for oncoming traffic before entering an intersection. The defendant, who saw the plaintiff enter the intersection and could have avoided the accident, but insisted on his right of way, was found 25% liable.

[337] Similarly, in *Davidson v. Kamloops* (1995), 56 B.C.A.C. 201, the plaintiff was found 100% liable after she drove through a stop sign and into an intersection, without looking left or right, where she was struck by another vehicle. She alleged

she did not see the stop sign because it was obscured by tree branches. The trial judge concluded that even without a visible stop sign, the plaintiff owed a duty under the *Highway Act* to oncoming traffic approaching from her right as she entered the intersection. Ms. Huang points out the decision precedes *Aberdeen* and the apportionment was based on causation not blameworthiness.

[338] In any event, although Ms. Huang committed essentially the same acts of negligence as the plaintiffs in both *Salaam* and *Davidson*, the negligence of the driver is in no way comparable to the CPR's.

[339] She also relies upon some older authorities. Those that post-date *Aberdeen* include *Knight v. Li*, 2011 BCSC 184. The plaintiff was intoxicated, ran a stop sign and hit the defendant who was driving through an intersection with a pedestrian controlled light. The trial judge found the plaintiff 75% and the defendant 25% at fault, because he was driving too quickly and did not approach the intersection with sufficient caution.

[340] The only case I was referred to involving a train collision is *Zsoldos v. Canadian Pacific Railway Company*, 2009 ONCA 55, leave to appeal dismissed [2009] S.C.C.A. No. 120. The collision occurred at night at an unlit passive crossing equipped with crossbucks but no stop sign. The plaintiff was impaired but very familiar with the crossing. The road approached the tracks at a 45 degree angle and the sightlines "could be" obscured by crops. There was a sign on the roadway warning drivers of the crossing and the need to reduce their speed. The trial judge found the existing sign was too close to the track for drivers to stop in time for a train. The CPR was found negligent for failing to carry out night time inspections of the crossing to determine whether the passive system was sufficient to protect motorists using it at night. The court determined if the railway had done so, it would have known additional warnings were required. The plaintiff's contributory negligence was assessed at 25% based on his impairment and driving too quickly. Notably, the Court of Appeal observed that assessment may have been somewhat excessive but there was no cross appeal by the plaintiff.

[341] Turning to consider the *Aberdeen* factors, I agree with Ms. Huang's suggestion that the duty owed by the CPR to motorists using Smith Crossing was important to public safety. The enormity of the risk in the event of a collision is undeniable. Smith Crossing is one of a multitude of crossings across Canada that are not protected by an automated warning system. Motorists using those crossings depend upon the railways that own and operate them to ensure it is reasonably safe to do so. Trains are unable to stop to avoid an emergent hazard.

[342] I do not agree, however, that the duty Ms. Huang owed was only to herself. As the defendants point out, train collisions can result in derailments and harm to train crews, bystanders, other motorists, railway property and adjacent properties.

[343] Regarding the number of acts of fault or negligence, Ms. Huang suggests she committed only one act of negligence when she failed to come to a complete stop at the First Stop Sign seconds before the Collision. Certainly that one act was a *cause* of the Collision, but Ms. Huang's negligent conduct had occurred every time she drove eastbound over Smith Crossing.

[344] At the same time, I accept the CPR engaged in a more prolonged, repeated failure to observe, evaluate and address the deficient southbound sightline at Smith Crossing prior to the Collision, despite many opportunities to do so, resulting from the CPR's ongoing careless approach.

[345] With respect to timing, the CPR's failure to adequately monitor and maintain adequate sightlines at Smith Crossing preceded Ms. Huang's arrival at Britco on April 22, 2014.

[346] I have already found that Ms. Huang's conduct involved breaches of the MVA, whereas the CPR was not subject to statutory requirements at the time of the Collision.

[347] With respect to what might be characterized as the subjective element or the nature of their conduct, the CPR was clearly more blameworthy. Ms. Huang's

negligence resulted from an unreasonable but honestly held belief the railway tracks had been abandoned, not recklessness or deliberate risk taking. In contrast the CPR was indifferent in its approach to maintaining adequate sightlines despite being fully aware of the grave risk of collisions.

[348] In summary, while some of the *Aberdeen* factors suggest both parties are equally blameworthy, and only Ms. Huang was subject to and breached existing statutory requirements, the CPR was more blameworthy with respect to three important factors. I conclude therefore the CPR's degree of fault is greater than Ms. Huang's bearing in mind that causation plays no role in the analysis. I apportion liability 60% to the CPR and 40% to Ms. Huang.

IV. DAMAGES

A. Discussion of the Evidence

1. Ms. Huang at the Collision Scene

[349] In response to the Collision, Mr. Barfett stopped his truck on Glover Road. He jumped over a railway car and headed toward Ms. Huang's vehicle. He remembered there was a man behind him who said he had first aid training. Together they fought to get the car door open. Mr. Barfett called 911 and kept the door open while the man checked on Ms. Huang. Mr. Barfett saw she was slumped over and not moving. He recalled the fire department arriving first, followed by police and then an ambulance.

[350] Darryl Edwards was the first paramedic to arrive at the scene. Mr. Edwards remembered Ms. Huang was not communicative. In his occurrence report he wrote: "The patient appeared to be in her 30s with a decreased LOC 8 out of 15", based on the Glasgow Coma Score ("GCS"). He was not able to specify the basis for the score of eight. His report also stated: "She had a head injury which was bleeding but was controlled." Mr. Edwards testified life support paramedics arrived five minutes later and took over, followed by an air ambulance and flight crew. He noted in his report that "we" stabilized Ms. Huang's C-spine, extricated her and moved her into

an ambulance for further assessment and preparation for the flight. Two patient care reports completed by other paramedics show Ms. Huang's GCS was assessed at 15 out of 15 and indicate she was responsive to commands and communicating to some extent.

[351] Ms. Huang seems to have a dream-like memory of being in her car after the Collision, unable to move her body, and somebody talking to her.

2. Ms. Huang after the Collision

[352] The air ambulance transported Ms. Huang to Royal Columbian Hospital ("RCH"). Constable Schupp rode with her and the flight crew. He could not recall if Ms. Huang was conscious or unconscious during the flight although she lay on a stretcher with her eyes closed, not speaking.

[353] Ms. Huang was transferred from RCH to the intensive care unit at Vancouver General Hospital ("VGH"). In or about May 22, 2014 she was admitted to G.F. Strong Rehabilitation Centre ("GFS"), where she remained until mid-August when she discharged home.

[354] Ms. Huang's husband was already in Vancouver visiting Ms. Huang on the day of the Collision. He spent as much time as he could here while she was in hospital, but travelled back and forth to China because of work obligations. In or about June 2014 her older sister Bin Huang ("Bin") came from China and stayed for six months, obtaining a passport and a six month visa to do so. It was the first of three six-month visits, the second and third starting in October 2015 and October 2016 respectively. Bin is a physician who had retired from full-time practice before the Collision. She quit a part-time job to help Ms. Huang.

[355] Mr. Lin, Bin and Ms. Huang gave entirely consistent evidence about her symptoms, recovery and ongoing limitations after the Collision.

[356] Ms. Huang indicated she had no memory of the air ambulance or being at RCH. Her face was very swollen and bloody when Mr. Lin arrived. She was

unresponsive except to say repeatedly she was in pain and felt like she was burned. Despite receiving morphine she continued to complain of pain. Ms. Huang does remember being at VGH, taking a lot of painkillers, feeling half conscious and still not being able to move her body. Ms. Huang described the pain in her legs and hands as extreme despite the medication. Mr. Lin said she became more communicative at VGH but was quite weak and it was hard to hear her.

[357] At GFS Ms. Huang initially had difficulty even sitting up in bed. She described a feeling of instability that was like being inside a boat. At first she could not use her fingers or make a fist. Her hands had no strength. Ms. Huang also needed a lift to get her in and out of bed and to use the toilet. Bin spent all day every day with Ms. Huang at GFS, sometimes massaging her feet and hands because she complained of numbness. Bin also prepared her nutritious drinks with Chinese herbs. Ms. Huang needed need help with eating but also used a special spoon. Bin would feed her sometimes, testifying Ms. Huang shook as she tried to eat herself. Bin also took her sister outside and helped her shower because the nurses only bathed her once a week.

[358] During her time at GFS, Ms. Huang participated in physio, occupational and speech therapy. Ms. Huang also met with a psychologist for the first time in her life because she was “crying a lot”. Ms. Huang described working very hard to recover the use of her hands with the assistance of the occupational therapist. The physiotherapy focused on improving her mobility. Bin observed Ms. Huang pushing herself to do exercises during therapy sessions.

[359] Ms. Huang testified that by the time she left GFS, her hands looked normal but felt “thick” and the burning pain had not improved. Ms. Huang recalling learning to stand and walk in the swimming pool at GFS but mobilizing with a wheelchair while she was there and using a walker for the first time a few days before being discharged.

[360] Both Bin and Mr. Lin were present when Ms. Huang returned home. It is, as I have indicated, a three-level townhouse. The laundry room and the garage are located in the basement. The kitchen is on the main floor and her bedroom is upstairs. From the main entrance of her home to the street there is a gate, a paved walk, and about nine steps.

[361] According to Bin, Ms. Huang could not quite walk at that point. Both Bin and Ms. Huang described it as very, very difficult for her to get upstairs to her bedroom. Bin supported her on one side and encouraged her to pick up her legs step by step as she held onto the railing. Ms. Huang remembered Bin and her husband helping her up to the bedroom. She also needed help accessing the washroom. At first Ms. Huang relied on Bin to push her in a wheelchair when they went outside. By the “wintertime” she was walking short distances using the walker. Ms. Huang described Bin really urging her to make progress. Ms. Huang continued to struggle with her hands. Although she could move them, they felt numb or not sensitive enough.

[362] Bin accompanied Ms. Huang to most of her appointments especially in bad weather or when she had more than one in one day, carrying her umbrella and making sure she ate in between. Ms. Huang also needed help navigating the outdoor stairs with her walker and help getting in and out of taxis especially in bad weather.

[363] Until the spring of 2015, Ms. Huang was assisted by homecare workers 13 hour per week. While Bin was there, however, she prepared Chinese meals for Ms. Huang, cleaned the kitchen, and completed other housework left undone by the homecare workers. She also slept with Ms. Huang in case she needed help getting to the washroom during the night. In addition to encouraging her to exercise, Bin would massage Ms. Huang.

[364] When Bin left for China in or about December 2014, Mr. Lin returned to Vancouver for about one month. After that, Ms. Huang was alone and reliant on homecare workers to help her with grocery shopping, cooking and housekeeping.

She found it difficult to prepare meals for herself partly because she had trouble cutting things. She dropped dishes, had trouble picking up small items with her fingers, and could not take off bottle tops. She remembered not being aware she had cut herself while chopping something until she saw blood. Sometimes she would forget to turn off the stove.

[365] Ms. Huang continued her rehabilitation, participating in occupational and physiotherapy. For a time, therapists came to her home. Ms. Huang also attended massage therapy regularly. A kinesiologist helped her with rehabilitation exercises that she did mostly at home. Ms. Huang also exercised at the local community centre located just across the street from her home. The kinesiologist met and continues to meet with her there once per week, which she finds motivates her to work harder.

[366] Mr. Lin and Bin also accompany her to the gym when they are here. Mr. Lin said Ms. Huang insisted on exercising every day and worked very, very hard to recover from her injuries. He also said she looks fit but does not have much strength. Mostly she uses the treadmill but cannot walk fast. He has noticed she loses her balance if she carries anything. Bin said more recently she has had to push Ms. Huang to exercise and go across the street to the community centre.

[367] Lindsay Alford, an occupational therapist with GFS who provided outpatient services to Ms. Huang until March 2015, also testified about her progress. During that period they focused on her upper extremity strength and function, and improving her independence within the home. Ms. Alford indicated by the end of her involvement, Ms. Huang was completing most of the tasks they worked on with extra time modifications and adaptive aids, although she continued to experience strength and sensory impairments in her hands, as well as fine motor and dexterity impairments. Fatigue remained a big issue. Ms. Huang told Ms. Alford she was preparing two meals a day, but her evidence was those meals consisted of a glass of milk and piece of bread for breakfast and heating up pre-prepared items. Ms. Huang was also able to manage a small load of laundry which she carried down

the stairs in a basket or bag. Ms. Alford described Ms. Huang as trying hard during their sessions. The therapy included educating Ms. Huang about conserving her energy for the most important tasks of daily living.

[368] Based on Ms. Alford's assessment of her progress, the hours of homemaking support were reduced from 13 to nine hours per week. Subsequently they were reduced to eight hours per week which is provided over three days. Ms. Huang says the level of support is not nearly enough. She continues to struggle with meal preparation: chopping and cutting, lifting pots, and dealing with a hot stove, along with other tasks, are difficult for her. Unless her sister or husband are visiting, Ms. Huang relies on neighbours to take her grocery shopping which involves helping with her walker, the actual shopping, and carrying the groceries into her home. There are many barriers to her grocery shopping independently which she mostly does at an Asian supermarket, including fatigue, poor balance, and the small basket on her walker. She was cross examined on the benefits of online grocery shopping, something she said she is not comfortable doing, preferring to see what she is buying. She also expressed uncertainty about whether the Asian foods she eats would be available and how she would deal with the delivery of large or heavy items to her doorstep. According to Ms. Huang and Bin, homemakers spend most of the time preparing meals and cleaning the kitchen and bathrooms. There is not much time left for any additional housework. Although she is able to do some light housekeeping, Ms. Huang described her home as a mess. Because her energy is very limited and she tires so easily, she finds she is not able to accomplish much in a given day.

[369] Ms. Huang provided fairly detailed evidence about most of her ongoing symptoms and limitations. She described her legs as feeling very, very heavy like metal, all the joints as inflexible, and walking like a robot. She finds her leg muscles get very tired. Her left leg is especially stiff and she catches her foot on the ground a lot. Ms. Huang indicated there have been a few dramatic falls and countless smaller ones. In addition to tripping because of her left foot, she said she has fallen because she loses her balance, for example when she is using the walker and the ground

is uneven or it catches on something. She finds going down stairs particularly problematic.

[370] Mr. Lin gave a similar but less detailed account of Ms. Huang's physical limitations, noting quite a bit of improvement in the first year after the Collision but not much since. He described her left leg as quite stiff, which she drags when she walks, and her pace as slow. Mr. Lin indicated she tends to fall when she climbs stairs. He described her slipping and falling a few days before his testimony when she tried to get up from a chair to carry her dishes. Similarly, Bin's biggest concern for Ms. Huang is her falling when she is alone. Bin observed Ms. Huang almost fall twice while using the treadmill, and Bin prevented others. Although Ms. Huang relies on a walker outside the home, inside the home she does not, using the walls and furniture for support instead.

[371] Among Ms. Huang's most significant ongoing symptoms is fatigue. She finds she has very little energy and is easily exhausted. For some time after the Collision, Ms. Huang suffered from nightmares and trouble sleeping. After her examination for discovery and several sleepless nights, she was prescribed Zopiclone, a sleeping medication which she takes as needed. Both she and Bin described her sleep as improving in the year before the trial. Her fatigue is unchanged, however. On a typical night, Ms. Huang sleeps about 10 hours. She also naps in the afternoon. Everything makes her tired, especially walking. After even 15 minutes she finds she needs to lie down and rest.

[372] Consistent with this evidence, Ms. Huang displayed obvious signs of fatigue throughout her testimony, including frequent yawning.

[373] Ms. Huang said she suffers from headaches and dizziness when she is tired. She identified two types of headaches: migraines and tension headaches which occur at least once a week. She also experiences two kinds of dizziness. One involves feeling unbalanced which happens very frequently and the other, feeling as though the world is spinning, which occurs only occasionally.

[374] Ms. Huang feels stiffness in her neck that makes it hard to turn. Although her range of motion has improved, she has ongoing pain in her left shoulder and arm that makes it painful to reach up for things.

[375] Ms. Huang's hand symptoms have also continued. The skin still feels "really, really thick" and there is a constant burning pain. Proficient at keyboarding before the Collision, Ms. Huang's typing is now much, much slower. If she drops a small item on the floor, like her credit card, she has trouble picking it up. Similarly she struggles to pick one small item out from among others in her purse or pocket. Mr. Lin stated simply her fingers do not move "like normal people". In addition to engaging in hand exercises and various activities that involve her hands and fingers, she tried piano lessons to improve her dexterity but her inability to play was very upsetting to her.

[376] Not surprisingly, Ms. Huang became depressed after the Collision which she linked to realizing she was not going to be to "normal" again and her goal of establishing a successful career and then bringing her husband to Canada that she had worked so hard to achieve was not possible. She described feeling like a "100 year old woman" at the age of 49, who was a burden to her family and friends.

[377] To address her depression, Ms. Huang began counselling with psychologist Dr. Elsie Cheung and was later prescribed anti-depressant medication by her family doctor. Despite the medication and ongoing therapy, Ms. Huang said she often feels numb or "dull towards things" and lacks the energy and motivation to engage in physical activity. She also experiences feelings of intense sadness and finds she is overly sensitive now.

[378] Both Mr. Lin and Ms. Huang indicated that since the Collision she has lost her sense of humour and interest in socializing. She used to enjoy parties and quite often spent time with friends, but she rarely sees them now in part because she feels she has nothing to offer and does not see it as appropriate to talk to them about her problems. She no longer plays the role of lifting up the family atmosphere which she

used to do by making jokes, organizing activities and inviting people over. Bin as well as Mr. Lin and Ms. Huang testified that she has also lost all interest in travelling, which was a passion of hers. Mr. Lin said their only trip since the Collision was a visit with Amy in Toronto and the flight was difficult for Ms. Huang who needed help getting seated and was afraid to try to use the tiny washroom. She identified her daughter's success at university as her one remaining source of joy.

[379] Other deeply personal symptoms that have had a significant impact on Ms. Huang include bladder incontinence and a loss of sexual function. She has engaged in pelvic floor therapy and takes medication to address her bladder symptoms but continues to experience some incontinence, which she deals with by wearing pads.

[380] Describing essentially no genital sensation and other significant negative changes in her sexual function after the Collision, Ms. Huang said she felt uncomfortable during initial attempts at intercourse with Mr. Lin after her discharge from GFS. Subsequent attempts were also unsuccessful. Ms. Huang regards Mr. Lin as disinterested in her. She feels "really, really weird" sharing a bed with him but "just lying there together doing nothing". She testified he is now more like a caregiver than a husband, and she expressed much sadness if not despair that he remains with her out a sense of obligation, given his "high morality". She fears him becoming involved with another woman in China and the marriage ending. Bin shared her concern to some extent.

[381] Much of Ms. Huang's evidence on this point was also corroborated by Mr. Lin. He described how much they enjoyed their time together before the Collision. Now when he visits he feels as though he is coming to take care of a patient and finds it hard work.

[382] Both he and Ms. Huang described their sexual relationship before the Collision as very positive and an important part of their marriage. Mr. Lin suggested their loss of intimacy has had as much to do with Ms. Huang's lack of interest and

loss of sensitivity, but he also finds her difficult to talk to now. She often does not respond to him and becomes upset or angry if he tries to joke about this. Apart from going on short walks and to the gym across the street, the two of them no longer engage in recreational activities together.

[383] At the same time, Mr. Lin testified that he remains committed to Ms. Huang and is willing to attend counselling with her. He loves her and feels a deep sense of gratitude toward her. He spoke of her parenting as exceptional and clearly admired her ambition, determination and competence before the Collision. Ms. Huang indicated she was both surprised and happy in response to his evidence about counselling, describing Chinese men as typically too embarrassed or unwilling to talk about marriage and family issues with another person.

[384] Mr. Lin, Bin and Ms. Huang also gave very consistent evidence regarding significant changes in her personality and cognitive functioning, as well as her emotional reactivity after the Collision. Describing her as an excellent decision-maker, highly organized, efficient, very confident, independent, and upbeat before the Collision, all three indicated she is now essentially the opposite. Each provided examples that demonstrate she is also easily irritated and impulsive. Mr. Lin recalled that about a week before he testified, Ms. Huang became angry and hung up on him during a phone call because he was having trouble hearing her due to a poor connection. When he tried to contact her later through WeChat, he discovered she had removed his name as a contact. Other examples show she engages in similar behaviour with Amy. Mr. Lin referred to one particular incident as improper and embarrassing for their daughter. Ms. Huang has been reactive and intolerant with homecare workers, finding fault with their cleaning methods and cooking. Ms. Huang is exquisitely aware of these negative changes and becomes guilt-ridden and very distressed by her negative behaviour.

[385] Mr. Lin, Bin and Ms. Huang offered a number of other examples consistent with the evidence she is no longer organized, slow to process information, unable to multi-task, and exercises poor judgment at times. She and Mr. Lin pointed to her

response to a broken furnace. Rather than obtain a number of repair estimates, which she would have done in the past, she hired someone who replaced rather than repaired the furnace and installed a new hot water tank at very significant expense. Ms. Huang was obviously alarmed by her inability to control costs, knowing she was particularly skilled at doing so and it was a fundamental part of her work before the Collision. She also described impulsively booking and paying for a trip to the North Pole, after her doctor suggested travelling might improve her mood, which she then cancelled without a refund believing she would not be able to manage physically.

[386] Although Ms. Huang was cooperative and responsive throughout her testimony, I noticed that very occasionally her responses seemed inappropriate, displaying an almost child-like naiveté. For example, when asked by her own counsel if she knew a particular Britco employee, she replied no and then became preoccupied with wanting to know why she was being asked that question. Similarly, when cross examined about her garden at home, she invited opposing counsel to come and see it for himself.

[387] Ms. Huang also described changes in her cognitive function as affecting her ability to read and write. She finds she becomes very distracted while reading and has trouble remembering what she has read. In addition to problems with her dexterity, she now writes really slowly because her thoughts are disorganized and she makes a multitude of mistakes.

[388] She has however remained responsible for her own financial affairs and there is no indication she struggles with those tasks. From May to August 2016, Ms. Huang took three short courses at Langara College related to XL software, achieving A pluses and an A. Ms. Huang testified there was no in-class work, she already knew all of the material, and she worked very hard on the homework to get the marks she did.

[389] Ms. Huang has been receiving some specialized physiotherapy, including gait-training therapy from NeuroAbility, a clinic that treats clients with spinal cord and brain injuries, in addition to pelvic floor therapy. In addition to continuing to work with a kinesiologist, she still attends massage therapy frequently, in part to help with pain.

[390] Reluctantly, Ms. Huang acknowledged her recovery seems to have plateaued, a word she says she “hates”. She still hopes her gait and her dexterity will improve more and is concerned about maintaining the level of function she has, finding she regresses quite quickly.

3. Medical Evidence

[391] Ms. Huang relies upon the evidence of a number of medical specialists who provided consistent findings and opinions about Ms. Huang’s injuries, conditions and symptoms arising from the Collision; her level of functioning and prognosis, as well as recommendations regarding future treatment and services. They include Dr. H.A. Anton, a physiatrist; Dr. Douglas Hamm, an occupational medicine specialist; Dr. Jennie Mickelson, a urologist; Dr. Stacy Elliot, a sexual medicine specialist; Dr. Stephen Anderson, a psychiatrist; Dr. Ulrich Lanius, a neuropsychologist; Dr. John Du, also a neuropsychologist; and Louise Craig, a physiotherapist and functional capacity evaluator. Drs. Mickelson and Elliot were not cross examined.

[392] The defendants rely upon the opinion evidence of two medical specialists: Dr. Maryana Apel, a physiatrist; and Dr. R. Sahjpaul, a neurosurgeon. Dr. Sahjpaul was not cross examined. The opinions he expressed in his report dated December 30, 2016 do not significantly contradict those of Ms. Huang’s experts. Some of Dr. Apel’s opinions certainly do.

[393] In addition, Ms. Huang relies upon the opinion evidence of Nazneen Chow regarding the cost of her future care, and the defendants, Shannon Smith, both occupational therapists.

[394] The defendants do not dispute Ms. Huang suffered very serious injuries in the Collision, including a spinal cord injury and a brain injury, although aspects of the spinal cord injury and extent of the brain injury are contested. The defendants also acknowledge she experiences ongoing fatigue, and developed depression and a secondary condition in her left shoulder as a result of the Collision. Further, they do not deny the Collision caused multiple contusions, bruises and lacerations to her body which have healed, although she has been left with some permanent scarring on her face.

[395] The reports and the evidence of the experts demonstrate that on the whole, Ms. Huang provided remarkably consistent accounts of her symptoms and functioning that were also consistent with her testimony and the experts' objective findings as well as their clinical observations of her, excepting Dr. Apel. Aside from Dr. Apel, the experts found Ms. Huang made good if not maximal effort during any testing they conducted, with some very minor exceptions. All of the experts, including Dr. Apel, found Ms. Huang to be cooperative. Almost all, if not all, of the experts indicated Ms. Huang identified fatigue as a very significant problem for her, which was, again, consistent with their own observations. Most noted she also complained of fatigue during their assessments which they accommodated with rest breaks.

[396] The key findings and opinions of Ms. Huang's experts, and in particular Dr. Anton, may be summarised as follows:

- As a result of the Collision, Ms. Huang suffered an incomplete spinal cord injury with features of central cord syndrome at the C4 through C6 level, with the last normal level being C5. Her spinal cord injury has resulted in motor and sensory impairments including neuropathic pain in her upper extremities, weakness and reduced dexterity in her hands, abnormal sensation and neuropathic pain in her hands, weakness in her legs, an abnormal gait, a neurogenic bladder and much impaired sexual functioning, a mild traumatic brain injury, a neurocognitive disorder due to the traumatic brain injury, major

depressive disorder and a secondary condition involving myofascial pain and reduced range of motion in the left shoulder. Fatigue is one of her most significant symptoms and likely has multiple causes including her spinal cord injury, her brain injury and her depression.

- Ms. Huang has received and participated in appropriate treatment and rehabilitation services for her physical and psychological injuries to date.
- Ms. Huang's condition is unlikely to improve significantly although her capacity to function with her impairments may improve with further therapy.
- She faces an increased risk of a decline in function as she ages due to her injuries, in particular her spinal cord injury.
- Ms. Huang is not competitively employable.
- Various ongoing treatments, therapies, services, equipment etc. over the short and long-term are recommended to maintain her recovery for as long as possible, to promote her quality of life and address the risks of deterioration.

[397] Dr. Apel offered the following impressions of Ms. Huang's injuries:

- The Collision had possible mild residual sequelae of mild closed traumatic brain injury;
- Ms. Huang developed partial left frozen shoulder, likely during the recovery period, which has significantly improved to date and has a prognosis for further improvement and/or resolution subject to appropriate self-management, including an exercise program;
- Ms. Huang was diagnosed with central cord syndrome injury but this is no longer the case, as her most significant residual disability is her left lower extremity. Ms. Huang's current clinical last preserved spinal level of motor function is L2 (hip flexor level) with no consistent sensory abnormalities noted at all.
- Ms. Huang presented with a history of benign paroxysmal positional vertigo before the Collision;
- Her complaints of neuropathic left upper extremity pain, were not confirmed "directly or indirectly during clinical objective examination findings".

- Ms. Huang demonstrated significant deconditioning and poor fitness.
- Ms. Huang's current fatigue is likely multifactorial and "possibly subject to depression, sequelae of her brain and/or spinal cord injury", but to a significant degree her deconditioning.

[398] Regarding prognosis, Dr. Apel opined that although any neurological structural recovery was complete, Ms. Huang had not yet achieved maximal medical improvement. In contrast to the other medical specialists, her opinion was Ms. Huang could achieve *significant* further improvement in her level of function and comfort by addressing issues of fitness and conditioning, her emotional and psychological problems, and her reported neuropathic pain by desensitization and meaningful pharmacological and non-pharmacological treatment. Dr. Apel emphasized this view during her direct examination. Under cross examination, however she appeared to retreat from it to a certain extent, stating at one point Ms. Huang could improve a bit more.

[399] Her report provides that Ms. Huang's "structural residual difficulties" have the potential to get worse as she ages, including weakness, which again, could be remedied by ongoing "meaningful fitness and conditioning maintenance". During her testimony, however, Dr. Apel indicated she would not be surprised if Ms. Huang ended up in a wheelchair.

[400] Dr. Apel also expressed the opinion that Ms. Huang should be employable performing sedentary/light duties that do not involve weight-bearing, walking on uneven ground, or activities that stress her balance, suggesting part-time work that allows her the option of telecommuting and additional time for more complicated tasks.

[401] I say at this stage that where Dr. Apel's opinions conflict with those of the other medical specialists, I prefer their evidence. In addition to being concerned about her objectivity, I view the expertise of Dr. Anton in particular as superior to hers, although she is certainly qualified to provide the opinions she did. Also a physiatrist, Dr. Anton has extensive and considerably more experience in diagnosing

and treating patients with complex spinal cord injuries and acquired brain injury. Until recently, his clinical practice included active involvement with patients at GFS, BC's main provider of complex rehabilitation services to persons with brain and spinal cord injuries. In addition, he has engaged and continues to engage in significant research in the field. More recently, the issue of fatigue has been the focus of his research. He leads a group called "Fatigue and Function and Neuromuscular Disorders" based at GFS that has published several papers on fatigue and spinal cord injury.

[402] In relation to psychiatric and psychological matters, Dr. Apel indicated she would defer to a psychiatrist and seemed to acknowledge the importance of neuropsychological testing in determining the scope and magnitude of the cognitive effects of Ms. Huang's injuries.

[403] Regarding the issue of objectivity, Dr. Apel's report and her evidence left me with the impression she was striving to minimize Ms. Huang's condition. When asked if she made any observations about Ms. Huang's fatigue, although the evaluation lasted three hours, Dr. Apel indicated she had not, stating:

Under the [indiscernible] observation as general statement, fatigue would be part of the distress that I would comment on, if it was either complained of or evident. And what statement here the patient was not in distress.

And as I said, examination was fairly labour intensive and it was significant in time spent. ... So patient was able was able to climb down from the examining table. I, of course, did not observe her to get dressed although I asked does she need help, I always do. And then she left the office and there was no difference in her presentation, in her abilities in comparison to how it was when she came in.

[404] Frankly, I am not able to accept that Ms. Huang did not complain of fatigue, appear fatigued, or ask for a break, given what I observed while she testified, the otherwise uniform evidence regarding the significance of her fatigue symptoms, and her interactions with other medical specialists.

[405] Dr. Apel's report noted Ms. Huang was unwilling to demonstrate her stretching exercises, which she acknowledged, testifying Dr. Apel asked her to

perform them on a cold concrete floor which would have been painful. Ms. Huang described Dr. Apel as disrespectful and treating her like “an enemy” during their appointment. According to Ms. Huang, when she asked for a mat, Dr. Apel suggested she was refusing to perform the exercises, stating “well if you don’t want to do it, you don’t need to”. Ms. Huang was not cross examined about this incident.

[406] In cross examination, at times Dr. Apel was less than straightforward, and struggled to answer questions directly.

a) Spinal Cord Injury

[407] Dr. Anton first assessed Ms. Huang as a treating specialist while she was a patient at VGH. At that time, he reviewed the MRI imaging of her spine that showed no fractures but damage to some of the ligaments that support and stabilize the spinal cord, and swelling in a number of locations around the spinal cord. She also had some changes in the signal within the spinal cord indicating an acute spinal cord injury, reported at C5 and C6. A subsequent MRI reported them at C4 to C6 (mid-neck) potentially affecting her arms, legs, trunk, bowel, bladder, and parts of the autonomous nervous system.

[408] Dr. Anton explained that Ms. Huang’s neurological function improved over time to some extent because the injury to her spinal cord was incomplete. In his report, he concluded further significant improvement was unlikely. His opinion was not undermined by cross examination. Applying the standard American Spinal Injury Association impairment rating, he classified her level of injury as AIS-D which was not disputed.

[409] He clarified Ms. Huang’s spinal cord injury has some but not “text book” features of a “central cord syndrome” which typically affects the hands more than the legs.

[410] When Dr. Anton met and examined Ms. Huang on September 29, 2016, he found a complex pattern of altered sensation in response to different sensory modalities such a light touch, pinprick and cold. He identified the sensory

impairments she has been left with as reduced sensation and neuropathic pain, with hypersensitivity to sensory stimuli in the hands, or allodynia, with causes her to experience normal touch as painful. During his testimony he indicated she is consequently at risk of burning and cutting herself.

[411] Regarding motor impairments, he found some mild weakness in her hand and legs, worse on the left than the right, with a specific weakness in the muscles of the left ankle that lift the foot. Regarding the weakness in her hands, it was not clear to Dr. Anton she gave maximal effort. He specified he did not mean to suggest she was not trying. Instead she may not have fully understood or the decreased sensation in her hands made it harder for her to use the muscles. He did not express the same concern about the effort she made in relation to the weakness he found in her wrists and some specific finger muscles. Dr. Anton also noticed subtle wasting in the muscles at the base of the thumb and between the thumb and index finger, which he described as secondary to Ms. Huang's spinal cord injury.

[412] Both Dr. Anton and Dr. Hamm gave evidence about Ms. Huang's abnormal gait both with and without a walker that again was consistent with her own and Mr. Lin's. Dr. Anton observed that both legs appeared stiff. Her left leg was externally rotated. Her walk was clumsy, slow and effortful, or energy-consuming. Dr. Hamm described Ms. Huang's gait in much the same way, stating that due to her left toe drop, she tends to swing her left leg out a little bit to clear the ground. Dr. Anton also specified the weakness in her left ankle means she has trouble clearing her left foot which puts her at risk of tripping and falling.

[413] Dr. Hamm's opinion about the neurological and functional effects of what he referred to as Ms. Huang's "traumatic central cord injury at the cervical level" was entirely consistent with Dr. Anton's.

[414] Dr. Anton also expressed the opinion that Ms. Huang was at increased risk of a decline in function with aging, as a consequence of her injuries, especially her spinal cord injury, that he described as really difficult to quantify. He explained

normal aging is associated with some decline and slightly more than one-half of those without a spinal cord injury, over the age of 75, require some assistance with daily living activities as a consequence. In his report he opined some evidence suggests functional decline in persons with spinal cord injury typically occurs 15 to 20 years earlier. He testified there is clear evidence the decline and the consequent need for assistance happens at an earlier age for people with neurological difficulties. He clarified that some literature suggests this is due to aging and other literature suggests how long a person has lived with a spinal cord injury is also a factor. He identified both early aging and the timing of the injury as relevant to the risk Ms. Huang faces.

[415] Although he did not recommend a motorized scooter or electric wheelchair at this point, he testified it will become increasingly difficult for Ms. Huang to manage with a walker. At some point, she will be a candidate for the device(s), with the goal of conserving her energy, facilitating access to the community, and participation in activities. I note Dr. Apel also accepted there is a substantial risk Ms. Huang's condition will deteriorate to the point she will require a wheelchair.

[416] Dr. Anton also stated Ms. Huang is probably at some increased risk of early mortality due to her spinal cord injury. Although a healthy lifestyle including regular exercise can ameliorate that risk, he noted the mobility impairments caused by her spinal cord injury make it more difficult to participate in exercise. For much the same reason (weight bearing exercise), he explained, as a woman with a spinal cord injury, Ms. Huang is at a somewhat increased risk of osteoporosis, and therefore fragility fractures in the spine and extremities.

[417] Dr. Anton made a number of recommendations including:

- a referral to a specialist in sleep disorders and blood work to rule out a treatable cause of fatigue,
- topical pain medication and if ineffective, an oral medication such as gabapentin which he cautioned may have negative cognitive side effects,

- urology follow up,
- evaluation by a sexual health clinician,
- referral to a psychiatrist for an opinion regarding treatment options for depression,
- diagnostic testing if her shoulder pain grows worse,
- dietary and vitamin supplements to manage the risk of osteoporosis as well as baseline bone density studies,
- ongoing medical care from a family physician,
- at least episodic consultation and care from a physiatrist for problems arising from her SCI,
- in the short term, continuation with occupational therapy, physiotherapy focused on improving her gait and balance, and kinesiology supervised exercise,
- continued assistance with housekeeping, cooking and shopping,
- mobility aids for safe ambulation:
 - a brace for her foot drop, if her gait does not improve a trial ankle foot orthosis,
 - a wheelchair for longer distances and probably at power wheelchair and scooter in the future as her mobility declines with aging.
- in the medium and long term, participation in appropriate exercise facilitated by annual review and treatment by a physiotherapist with expertise in SCI, access to a gym or fitness centre and support of a kinesiologist.
- assistance from an occupational therapist during transitions in her life or when she requires new equipment
- given she may have cognitive issues, a case manager may be required to help her access care and treatment, along with additional care needs arising from cognitive impairment that a neuropsychological assessment will make clearer.

[418] Dr. Hamm's recommendations were very similar: Ms. Huang should continue to attend gait training, psychological counselling, physiotherapy and massage.

He also said she could benefit from an ankle foot orthotic that would provide more dynamic support for her ambulation.

b) Fatigue

[419] As I have indicated, a number of the plaintiff's medical experts provided opinion evidence about her ongoing fatigue, which all identified as one of her most significant symptoms.

[420] Dr. Anton testified that fatigue is a well-recognized secondary condition for those with spinal cord injuries. He identified two aspects to Ms. Huang's fatigue. One is physical fatigue. Her muscles get tired because she is weak and everything she does – walking, eating, dressing etc. – requires more energy and is more difficult. Two, her fatigue has more general effects and worsens over the course of the day, requiring her to take breaks and make choices about how to use her more limited energy.

[421] In his report, Dr. Anton discussed depression and a sleep disorder as other potential causes of her fatigue. In cross examination, he agreed physical deconditioning could be contributing and if a potentially treatable cause is found, or her depression improves with further treatment, her fatigue could lessen. He maintained, however, the fatigue she now experiences would probably persist, because there is no way to ameliorate the key factor, which is every task she performs is now harder work.

[422] Psychiatrist Dr. Anderson diagnosed Ms. Huang with a neurocognitive disorder due to a traumatic brain injury and identified fatigue as a common symptom of a neurocognitive disorder. Noting an endocrine disorder can result from brain injury, he suggested it as a possible cause of her fatigue worthy of an assessment by an endocrinologist.

[423] Ms. Craig's functional capacity evaluation report dated May 26, 2016 also includes important fact and some opinion evidence about Ms. Huang's fatigue. For example, during the evaluation, Ms. Huang made three requests to lie down

and demonstrated multiple signs of fatigue. She also asked to end the evaluation early due to elevated fatigue levels. When she returned the following morning at 8:00 a.m. she reported feeling well rested, but by 9:30 a.m., she showed signs of fatigue that interfered with the testing, and by 10:50 a.m., she appeared significantly fatigued. Ms. Craig noted Ms. Huang did not recover completely after finishing activities even when she took a break.

[424] Much like Dr. Anton, Ms. Craig opined the tasks of daily living require significantly more energy and attention because each involves much more effort given her spinal cord injury and her brain injury and the same is true for completing daily exercise. Although Ms. Craig indicated she would ultimately defer to the opinion of a physiatrist regarding the potential for improvement in Ms. Huang's fatigue, she maintained: "I don't know how you would get around the person's fatigue in response to activities of daily living."

c) Other Spinal Cord Injury Related Conditions

[425] Dr. Mickelson, Ms. Huang's treating urologist, diagnosed her with a neurogenic bladder secondary to her spinal cord injury, based on a number of symptoms and objective findings including bladder over-activity associated with urgency, elevated voiding pressures, and intermittent residual urine after voiding.

[426] Her report dated October 21, 2016 states that Ms. Huang reported wearing pads routinely, a slowing of her urinary stream, incontinence along with urgency, and rarely urge-related leakage, consistent with her testimony. By then, Dr. Mickelson viewed Ms. Huang as managing her symptoms well with pelvic floor physiotherapy and oral medication to reduce bladder over-activity.

[427] Regarding Ms. Huang's prognosis, Dr. Mickelson opined, and I accept, it is unlikely her symptoms or objective findings will resolve and she is at risk for worsening symptoms of bladder over-activity including urgency, urge-related incontinence, frequency and nocturia. Dr. Mickelson described Ms. Huang's elevated

voiding pressures, slow stream and post-void residuals as concerning, identifying a number of possible conditions that could develop as a result.

[428] Both Dr. Anton and Dr. Mickelson offered limited opinions about the effect of the spinal cord injury on Ms. Huang's sexual function. The report of Dr. Elliot, a sexual medicine specialist, focused entirely on this issue, and was not challenged or contradicted in any way.

[429] In her report, Dr. Elliot identified profound changes to Ms. Huang's sexuality since the Collision. In addition to decreased sexual self-esteem and confidence and feeling rejected sexually by her husband, Ms. Huang has been seriously affected by a range of sensory and physical impairments I do not propose to itemize given their intimate nature and the defendants' position. Dr. Elliot opined all of the changes were caused by the Collision, largely due to the spinal cord injury and the mild traumatic brain injury. Dr. Elliot explained sexual dysfunction is common after a spinal cord injury due to both direct neurological damage and indirect secondary consequences such as neurogenic bladder incontinence, altered sensory and motor abilities, and the higher risk of depression which lowers sexual interest and arousal capacity.

[430] Dr. Elliot noted that Ms. Huang was much more concerned about feeling sexually rejected by her husband and the consequent loss of emotional bonding, than her own loss of sexual pleasure. Dr. Elliot highlighted the importance of treating Ms. Huang's depression and consulting Mr. Lin regarding his views about improving the marriage and or their sexual life, opining Ms. Huang's sadness, anger, depression and lack of independence will likely further push him further away. Dr. Elliot specified the best case scenario would involve relationship therapy together. In the event Ms. Huang is prepared to explore her own sexuality, Dr. Elliot recommended a sexual therapist.

d) Soft Tissue Injuries

[431] Dr. Anton identified Ms. Huang's left shoulder pain and decreased range of motion as probably "frozen shoulder", offering rotator cuff injury as a differential diagnosis. He described the condition as a complication of her spinal cord injury. He clarified the shoulder pain is myofascial and is probably caused by changes in posture associated with the use of a walker.

e) Traumatic Brain Injury and Psychological Injuries

[432] Dr. Anton, Dr. Lanius, and to a lesser extent Dr. Apel diagnosed Ms. Huang with a traumatic brain injury caused by the Collision. Similarly, Dr. Sahjpaul offered the opinion that Ms. Huang sustained memory and cognitive changes consistent with a mild traumatic brain injury.

[433] Dr. Anton described her brain injury as probably mild based on her first documented GCS of 15.

[434] Dr. Lanius, Dr. Du and Dr. Anderson also diagnosed Ms. Huang with a mild neurocognitive disorder resulting from a mild traumatic brain injury caused by the Collision, although Dr. Anderson indicated it was mild to moderate.

[435] In addition, Dr. Anderson diagnosed Ms. Huang with a moderate to severe major depressive disorder, and general anxiety symptoms. He clarified her depressive symptoms overlap with symptoms of anxiety, pain, and the residual effects of the brain injury. Dr. Anderson identified ongoing cognitive difficulties such as problems with concentration, memory, multi-tasking, executive functioning, speech and reading, as likely due to her brain injury in combination with other factors including pain, fatigue, insomnia, anxiety, and or depression. Further, he expressed the view she has also developed some of the common physical symptoms of neurocognitive disorder that include headache pain, fatigue, sleep disorders, dizziness, etc. along with apathy, emotional numbness, irritability and somnolence. Although Ms. Huang reported occasional nightmares involving a train coming directly

toward her, he opined she has not developed sufficient symptoms to warrant a diagnosis of post traumatic stress disorder (“PTSD”).

[436] Dr. Anderson saw neuropsychological testing as required to gain a better understanding of Ms. Huang’s cognitive profile, noting however that she obtained a very low score on the Montreal Cognitive Assessment test, a cognitive screening test used most often to identify dementia. He concluded that ongoing cognitive difficulties due to the residual effects of her brain injury would likely be permanent, noting that recovery tends to plateau within two years. He also concluded the long-term prognosis for her psychiatric issues was poor, writing:

.. In general, the longer psychiatric disorders last, the less likely they are to remit with treatment. Prognosis is also poorer for patients who have more than one psychiatric diagnosis. In Ms. Huang’s case she likely has a neurocognitive disorder in addition to a severe major depressive disorder and generalized anxiety symptoms. Ms. Huang will likely remain emotionally vulnerable on a long term basis and be at risk of deteriorating if she is exposed to new psychological stressors or if her physical symptoms worsen as she ages.

[437] Dr. Lanius too diagnosed Ms. Huang with major depressive disorder, moderate in severity, and a chronic adjustment disorder with symptoms of anxiety and depressed mood, other specified trauma and stressor-related adjustment disorder, but not PTSD. Dr. Lanius concluded Ms. Huang’s depression was the direct result of her brain injury, as well as an emotional response to the physical and cognitive limitations caused by the Collision. He identified neurocognitive deficits, as well as her fatigue, as likely related to the combined effect of her brain injury, ongoing depression, traumatic stress symptoms, chronic sleep disruption and chronic pain, clarifying the pattern and nature of her deficits are beyond what one would expect with depression alone.

[438] Like Dr. Anderson, Dr. Lanius and Dr. Du viewed the likelihood of Ms. Huang’s neurocognitive functioning improving as limited given the length of time that has passed, describing her prognosis as very guarded to poor. Dr. Lanius identified Ms. Huang as at increased risk of ongoing depression given her mild

traumatic brain injury, the most common long-term symptoms being fatigue, poor memory, headache, frustration and depression, and further suggested an underlying traumatic stress syndrome (but not PTSD) may interfere with effective treatment of her depression. In addition, he opined she faces an increased risk of premature deterioration in neurocognitive function as she ages. Dr. Du's opinion was similar. He described her depression, anxiety and cognitive impairment as likely to affect and worsen each other, and concluded it was unlikely her depression would improve significantly.

[439] Dr. Lanius and Dr. Du rely upon the results of neuropsychological testing in forming their opinions including those regarding her neurocognitive impairments, which were not available to Dr. Anderson, Dr. Apel or Dr. Sahjpaal. Significantly, Dr. Du's assessment was conducted in Mandarin eliminating the impact of English as a second language ("ESL") and cultural factors on the testing results.

[440] Dr. Lanius and Dr. Du estimated Ms. Huang's pre-Collision intellectual functioning as superior to very superior, and superior respectively, based on her education, work history and some collateral interviews. Dr. Lanius noted people with undergraduate degrees in engineering typically function within the superior to very superior range. Ms. Huang had in addition successfully completed a graduate degree in engineering and an MBA. He also relied upon her achievement score for math computation, in the 98th percentile or the very superior range, as a good indicator.

[441] Dr. Lanius noted that in general Ms. Huang's neuropsychological testing was complicated by her ESL status. He clarified that language-based subtests (those that primarily involve verbal performance and or content) were likely most affected, although they had some utility in evaluating an overall pattern of performance.

[442] With this in mind, Dr. Lanius identified three measures of overall intellectual functioning that placed Ms. Huang in the average range (30th, 45th, and 50th percentile) as likely seriously underestimating her abilities. In contrast, he viewed her

low average score (9th percentile) on a particular measure for working memory and the ability to sustain attention as likely indicating a genuine deficit, falling much below her estimated pre-Collision function. He reached the same conclusion about her performance on the processing speed index, which fell in the average range (34th percentile). Other measures of attention resulted in scores in the 9th, 16th (arithmetic), 25th and 50th percentile. When tested for auditory divided attention, Ms. Huang's performance was impaired, falling below the 2nd percentile, which Dr. Lanius described as an exceedingly poor score. On another measure sensitive to left-hemisphere divided attention and working memory, the scores ranged from deficient, to average, again well below to below his estimate of her pre-Collision functioning. Similarly, she scored in the borderline range (impaired performance) on a test for visual-motor attention.

[443] Ms. Huang's test results related to verbal skills and memory were higher, mostly in the average range. However, on one particular measure of verbal memory, that Dr. Lanius viewed as less impacted by her ESL status, and required her to remember a wordlist presented across five trials, her overall performance was at the 1st percentile (extremely low range), significantly below her current verbal functioning and estimated pre-Collision functioning. Describing Ms. Huang's verbal memory as grossly intact, Dr. Lanius said her performance on this measure was impaired by much reduced learning efficiency and displayed a clear deficit with non-contextual memory.

[444] Measures of her visuo-perceptual reasoning, which ranged from the 16th to the 75th percentile (low average to average), were also below the superior functioning he viewed as likely pre-Collision, and measures of her delayed, as opposed to immediate, visual memory functioning were much below. Dr. Lanius described the pattern as consistent with an acquired deficit. He also noted that even Ms. Huang's immediate visual memory was much poorer when she was required to complete a much more complex visual reproduction task. This demonstrated, in his view, overall limitations in cognitive capacity for free recall as the difficulty of the task

increases, and also likely reflected an acquired deficit secondary to a mild traumatic brain injury.

[445] Ms. Huang's performance on tests of concept formation and abstract reasoning, some of which assess issues such as executive function, spatial planning and reasoning, and initiation of problem-solving behaviour among others, were mixed but below, if not significantly below, her estimated level of pre-Collision functioning. On one measure of non-verbal abstract reasoning sensitive to frontal lobe impairment, particularly within the right hemisphere, her performance fell in the borderline range (5th percentile), or mildly to moderately impaired.

[446] Much as Dr. Lanius anticipated, tested in Mandarin, Ms. Huang's overall IQ was higher, falling in the high average range (82nd percentile), with her vocabulary and abstract verbal reasoning scores being superior. Dr. Du explained that verbal IQ, unlike working memory and processing speed, is resistant to the effects of brain injury.

[447] He specified that other testing results for concentration and processing speed were poor (4th percentile), those related to multi-tasking were low average (18th percentile), and those based on a Chinese version of a standard memory test were very, very poor, below the 2nd percentile, leaving her incapable at this point of graduating from high school, despite her overall intellectual function. Dr. Du described these testing results as consistent with Ms. Huang's self report, that of her sister, and those obtained by Dr. Lanius.

[448] Dr. Du, like several others, concluded that Ms. Huang was not competitively employable given her limited cognitive "endurance", reduced memory, unreliable divided attention or multi-tasking, and impaired "high level of reasoning". Further, he opined that her low mood and ongoing pain would likely make her irritable and easily overwhelmed by usual everyday stressors.

[449] Dr. Lanius opined that Ms. Huang's deficits with regard to memory, concentration and multi-tasking have a profound effect on her neurocognitive

functioning. Her symptoms are severe enough to not only prevent her from working, but also affect her basic interpersonal functioning. She is not able to engage in simple forms of multi-tasking such as watching television with her sister while talking, for example, a point her sister confirmed during her testimony.

[450] Dr. Du expressed concern about Ms. Huang's ability to live by herself safely, stating she likely has difficulty following through with activities such as turning off the stove, and would struggle to deal with emergency situations in light of her limitations with "mental flexibility" and high-level problem solving, combined with her anxiety. He suggested she would need a lot of training supervised by an occupational therapist to learn to manage these issues. Dr. Du also suggested she needs assistance with homemaking based on her reduced cognitive "tolerance" which requires her to pace her activities and rest as needed.

[451] Dr. Lanius recommended various forms of psychological treatment for Ms. Huang, as well as a referral to an otolaryngologist and or audio-vestibular specialist given her dizziness and falls. Dr. Du recommended additional professional mental health treatment for maintenance purposes, to address her grief and loss and ultimately to help her to accept her injuries and limitations, along with some joint sessions with her husband. Dr. Du specified Ms. Huang would likely require long-term psychotherapy due to her spinal cord and brain injury.

[452] Describing Ms. Huang as emotionally fragile, Dr. Anderson also recommended supportive individual therapy on a long-term basis and a course of marital therapy for her and her husband. In addition, he predicted she will need anti-depressant medications long-term and recommended trials of specific medications that may better address pain and sleep problems. Most of his other recommendations were addressed by and fell more closely within the expertise of other medical specialists including, for example, a trial of oral pain medication for neuropathic pain.

[453] The parties disputed the seriousness of Ms. Huang's traumatic brain injury, focusing on its diagnostic classification. Based on the GCS score of eight obtained by the first paramedic to arrive, and the length of her post-Collision amnesia (ending when she regained continuous memories at GFS), both indicators of severe brain injury, Dr. Lanius suggested her brain injury was at least mild, and Dr. Anderson, mild to moderate. While the observations of Mr. Barfett and Mr. Edwards satisfy me Ms. Huang was unconscious for some minutes after the Collision, I share the defendants' concern about the validity of the score of the GSC of eight and the effect of morphine and or other pain medications on her post-Collision amnesia. In any event, Ms. Huang's ongoing symptoms and their effects are what matter most, not the diagnostic classification of her brain injury as mild, moderate or severe.

[454] Based on a review of the reports of Dr. Anderson and Dr. Lanius, Dr. Anton noted his specific recommendations regarding Ms. Huang's future care needs had not changed but expressed the view it was likely her depressive disorder and cognitive problems had increased the hours of care she required. He suggested an occupational therapy assessment would provide an accurate estimate and or the number of hours of assistance Ms. Huang's sister provided while living with her. It was also his opinion, given the new information, that Ms. Huang would require the assistance of an occupational case manager on an ongoing basis which at a minimum would involve monthly contact.

f) Functional Capacity

[455] Asked to assess Ms. Huang for the purpose of determining her physical capacity for sedentary work, Ms. Craig's findings are set out in her report as follows:

She demonstrates the capacity for occasional below sedentary (up to 5 pounds) physical strength demands. She is not able to lift from lower levels. She demonstrates reduced handgrip strength bilaterally that limits function. She demonstrates reduced fine dexterity/fine manual control bilaterally. She is able to reach for limited durations with limited left shoulder range of motion. She is able to negotiate stairs only with firm handrail support and by taking stairs one at a time while visualizing the stairs to prevents falls. She demonstrates limited balance and is at risk for falls. She demonstrates reduced tolerance for casual sitting and work-intensive sitting. She demonstrates limited tolerance for sitting and can stand for short intervals

only. She requires a mobility aid for ambulation and demonstrates gait changes with walking due to muscular imbalance and weakness that increase her trip-fall risk. She is limited in her ability to attain and rise from kneeling and crawling positions, doing so only with moderate support on an infrequent basis. She is able to partially stoop or hold a stooped posture for brief durations.

[456] During her testimony Ms. Craig clarified Ms. Huang is at risk of falling when she uses stairs, particularly if she is fatigued. Ms. Craig found Ms. Huang was able to walk slowly for 20 minutes with her walker. Her grip strength was about one-half as strong as the average for women her age and her fine manual dexterity was very reduced, worse on the left. She was able to type very slowly (15 words per minute instead of the 40 to 60 expected of someone who uses a computer every day). Her handwriting was very shaky and hard to read. Ms. Craig identified tasks such as taking a lid off a jar, operating a can opener, and repeatedly chopping as difficult and fatiguing for Ms. Huang and she is at risk of cutting herself when using a knife. Because she is quite weak and not stable, she is also at risk of burns when dealing with a hot pan or boiling water on the stove.

[457] Ms. Craig opined that Ms. Huang's continued gait dysfunction is due to weakness of her trunk and legs, decreased balance and stability, and decreased mobility. Although also of the view Ms. Huang's neurological injuries and resulting deficits were unlikely to change, Ms. Craig recommended further neurological physiotherapy to maximize recovery and maintain her functional level, explaining that even a slight improvement in her gait may increase her tolerance for walking and reduce her risk of falls. She also suggested Ms. Huang will continue to require a form of pain management such as the acupuncture and massage therapy she has been using for this purpose up to now.

[458] Regarding homecare, Ms. Craig opined that Ms. Huang requires assistance with grocery shopping and meal preparation, regular household cleaning, including bathrooms, vacuuming, mopping, and larger laundry items including carrying laundry up and down the stairs, and heavier seasonal cleaning such as moving furniture, washing walls, windows, blinds, cleaning cupboards and moving heavier storage

boxes. Ms. Huang also requires assistance with household maintenance, and regular and seasonal work in the yard and garden, if she is no longer in a setting where her outdoor space is managed for her, and help with all aspects of moving if she moves from her current home.

[459] Ms. Craig initially concluded Ms. Huang's physical limitations and fatigue level prevented her from working in a competitive environment although perhaps able to tolerate very limited part-time sedentary work. After reviewing Dr. Lanius's report, however, Ms. Craig opined it was unlikely Ms. Huang could return to work in her prior role even on a limited, part-time basis.

[460] Consistent with her own evidence and some of the neurocognitive testing results, Ms. Craig also observed Ms. Huang took much, much longer than is typical to complete the paperwork provided at the beginning of the evaluation and in fact she had to take it home with her.

g) Cost of Future Care Assessment

[461] Both of the occupational therapists who prepared cost of future care reports, Nasneen Chow and Shannon Smith, met with Ms. Huang in her home. In general, their observations of Ms. Huang's physical functioning are consistent with Ms. Craig's assessment.

[462] Having been provided with only Dr. Apel's report, Ms. Smith, for the defendants, found Ms. Huang's hand dexterity quite a bit worse than she expected, and described it as impaired, observing, for example, Ms. Huang had to carry a glass of water with two hands.

[463] When Ms. Huang performed the home-base exercises provided by her physiotherapist at NeuroAbility for Ms. Chow, she noticed weakness in Ms. Huang's extremities and pelvic core muscles and less flexibility in her left leg compared to the right. Ms. Chow also noticed Ms. Huang fatigued easily and required a restful position after about 20 minutes of sitting up; she relied on the railing to support her as she came down the stairs and could not walk up or down them in a reciprocal

fashion; she held onto walls or furniture while walking inside her home; her standing and walking balance were poor; she needed another person to bring her walker up and down the stairs outside her home; she had great difficulty negotiating the path outside her home during snowy weather and required hands-on assistance due to the risk of falling on the snow and ice.

4. Sufficiency of the Evidence

[464] I note at this stage the defendants argue that without the evidence of Ms. Huang's treating physicians and therapists, or any of their clinical records, the Court is left with mere snapshots of her condition and medical needs, and gaps in the evidence that impact on her cost of care claim in particular. The problem is magnified, say the defendants, because Ms. Huang was not a reliable witness insofar as she struggled to remember events, particularly the timeline for events that occurred after the Collision. They urge caution in relying upon Ms. Huang's evidence where it is not corroborated by "independent" evidence.

[465] As I have already indicated, the defendants acknowledged all of Ms. Huang's significant injuries, and many if not most of her ongoing symptoms. There is no dispute about the services and therapies she actually participated in or received. The controversy is largely confined to her current level of function and her prognosis. Ms. Huang certainly described her memory as poor and I agree that at times she found it difficult to remember the chronology of post-Collision events, and the frequency of particular treatments. I was not concerned however about the accuracy of what she did remember. Despite her limitations, Ms. Huang was a careful witness. Her evidence combined with the evidence of her sister and her husband, along with other fact evidence, provide a fulsome as well as entirely consistent account of her injuries, her symptoms, her recovery and her ongoing limitations. There is no requirement that corroborating evidence be independent. The question is whether it is accurate. The defendants have not suggested Bin or Mr. Lin were anything less than credible and reliable, which I am satisfied they were.

[466] To be clear the defendants do not go so far as to suggest proof of Ms. Huang's current functioning, and her prognosis must be provided by treating specialists. Their primary allegation is that Ms. Chow's opinion evidence in particular is undermined by her reliance on information from Andrew Wong, Ms. Huang's treating occupational therapist. Mr. Wong did not testify, nor are his clinical records in evidence. I have addressed this issue below in relation to the cost of future care claim.

B. Findings of Fact

[467] The parties agree that due to Ms. Huang's incomplete spinal cord injury, her life expectancy as of the date of trial has been reduced from 36.3 years to 28.6 years based on the opinion of Dr. David Strauss.

[468] Based on the evidence of Ms. Huang, Bin, Mr. Lin and Ms. Alford, and accepting the fact and opinion evidence of Ms. Huang's medical specialists regarding the nature of her injuries, related conditions, ongoing symptoms, her functional limitations and her prognosis, my findings include but are not limited to the summary set out at paragraph 396.

[469] My additional findings are as follows:

- As a result of her incomplete spinal cord injury, Ms. Huang is left with permanent sensory and motor impairments that include reduced sensation and neuropathic pain with allodynia or hypersensitivity to sensory stimuli in her hands. Her neuropathic pain has thus far, not been effectively treated with topical analgesics. Ms. Huang's sensory impairments put her at risk of burning and cutting herself.
- Ms. Huang's motor impairments arise from weakness in her hands and legs which is mostly mild, but worse on the left. There are specific weaknesses in her wrist muscles, some finger muscles, and those in her left ankle which lift the foot. Her grip strength is impaired as is her fine motor dexterity. Her gait is

significantly impaired. This along with fatigue and weakness places her at risk of tripping and falling. Although Ms. Huang will not experience any further neurological recovery, I accept there may be minor improvements in her gait with ongoing specialized treatment.

- Accepting the opinions of Dr. Anton and Dr. Hamm regarding Ms. Huang's prognosis, I find there is a real and substantial risk her physical functioning will decline as she ages which could result in her becoming wheelchair dependent in her later years.
- Ms. Huang's incomplete spinal cord injury has also caused her neurogenic bladder. Her symptoms include an over-active bladder causing a sense of urgency and incontinence, elevated voiding pressures, slow urine stream, and intermittent residual urine. Her incontinence is managed with medication and pads. All of her bladder symptoms are unlikely to resolve and she faces the risk they will worsen over time.
- Ms. Huang's sexual function has been severely impaired by her incomplete spinal cord injury, and perhaps to some extent by her traumatic brain injury, interacting with and confounded by her depression. The changes in her sexuality are as described in her own evidence, in Dr. Elliot's report and at paragraph 429. The impact of this impairment on her marriage and her emotional wellbeing has been very significant.
- I make no specific finding about whether Ms. Huang's traumatic brain injury was mild or moderate. Instead I find it has resulted in a neurocognitive disorder that has seriously affected her neurocognitive functioning in terms of memory, concentration, multi-tasking, processing speed, and her executive functioning, namely judgment, appropriate decision-making and planning. I make this finding accepting that Ms. Huang's pre-Collision intellectual functioning was superior to very superior and her executive functioning was entirely normal if not above average. Essentially she was a highly intelligent,

capable, well-organized, efficient and highly motivated person. I also find Ms. Huang's brain injury, perhaps combined with her psychological impairments, have left her emotionally reactive, overly sensitive, impulsive and irritable.

- There is no dispute that Ms. Huang suffers from depression as a result of the Collision. Accepting the diagnosis of major depressive disorder, I find her condition is now chronic, although properly treated with psychotherapy and medication. Her depressive symptoms have been mostly moderate. In addition to a significantly depressed mood, Ms. Huang experiences low motivation. It may be, as I have indicated, that her depression also impairs her decision-making and plays a role in some of her cognitive symptoms, namely concentration and memory, as well as fatigue, discussed below. In addition, she suffers from symptoms of anxiety and trauma due to the Collision.
- I find it is unlikely Ms. Huang's depression will resolve, although there is certainly a reasonable chance that with ongoing treatment she will move toward accepting and adjusting to her new reality and therefore experience some improvement in her symptoms.
- Ms. Huang's fatigue is among her most significant symptoms. It is ongoing, pervasive and quite debilitating. She finds all tasks tiring but standing, walking and using stairs particularly so. Although she is able to perform various household tasks including light laundry, light cleaning and simple meal preparation, fatigue profoundly limits how much she can do on any given day. The bottom line is that each task depletes her already reduced energy level and she must conserve that energy by picking and choosing how to expend it.
- I find her fatigue is likely caused by her incomplete spinal cord injury, brain injury and depression, with her spinal cord injury being the most significant cause. Although I accept it is possible an underlying condition may also be

contributing, I find it unlikely that even if a condition is found and treated, her fatigue will improve significantly.

- Ms. Huang also suffers from a secondary soft tissue injury to her left shoulder that causes ongoing myofascial pain and limits her use of her left arm for lifting in particular.
- Although Ms. Huang also complains of headaches and dizziness, her medical specialists did not address the cause of these issues. I therefore make no findings about them.
- I accept Ms. Craig's evidence regarding Ms. Huang's functional limitations along with the observations of Ms. Chow and Ms. Smith.

C. Damages Claims

[470] The essential purpose of damages is to restore an injured plaintiff to her original position, meaning the position she would have been in had the negligence not occurred: *Athey* at paras. 31-36.

1. Non-pecuniary Damages

[471] The purpose of non-pecuniary damages is to compensate a plaintiff for the pain and suffering, loss of enjoyment of life, loss of amenities, and in cases such as this one, a reduction in life expectancy, caused by the defendant's negligence. The law requires the compensation to be fair and reasonable to both parties. Fairness is measured against awards made in comparable cases although they only provide a rough guide, recognizing that each case is unique and fact-driven: *Trites v. Penner*, 2010 BCSC 882.

[472] Many years ago, the Supreme Court of Canada established a rough upper limit of \$100,000 for non-pecuniary damages in relation to catastrophic or near catastrophic injuries: *Andrews v. Grand & Toy Alberta Ltd.*, [1978] 2 S.C.R. 229.

[473] The amount of an award, however, is not determined based on the gravity of the plaintiff's injuries alone. The court considers a number of additional factors, such as age; the severity and duration of pain and disability; emotional suffering; loss of lifestyle; impairment of relationships; as well as impairment of physical and mental abilities: *Stapley v. Hejslet*, 2006 BCCA 34 at para. 46.

[474] Accordingly, *Andrews* likened the legal limit to a "legal ceiling, a rule of law and policy" which "operates like a governor". Trial judges are required to apply a functional approach and assess non-pecuniary damages in the light of the plaintiff's individual circumstances without regard to the limit. A clear appreciation of the plaintiff's loss and need for solace is key: *Dikey v. Samieian*, 2008 BCSC 604.

[475] Ms. Huang seeks an award at the upper limit, estimated at \$373,500, based on the profound and devastating consequences of her injuries which she submits have grievously affected every single aspect of her life.

[476] The defendants acknowledge Ms. Huang's serious injuries and their significant impact on her life. They take the position an award of \$225,000 is appropriate, arguing she has made significant improvements in her functioning and symptoms and there may be further improvements in her level of fatigue, her relationship with her husband, her mood and overall functioning. Further, they suggest as the number of medical appointments she attends decreases, she will have more time and energy for recreational activities, exercise and volunteer work, which also will likely further contribute to improving her quality of life.

[477] Ms. Huang relies upon a number of authorities that awarded the upper limit for their discussion of what injuries and or what consequences have been found to meet the catastrophic or severe threshold, including *Grewal v. Brar et al*, 2004 BCSC 1157, and *Wilhelmson v. Dumma*, 2017 BCSC 616.

[478] In *Grewal*, the plaintiff was 25 years old at the time of the accident. She suffered a cervical fracture that caused incomplete quadriplegia, a significant brain

injury that resulted in ongoing cognitive, emotional and behaviour difficulties, and depression.

[479] In *Wilhelmson*, the plaintiff was only 21 when she was severely injured in a head on collision that killed three people including her boyfriend. Her physical injuries were life-threatening and numerous including very extensive abdominal injuries, multiple orthopedic injuries, a ruptured diaphragm, an aortic injury requiring insertion of a stent, and a chance fracture of her spine. She required resuscitation at the scene, was placed in a medically-induced coma for 25 days, and underwent 10 surgeries in two weeks. There were numerous complications from the surgeries including repeated and serious bacterial infections. The plaintiff faced the likelihood of further complications from her abdominal injuries including bowel obstructions. Although the spinal fracture healed, she was left with permanent, disabling pain, the possibility of complex spine surgery and early degenerative changes. She also suffered from permanent sensory symptoms including a loss of sensation and “pins and needles”. Significantly, the plaintiff developed moderate to severe PTSD, severe depression, anxiety and panic attacks. She experienced great difficulty sleeping and ongoing nightmares. She did not, however, suffer a traumatic brain injury. Following the accident, the plaintiff became pregnant. Based on medical advice about the risk to her health arising from her injuries, although she wished to have the child she terminated the pregnancy. In awarding the upper limit, the trial judge identified the emotional pain arising from this ordeal and the risk it would happen again as one of the most compelling factors.

[480] Ms. Huang is, as the defendants point out, much older than the plaintiffs in most of the authorities she relies upon, who as young adults would experience pain, disability and very little quality of life for most, as opposed to part, of their lives. In addition, Ms. Huang’s pain symptoms, including neuropathic pain, although serious and chronic, are much less intense and debilitating than those endured by the plaintiff in *Wilhelmson*.

[481] The defendants rely upon *Adamson v. Charity*, 2007 BCSC 671, and *Best v. Thomas*, 2014 BCSC 1033. In *Adamson*, non-pecuniary damages of \$200,000 were awarded. The plaintiff was a 42-year-old carpenter who suffered a mild traumatic brain injury and an injury to his cervical spine, which caused chronic pain and severe headaches. He also developed major depression. The trial judge found him to be competitively unemployable. The plaintiff's prognosis however included the likelihood his depression would improve leading to a slight reduction in his pain perception, and a better ability to cope with his changed circumstances. Although it is difficult to discern how his injuries and ongoing limitations had impacted on his functioning, I note the plaintiff was awarded a comparatively modest amount for the cost of his future care.

[482] In *Best*, which the defendants identify as the closest comparator, the plaintiff was awarded \$225,000. At 32, he was injured in a motorcycle accident and required surgery to his spinal cord to remove damaged discs, leaving him with significant pain, spasticity or shaking in his legs and left arm, poor balance and fatigue. He also suffered a mild traumatic brain injury, severe headaches and a major depressive disorder of moderate severity and exacerbated pre-existing hearing loss, as well as significant fatigue, difficulty with urination, constipation and some loss of sexual sensation and function. The plaintiff walked with a cane, had limited tolerance for standing, and some difficulty caring for himself. He was unable to work at a job he enjoyed or obtain competitive employment. His quality of life had been seriously undermined.

[483] I note that although he sought an award at the upper limit, the only recent authority he relied upon awarded approximately \$100,000 below that amount. Further, there is no indication the plaintiff's life expectancy had been reduced by his injuries.

[484] Certainly, some features of each of these cases are comparable to this one. Bearing in mind the functional approach, I must also consider Ms. Huang's own

circumstances in determining whether her pain and suffering justify awarding the maximum or near maximum amount of damages: *Wilhelmson* at para. 187.

[485] It is clear to me the impact of Ms. Huang's multiple injuries, including her spinal cord injury, her brain injury and her depression, as well as significant fatigue, has been profound and devastating for her, making an award close to the upper limit reasonable and fair. As Ms. Huang points out, almost everything that gave meaning to her life has been irreparably damaged or lost: the professional career she worked so hard to establish in Canada, her independence and self-sufficiency, her tremendous competence, her sense of self-worth, a happy and sexually fulfilling marriage, and the pleasure and enjoyment she derived from travel, spending time with friends, reading and being physically active. She is now disabled and exhausted by the most basic tasks of day to day living, living alone and very isolated when her husband or sister are not here, and in terrible emotional pain, acutely aware of how her cognitive, psychological and physical deficits have fundamentally changed the person she once was. Her prognosis does not leave much hope for any meaningful improvements. She faces the risk of further deterioration in her physical and mental functioning as she ages, along with a shortened life expectancy.

[486] Applying the *Stapley* factors, and considering the cases relied upon by the parties as a rough guide, I award Ms. Huang \$330,000 in non-pecuniary damages.

2. Loss of Earning Capacity

[487] Although a claim for past loss of income or earning capacity is often characterized as a separate head of damages, it is a component of the loss of impairment of the plaintiff's capacity to earn an income which is a capital asset.

[488] In general the value of a plaintiff's earning capacity is equivalent to the value of the earnings she would have, not could have, earned, absent the injuries caused by the defendant's negligence, less the earnings she actually earned and is expected to earn based on her residual capacity.

[489] A claim for loss of earning capacity raises two key questions: (1) was or has the plaintiff's capacity to earn income been impaired by her accident related injuries and, if so, (2) what amount of compensation should be awarded for the resulting financial harm, taking into account the relevant and realistic contingences:

Hoy v. Williams, 2014 BCSC 234. The law requires proof of actual past events on a balance of probabilities, but hypothetical events, including those in the past, are considered if there is a real and substantial possibility they would occur. Once proven to this standard, a hypothetical event is given weight according to its relative likelihood, and compensation is awarded based on an estimation of the chance the event would have occurred (or will occur): *Steward v. Berezan*, 2007 BCCA 150 at para. 17. The assessment is an exercise of judgment, not a mathematical calculation, firmly grounded in the particular facts of the case.

[490] Here there is no dispute Ms. Huang's injuries impaired her capacity to earn income in the past and the future. Nor is there any dispute about what she may earn in the future. The defendants acknowledge that as result of the Collision, Ms. Huang was not and will not be competitively employable.

[491] The parties also appear to accept her loss of earning capacity should be measured using the earnings approach which, with respect to the future, often involves assessing the plaintiff's estimated annual income loss multiplied by the remaining years of work, discounted to reflect current value.

[492] Given the defendants' position, the only dispute here is about what Ms. Huang would have earned in the past and in the future absent the Collision.

[493] The factual issues relate to her Canadian employment history, which the defendants characterize as sporadic, and the trajectory of her position with Britco and or other future employment.

a) Ms. Huang's Employment History

[494] Prior to the Collision, in 2004 and 2005 Ms. Huang worked as a project coordinator for Klein Systems Group Ltd. For part of 2007, she worked as a

mechanical engineer for SRC Engineering Consultations Inc. She left there for Westmar Consultants Inc. where she worked as a project control specialist until April 2008 when she was laid off due to lack of work. She received employment insurance benefits from May 2008 until April 2009. She also completed her certificate in project management at UBC in 2009. Ms. Huang did not work in 2010, testifying she decided she should focus on her daughter for a period of time. In April 2011 she was hired by a company called AMEC as a project planner earning a salary of \$65,000 but was “laid off” in September 2011. Ms. Huang felt as though her supervisor was unhappy with her because she had made suggestions about how to improve a schedule he prepared. She again received employment benefits from October 2011 until February 2012 when she was hired as a project controller by an engineering consulting firm called Chemetics. Her starting salary was \$70,000. Ms. Huang continued to work there on “lots” of big engineering projects, developing project schedules and monitoring progress, until late November 2013 when she was dismissed, earning \$76,054 that year. She described the dismissal as unjustified and again, occurring after she made corrections to a supervisor’s schedule with a view to being helpful. As much as she felt wronged, Ms. Huang indicated she had resolved to take a less direct approach with supervisors in the future.

[495] Ms. Grace Yang, a senior business development manager with Chemetics, testified positively about Ms. Huang’s performance on a project in 2013. Ms. Huang received a 5% bonus or raise in 2012. Ms. Yang described this as the highest possible rate. She herself received something below that, perhaps 3.5%. Ms. Yang was not aware of any deterioration in Ms. Huang’s performance before her dismissal, and provided her with a supportive reference when she applied to Britco.

[496] Ms. Huang testified that although she did not start at Britco until April 2014, she was first interviewed in January 2014 and was confident the job would be a very good fit. The base salary was \$85,000. Britco also offered annual bonuses and a 3% matching RRSP contribution that she intended to maximize, wanting the tax savings. After starting, Ms. Huang was assigned to two engineering projects. She described feeling very capable of doing the work.

[497] Mr. Gardner testified that Britco was a successful business with about 600 employees when he left in or about June 2014. It had a very large project with Manitoba Hydro involving a 2,000-room workforce facility to support construction of a hydro-electric dam, and a number of other projects designing and building workforce accommodations in northern Alberta. The building rental division was also doing well and had been for a number of years. Mr. Gardner testified to a high demand for project schedulers and good job security around the time Ms. Huang was hired.

[498] Raymond Yu, Ms. Huang's former supervisor at Britco, also testified. Mr. Yu started with the business in November 2012 at a base salary of \$95,000, having worked for six years as a project scheduler, but with significantly fewer qualifications than Ms. Huang. He subsequently received bonuses and "very, very minor" wage increases. Mr. Yu was the only other project scheduler when Ms. Huang was hired. He testified Britco was bidding on some large projects at the time that it did not obtain and she was not replaced after the Collision.

[499] Mr. Yu presented as a reluctant if not somewhat bitter witness. He lost his job at Britco a short time before giving evidence, following the change in ownership. Mr. Yu did describe the job market as good and a salary of \$110,000 to \$120,000 as reasonable at this point, for a project scheduler with his level of experience.

[500] Mr. Yu had trouble recalling details about Ms. Huang. For example, he had no specific recollection of her software knowledge although he remembered not being concerned about it. He also said he did not have a lot of time to spend with her after she started. He did remember having a concern about her communications, referring, I assume to her English language skills. Mandarin is also Mr. Yu's first language. Although he spoke English fluently, his accent was quite heavy. I note that Ms. Huang also testified in English initially. She too demonstrated fluency but a very strong accent. For most of her evidence she relied upon a translator.

[501] Ms. Huang testified that by the time she was hired at Britco she was no longer tied to Vancouver because Amy was away at university, describing herself as able

to work anywhere. After the Collision, she occasionally received inquiries through LinkedIn about job openings, including positions for a scheduler and a project planner. She identified her Mandarin and good connections in China as assets.

[502] I note that Ms. Huang's resume shows continuous employment in China from 1985, when she received her B.Sc in mechanical engineering, as a mechanical engineer and a project manager, for three different businesses or organizations, holding each position for several years until 2002 when she moved to Canada, excepting 1990 to 1993 at which point she completed her graduate degree in engineering.

b) Past Loss of Earning Capacity

[503] Both parties relied upon the opinion evidence of economists, Robert Carson for Ms. Huang and Darren Benning for the defendants, with respect to the assessment of Ms. Huang's loss of earning capacity.

[504] Assuming Ms. Huang would have continued to work full-time at Britco until the date of trial, Robert Carson estimated her past wage loss at \$252,336 based on her base salary alone, and \$274,001 including an increase of 7% to reflect general wage level increases in BC during the same period. Both of these figures are gross, meaning there have been no deductions for income tax, employment insurance or CPP premiums. Based on these same assumptions, Mr. Benning calculated her gross past wage loss at \$274,648 which adds amounts for non-wage benefits to her base salary each year instead of an estimated increase.

[505] Mr. Carson testified about the labour market realities for immigrants to Canada. He commented that although Ms. Huang's work experience and education in China demonstrate her ability, immigrants often have to complete post-secondary education in Canada to pursue equivalent employment, and typically it takes them 10 to 15 years to adapt to the Canadian labour market. He also said statistics show that, over average, it takes someone in Ms. Huang's circumstances 16 to 20 weeks to find new employment.

i. Parties' Positions

[506] Ms. Huang seeks an award of \$252,000 for her past loss of earning capacity, arguing although she had changed employment periodically in the years prior to the Collision, her salary increased each time and there is no evidence she would have lost her job with Britco. The defendants assert a much lower amount, \$50,121, is appropriate, suggesting the gaps in her employment history before the Collision would likely have continued.

[507] I am required to assess what Ms. Huang would have, not could have, earned up to the date of trial. Despite it being a hypothetical exercise, I am nonetheless satisfied it is probable that Ms. Huang would have continued working at Britco for a significant period prior to the trial, bearing in mind the following: Britco needed a project scheduler when Ms. Huang was hired; Britco's successful status when Mr. Gardner left in June 2014; the vagueness of Mr. Yu's evidence about the pending projects Britco did not secure after the Collision; the absence of any suggestion the projects Ms. Huang was already involved with were discontinued; and Ms. Yang's testimony about Ms. Huang's positive work performance. Further, even though Ms. Huang was not replaced after the Collision, I expect it took some time before she and Britco realized she would remain unable to return to work. Mr. Yu described his own job loss as the result of restructuring that occurred much later in or about early 2017. Significantly, I am also satisfied Ms. Huang was highly qualified for the position, hardworking and highly motivated. At the same time, I accept Mr. Yu lost his job after many years with Britco following a change in ownership, and place some weight on Mr. McClymont's evidence he understood there had been a downsizing in the business "over the past year". I therefore also find it likely Ms. Huang would have faced a similar job loss in or about the year prior to trial.

[508] In light of her employment history, Mr. Carson's evidence regarding the average length of time required to find further employment, and drawing the inference that Ms. Huang would have performed well at Britco, I deduct an amount

equivalent to Ms. Huang's base salary over five months, \$35,415, from the award she seeks of \$252,000. Not including any amount for an increase in salary or bonus income, in my view, addresses the balance between the realistic negative and positive contingencies which include a longer period of unemployment and Ms. Huang earning some bonus income and or receiving salary increases at Britco or finding a new position with a higher salary. In the result, I award \$216,586 for past loss of earning capacity (gross).

c) Future Loss of Earning Capacity

[509] Ms. Huang seeks an award of \$1.3 million for the loss of future earning capacity. Arguing her pattern of "sporadic" employment likely would have continued after the Collision, the defendants suggest an economist should recalculate the amount based on particular findings including for example Ms. Huang continuing to work as a project scheduler for different employers about 50% of the time, in place of the assumptions Mr. Carson and Mr. Benning relied upon in their opinions.

[510] I reject this suggestion in light of the findings I have just made in relation to Ms. Huang's past loss of earning capacity and those discussed below.

[511] Mr. Carson calculates the present value of Ms. Huang's future earnings using two scenarios, both of which assume she would have continued to work full-time to age 67 and then half-time until age 70. The first calculation is based on the base wage she received at Britco fixed at the 2014 value (\$85,000) plus the RRSP matching contributions, most of the cost of MSP and extended health coverage, but no performance bonuses. The second scenario is also based on the base wage but includes a wage index, the same benefits and the 7% performance bonus. The scenario one calculation is \$1,130,756 and scenario two is \$1,243,194, including an 11.6% negative contingency to account for the risk of involuntary unemployment and reduction in the hours of work until age 67, and 16.5% from ages 67 to 70 based on those same factors, assuming Ms. Huang would choose to remain in the workforce.

[512] Mr. Carson testified the risk of early death is factored into the multiplier.

[513] Mr. Benning commented the risks or contingencies applied by Mr. Carson are well below those derived from the 2011 census data for women with a Master degree from Ms. Huang's age up to age 67, and 67 is a higher than average retirement age.

[514] Mr. Benning's calculations of Ms. Huang's future earnings, without Collision, are \$901,711, using the same survival rates derived from life tables for Canadian females published by Statistics Canada, and \$866,736, apparently based on her reduced life expectancy. Both amounts assume full retirement no later than 67 and full-time employment earnings commensurate with her Britco earnings (base salary, 7% bonus, and average annual wage inflation or \$96,124). They also apply labour market contingencies based for the most part on statistical averages for women with a Master degree. Those contingencies and their rate for 2017 are participation at 99.59%, unemployment at 3.57%, part-time at 9.66%, and survival rates at 99.69%. The contingency for participation drops steadily to 44.1% by age 66 and the part-time contingency increases to 30.50%.

[515] Mr. Benning's participation contingency includes both voluntary as well as involuntary withdrawals from work. He was not able to say what portion was attributable to each factor because Statistics Canada does not separate the two. He expressed the view, however, that the rate increases by age 60 because women are choosing to retire early as opposed to being unwell or sick. Regarding the part-time contingency, he estimated that two-thirds of it may relate to choice. Asked about gendered nature of the statistical data, Mr. Benning testified that on average women continue to have lower rates of attachment to the labour market, earn less and work part-time more often than men.

[516] Mr. Benning clarified that all of the negative contingencies he applied reduced the present value of her full-time employment earnings by 40%. He explained the lower calculation of \$866,736 uses different survival rates based on the mortality rates used by Dr. Strauss, an expert who assessed the impact of Ms. Huang's spinal cord injury on her life expectancy. Those rates incorporate the higher death rate for

women with a spinal cord injury comparable to Ms. Huang's. Based on these two figures and an assumption that 50% of earnings during the lost years being used for non-discretionary spending, Mr. Benning estimated the "lost years deduction" at \$17,488 ($\$901,711 - \$866,736 \times 0.50$).

[517] I have already indicated the parties agree Ms. Huang's life expectancy as of the date of trial had been reduced from 36.3 additional years to 28.6 or age 80.6.

[518] Mr. Carson testified that Ms. Huang's reduced life expectancy would reduce the amount of her future loss of earnings "a bit". The parties made no submissions about the lost years deduction, nor did they provide any authority regarding its application. In these circumstances, I am not persuaded a deduction for lost years is appropriate, given the estimated age of retirement and therefore the point at which income earned from employment is assumed to end is well below Ms. Huang's reduced life expectancy.

[519] I note that neither Mr. Carson nor Mr. Benning applied a positive contingency to account for the prospect of Ms. Huang finding a better paying job.

[520] Consistent with Mr. Carson's evidence about the experience of immigrants in the Canadian labour market, by the time Ms. Huang began working at Britco, she had already spent several years working at various jobs related to project scheduling in the engineering field. Completing an MBA not only added significant depth to her qualifications, it also immersed her in a very advanced English language environment. Ms. Huang's academic success confirms by then she was at least reasonably proficient. Once she settled in Vancouver she was entirely responsible for Amy. As Ms. Huang struggled to find and maintain suitable employment, she continued to enhance her qualifications, skills and knowledge base, completing a certificate in CAD (computer assisted design software) and the project management certificate.

[521] Ms. Huang's ongoing efforts to enhance her marketability in Canada by obtaining these further qualifications demonstrates a very strong desire to build a

successful career in Canada. Although some gaps in employment continued, her salary increased with each of the last three positions. I have already found Ms. Huang was more than qualified for her job with Britco and she was highly motivated and hardworking. She was also highly independent and very determined. Given the time and effort Ms. Huang had invested in launching a successful career in Canada, the work, achievement and self-sufficiency, I entirely accept she would have chosen to remain in the workforce full-time beyond the average age of retirement and continued working to some extent for as long as it contributed to the quality of her life. Despite the previous gaps in her employment, and my finding with respect to the loss of her job at Britco related to a change in ownership, I am satisfied she would have found other employment as a project scheduler in the engineering field and settled into a pattern of reasonably steady employment.

[522] In other words, I accept it is likely the struggles she had faced as an immigrant trying to re-establish a professional career in Canada were coming to an end. In addition, Amy was or was almost an adult, leaving Ms. Huang both free and willing to relocate if necessary. Furthermore, weighing against any negative inferences that might reasonably be drawn from the two dismissals is the trajectory of her professional career in China, demonstrating her capacity for continuous employment within the field and other evidence that satisfies me she typically behaved appropriately before the Collision. Finally, I accept that professional connections in China and having Mandarin as her first language were definite assets.

[523] Based on my findings, I conclude the participation and part-time contingencies applied by Mr. Benning, which include a voluntary component, over-estimate the risk of Ms. Huang leaving the workforce either full-time or part-time. In other words, I conclude it would be unfair to estimate negative labour market contingencies for her using averages for women in her approximate educational cohort. I therefore prefer Mr. Carson's approach to calculating risk. Weighing the realistic contingencies, both positive and negative, I also view it as appropriate to include a base wage index in the calculation, but not an annual 7% performance

bonus given the uncertainty as to, whether Ms. Huang would have received a bonus each year.

[524] Therefore, relying on Mr. Carson’s figures at page 8 of his report set out in Table 3 scenario one and scenario two, but not incorporating an amount for an annual bonus, I calculate that Ms. Huang’s lost future earning capacity is \$1,166,283, arrived at as follows:

Present Values of:

Time Frames	Present Value Multipliers	Annual Earnings	Annual value of Benefits	Risks	Annual Wages and Benefits	Annual Wages and Benefits Less Risks
Trial to Age 67	13,138	87,755	5,212	11.6%	1,221,400	1,079,718
Age 67 to 70	2,170	43,878	3,896	16.5%	103,670	86,565
Total No Bonus, Wage increases, Trial to Age 70:					1,325,070	1,166,283

3. In Trust Claim

[525] Ms. Huang makes an in trust claim for \$75,000 on behalf of her sister Bin and her husband Mr. Lin. She claims most of that amount, \$68,000, in relation to the care and assistance provided by Bin. The defendants suggest \$40,000 as compensation for Bin’s services but no amount on behalf of Mr. Lin, or in the alternative a very modest amount.

[526] The court may compensate a plaintiff for the care and other services provided by a spouse or family member, over and above what would be expected from the

relationship: *Hans v. Volvo Trucks North America Inc.*, 2016 BCSC 1155 at paras. 529 to 555. In *Dykeman v. Porohowski*, 2010 BCCA 36, the Court of Appeal observed at para. 28:

[28] Since *Kroeker* [*Kroeker v. Jansen* (1995) 4 B.C.L.R. (3d) 178], it has been settled law in this province that “housekeeping and other spousal services have economic value for which a claim by an injured party will lie even where those services are replaced gratuitously from within the family.” In *Kroeker*, such recovery was allowed under the heading of ‘loss of future ability to perform household tasks’, but obviously, damages for loss of such ability prior to trial may also be properly claimed and recovered... The reasoning in *Kroeker* has been extended beyond “spousal” services to services rendered by other members of a family... Such awards are colloquially referred to as “in trust” even though it is the plaintiff who recovers them, and British Columbia courts do not generally impose trust terms in their orders, regarding the loss as that of the plaintiff... [Emphasis in original; citations omitted.]

[527] The factors and principles that govern in-trust awards are as follows:

- (a) the services provided must replace services necessary for the care of the plaintiff as a result of a plaintiff’s injuries;
- (b) if the services are rendered by a family member, they must be over and above what would be expected from the family relationship (here, the normal care of an uninjured child);
- (c) the maximum value of such services is the cost of obtaining the services outside the family;
- (d) where the opportunity cost to the care-giving family member is lower than the cost of obtaining the services independently, the court will award the lower amount;
- (e) quantification should reflect the true and reasonable value of the services performed taking into account the time, quality and nature of those services. In this regard, the damages should reflect the wage of a substitute caregiver. There should not be a discounting or undervaluation of such services because of the nature of the relationship; and,
- (f) the family members providing the services need not forego other income and there need not be payment for the services rendered.

(*Bystedt (Guardian ad litem of) v. Hay*, 2001 BCSC 1735 at para. 180)

[528] Bin travelled from China to Vancouver on three separate occasions to care for Ms. Huang, starting in or about June 2014, quitting her job as a part-time physician, in order to do so. Each time she stayed for six months. During the first visit, she spent most of the day with Ms. Huang at GFS, supplementing the care she was

receiving by assisting her with showering, feeding her at times, massaging her hands and feet due to numbness, and after leaving GFS for the day, preparing Chinese herbal drinks for Ms. Huang, all with a view to aiding her recovery. Once she was discharged from GFS, Bin was even more actively involved in her care, helping her with stairs and to the bathroom at night, sleeping in the same bed, strongly encouraging her to exercise, preparing Chinese food including Ms. Huang's favourite dishes, doing the shopping, and performing housework not completed by the homecare workers. Bin also accompanied Ms. Huang to most of her appointments, helping her to get to and from taxis with her walker, carrying an umbrella, and ensuring she ate in between appointments.

[529] Bin continued to provide much the same level of care and assistance on the second and third trips. The amount of homemaking support had dropped from 13 to nine and then eight hours per week by the time of the second and third trips.

[530] There is no question that most if not all of the care and support Bin provided to Ms. Huang after the Collision is above and beyond what would be expected of a sibling relationship. Prior to the Collision, Bin had never visited Ms. Huang in Canada. Bin has a husband, adult daughter and granddaughter in China. In addition to working part-time, she had been assisting her daughter with her granddaughter's care before and after school. Supportive of the first trip, Bin's daughter became ill before the third trip and very opposed.

[531] Bin estimated spending about five hours per day assisting Ms. Huang during her visits, not including the time spent accompanying her to appointments over 78 weeks, which I accept.

[532] While I also accept all the support and assistance she provided during the first trip was necessary, by the second and third trip, some of the tasks she performed, such as *some* of the meal preparation, small, light loads of laundry and limited amounts of light cleaning, Ms. Huang does herself when she is alone.

[533] Accordingly, I consider \$50,000 to be reasonable and award that amount.

[534] Ms. Huang seeks an in trust award of \$7,000 for Mr. Lin, largely based on the extra weeks he spent away from work helping her during the most acute phase of her injuries. I agree with the defendants, however, that the evidence simply does not support this part of the claim. Although he made some additional trips to Canada while Ms. Huang remained in hospital, was present along with Bin when she was discharged from GFS, and no doubt provided her with critical emotional as well as practical support, his assistance has not extended beyond what would be expected of a spouse in these circumstances. Mr. Lin did not testify about an economic loss arising from his visits in the early stages. As the defendants noted, there is no evidence that since 2015, he has increased the frequency or duration of his visits to Canada. His assistance (when Bin is not also visiting) has involved doing some meal preparation and housework, duties that Ms. Huang was previously entirely responsible for, as well as taking her shopping and accompanying her at the gym. Accepting his evidence the visits are now hard work, I infer this has much to do with being unaccustomed to performing everyday domestic tasks and the broader impact of the negative changes in Ms. Huang's emotional, cognitive, behavioural and physical functioning.

4. Cost of Future Care

[535] Ms. Huang seeks \$2,500,000 for the cost of her future care. The defendants suggest approximately \$900,000 is appropriate.

[536] Although far apart on the amount, the parties do not disagree about the legal principles that govern damages for the cost of future care.

[537] The purpose of a cost of future care award for a plaintiff who has suffered serious permanent injuries was discussed in *Andrews* at 241:

In theory a claim for the cost of future care is a pecuniary claim for the amount which may reasonably be expected to be expended in putting the injured party in the position he would have been in if he had not sustained the injury. Obviously, a plaintiff who has been gravely and permanently impaired can never be put in the position he would have been in if the tort had not been committed. To this extent, *restitutio in integrum* is not possible. Money is a barren substitute for health and personal happiness, but to the extent

within reason that money can be used to sustain or improve the mental or physical health of the injured person it may properly form part of a claim.

(Emphasis in original).

[538] In *Milina v. Bartsch* (1985), 49 B.C.L.R. (2d) 33 (S.C.), McLachlin J., then a member of this Court, confirmed the primary emphasis is full compensation through the provision of adequate future care, in cases where serious permanent injuries prevent full restoration. The award is based on what is reasonably necessary to promote the mental and physical health of the plaintiff.

[539] The test is an objective one based on medical evidence. To be recoverable, an item of future care must be medically justified and reasonable, not medically necessary. There must be an evidentiary link between a physician's assessment of pain, disability and recommended treatment and the care recommended by a qualified healthcare professional: *Gregory v. Insurance Corporation of British Columbia*, 2011 BCCA 144 at para. 39.

[540] Regarding the standard of care, the question is whether a reasonably minded person of ample means would be ready to incur the expense for which an award is sought: *Andrews* at 245; *Harrington v. Sangha*, 2011 BCSC 1035 at para. 150.

[541] Assessing damages for future care costs involves predicting what may happen in the future. The standard of proof is the same as for any future pecuniary loss. All that must be established is a real and substantial possibility of a future loss: *Howell v. Machi*, 2017 BCSC 1806 at para. 395. If a plaintiff has not used a particular service or item in the past, however, it may be inappropriate to include its cost in the award: *Izony v. Weidlich*, 2006 BCSC 1315 at para. 74. The focus of the inquiry is whether a justified item likely will be used going forward: *Gilbert v. Bottle*, 2011 BCSC 1389 at para. 251.

[542] It is necessary to take into account positive and negative contingencies. Adjustments for contingencies should be made depending on the specific care

needs of the plaintiff. Awards are reduced or increased based on the prospect of improvement or requirement for additional care.

[543] As I have indicated, the parties rely upon competing cost of care reports prepared by Ms. Chow for Ms. Huang, and Ms. Smith for the defendants, along with the recommendations and opinions of their respective medical specialists. Ms. Huang also relies upon the evidence of Evan Stregger regarding the cost of home modifications.

[544] The most significant difference in the assessments of Ms. Chow and Ms. Smith relates to the future cost of homecare. The present value of Ms. Chow's estimate is \$1,787,629 based on four hours of homecare per day until age 55, six hours from age 55 to 65, and a live-in caregiver from age 65 onwards. Ms. Smith's estimate of \$155,093 involves Ms. Huang continuing with her current level of homecare, eight hours per week for the next one to two years, followed by two to four hours per month for batch cooking, housecleaning at four hours per week, and heavier seasonal cleaning of six to eight hours per year.

[545] Not surprisingly, the parties urge me to prefer the opinions and estimates of their own experts. The defendants argue Ms. Chow's quantification of Ms. Huang's homecare needs is significantly undermined by her reliance upon a conversation with Andrew Wong, the treating occupational therapist who did not testify. Nor are his and other clinical records, in evidence. In general, of course, any opinion that *depends* upon unproven assumed facts is properly afforded no weight. I am not persuaded this is the case with respect to Ms. Chow's recommendations about homecare. Although in cross examination she testified that information she received from Mr. Wong was important, and she deferred to him in quantifying homecare, she said so in response to a query as to why she did not consult with the homecare workers themselves, and the suggestion she was simply relying upon what Ms. Huang told her about "just getting by" when her sister was not there to help her. It is clear, however, Ms. Chow's expertise and her own observations of Ms. Huang significantly informed her recommendations, along with the knowledge she was

receiving eight hours a week of homecare assistance. Ms. Chow is highly experienced. She has been assessing and treating clients with both traumatic brain injuries and spinal cord injuries for 26 years and spends most of her time engaged in clinical work.

[546] The much bigger problem is that Ms. Smith received only Dr. Apel's report and relied upon her opinions, including her prognosis, in making recommendations. Therefore, Ms. Smith assumed Ms. Huang's function would improve with participation in rehabilitation efforts over approximately two years and did not take into account the impact of Ms. Huang's cognitive deficits or the significance of Ms. Huang's fatigue. Furthermore, Ms. Smith has significantly less direct experience than Ms. Chow.

[547] I note the estimates of Ms. Chow and Ms. Smith differ regarding the amount and duration of various therapies but not typically the actual cost.

a) Medication

[548] Ms. Smith did not consider anything other than the cost of Ms. Huang's current medications. Presently Ms. Huang is prescribed Citalopram (20 mg) for mood symptoms, Zopiclone for sleep, an analgesic ointment for neuropathic pain, and Detrol for bladder management. I accept that Ms. Huang will require both anti-depressant and sleep medication long-term. Dr. Anderson has recommended a trial of other anti-depressants, including Cymbalta because it is also beneficial for pain management. Ms. Chow recommends either her current medication or Cymbalta at their respective costs, annually. Dr. Anderson recommended against the long-term use of Zopiclone, and Nortriptyline instead to improve her sleep and night-time pain. Again, Ms. Chow recommends the annual cost of either Zopiclone or (Amitriptyline) medication. Dr. Anderson also recommended a trial of Gabapentin or Lyrica, oral analgesics to replace the topical cream she has been using, but deferred to the opinion of the physiatrists. Dr. Anton also suggested an oral medication if the topical cream is not effective, but cautioned she may not tolerate negative side effects on alertness and cognition.

[549] Again I accept Ms. Huang's neuropathic pain is permanent and she will continue to need some form of medication to manage her symptoms. Ms. Chow includes the cost of either Gabapentin or Lyrica but not the cream on an annual basis. Finally, Ms. Chow also includes the annual cost of Detrol, the medication prescribed by Dr. Mickelson for bladder management, which I also accept she will continue to require over the long term. In total the present value of the medications based on Ms. Chow's costing ranges from \$33,795 to \$63,658.

[550] Noting the higher cost of the recommended but yet untried anti-depressant and sleeping medications and the high cost of Lyrica, bearing in mind the possibility Ms. Huang may choose not to use or discontinue oral analgesics due to the potential side effects, and the realistic possibility she may not continue with more expensive recommended medications, I award \$48,000 (present value) for this item.

b) Physiotherapy

[551] Ms. Smith recommends sessions one to two times per week for the next year followed by three or four per year for monitoring purposes and to manage flare-ups. Ms. Chow recommends two sessions per week for the next year, once a week for the following year and then 12 sessions per year. Each based their recommendations for the next year on their understanding of Ms. Huang's current schedule with NeuroAbility.

[552] Certainly ongoing physiotherapy has been recommended by the medical specialists to maximize her recovery and maintain her level of function for as long as possible, particularly with respect to her gait, which I accept, also noting as Ms. Chow did, Ms. Huang's strong motivation to continue participating. Based of their evidence, I am also satisfied this means long-term physiotherapy is required to continue to support her function, as well as manage the consequences of a physical deterioration. In addition, I accept the physiotherapist will play an important role in supervising and directing the services of the kinesiologist outlined below. Uncertain whether Ms. Huang attends twice a week or once to twice a week, I award an amount in the mid-range of the estimates: \$9,000 for year one. I accept Ms. Chow's

other recommendations that sessions thereafter be once per week in year two and then once per month and her costs estimates. For year two I therefore award \$6,096 and for subsequent years \$1,524 per year (present value).

[553] The parties do not dispute the present value of the yearly cost of 13 sessions of pelvic floor physiotherapy should be awarded. I therefore award \$23,071.

c) Kinesiologist

[554] Ms. Chow suggests 48 sessions per year to ensure Ms. Huang participates regularly in a community-based exercise program. Ms. Smith also recommends 48 sessions in the first year followed by 15 to 20 in the second year and then only a gym membership. Given Dr. Anton's recommendation, Ms. Huang's significant depression, her cognitive deficits, fatigue, balance issues, and physical limitations, and the importance of exercise to maintaining her current level of function and mood, I accept Ms. Huang requires the assistance of a kinesiologist long-term. I note Ms. Chow's evidence that in her experience it is very easy for people with mild traumatic brain injuries, as well as spinal cord injuries, to become derailed. In light of her depression in particular, Ms. Huang struggles with motivation. In addition to ensuring she follows through, a kinesiologist can ensure she is performing appropriate exercises safely and correctly. I award \$73,662 which is the present value of this item at the annual cost estimated by Ms. Chow.

d) Massage Therapy

[555] Ms. Smith does not recommend any massage therapy.

[556] Ms. Huang currently attends massage once or twice per week, mostly for pain management. Dr. Hamm and Ms. Craig have recommended continuing massage therapy. Ms. Chow suggests a gradual reduction (although not an elimination) to encourage "increased self management" of her pain symptoms, once the recommended medications are in place. Based on the research literature, Ms. Chow indicated long-term massage therapy does not "necessarily" make a difference with soft-tissue pain, but for people with spinal cord injuries it does help maintain muscle

lengthening and prevent the onset of spasms. She proposes 48 sessions in the first year, 24 in the second, and 12 every year after that at total present day cost of \$31,235.

[557] I regard some continued massage therapy as medically justified to manage pain symptoms in the short term and then to provide the other benefits Ms. Chow identified for those with spinal cord injuries. I view her proposed reduction as too gradual and an immediate reduction to once every two weeks for the first six months followed by further reductions with a view to Ms. Huang using massage therapy every other month in the long term as reasonable. Doing the best I can to estimate an appropriate amount, I award \$13,000 for present day cost of this item.

e) Occupational Therapy

[558] Ms. Smith recommends only five hours per month for the next year and then three hours per month the year after. Ms. Chow's recommendations include 18 sessions per year for the first two years plus 12 hours of indirect time and travel costs (for consultation with team members, record-keeping and treatment planning); 12 sessions for years three and four, plus nine hours of indirect time and travel costs and then for year five onwards six to eight sessions, plus four hours of indirect time and travel costs, totalling \$50,555 (present value). In her report Ms. Chow identifies Mr. Wong as proposing the level of service, also noting however Ms. Huang currently meets with him every two or three weeks. In direct examination Ms. Chow identified Ms. Huang's multiple diagnoses as the reason for ongoing occupational therapy, indicating in her experience clients with this profile tend to require support long-term because they have a hard time dealing with changes and transitions. She also testified:

So they may not necessarily need that full comprehensive level of occupational therapy that she's getting right now that Andrew Wong is providing. ... at some point she will habituate to some of those problems she's having. And hopefully with the therapy and the support she'll settle a little bit. But that little buffer of those six to eight treatment sessions a year is just to allow that ability to check in with her.

[559] The defendants' main objection to this and other service-based recommendations relates to duration. What is not clear to me is whether Ms. Chow has incorporated Dr. Anton's opinion that at least monthly case management will be necessary for Ms. Huang in light of her psychological and cognitive deficits. In any event, given the recommendations of the medical specialists and the evidence of Ms. Chow, and her clinical experience as opposed to Mr. Wong's proposal, I accept ongoing occupational therapy at the level she proposes is medically justified and reasonable, on the basis that some case planning, coordination and monitoring of the kinesiologist will form part of the occupational therapist's role. I therefore award \$50,555 (present value).

f) Psychological Support

[560] Ms. Huang has continued to attend regular sessions with psychologist Dr. Cheung. Without the benefit of any psychological or psychiatric evidence, Ms. Smith appropriately defers to the opinions of qualified experts regarding Ms. Huang's need for ongoing treatment. Ms. Chow relies upon the recommendations of Dr. Lanius in estimating the cost of this item. Given that he, Dr. Anderson, Dr. Hamm, Dr. Anton and Dr. Du all recommend psychological treatment and Ms. Huang's undisputed depression, I am perplexed by the defendants' suggestion she failed to establish a medical justification for ongoing treatment because she did not call Dr. Cheung as a witness.

[561] Dr. Lanius recommends 48 sessions per year for the next two years followed by six sessions per year in perpetuity, as well as 20 to 40 sessions of neurofeedback treatment to manage Ms. Huang's neurocognitive deficits, describing neurofeedback as one of the few interventions that can be helpful with decreasing neurocognitive symptoms. He recommends evaluating Ms. Huang's response after 20 sessions, and if positive, she should attend an additional 20. Dr. Lanius does not explain the need for weekly psychological treatment over the next two years, a significant increase. Noting Ms. Huang faces a risk of a further decline in her mental health with

a further physical deterioration, Ms. Chow characterized the reduction to six sessions per year as a conservative level of psychological support.

[562] Bearing in mind Ms. Huang presently attends appointments every two or three weeks, and absent any evidence showing an increase will facilitate an improvement in her condition, or limit the risk of deterioration, I consider the current schedule for the next two years to be appropriate, followed by a reduction to six sessions per year as proposed by Dr. Lanius. I therefore award \$4,500 for years one and two, followed by \$1,150 yearly, the total present value of which is \$39,240.

[563] Accepting his evidence and recommendation regarding neurofeedback as medically justified given Ms. Huang's neurocognitive deficits, I consider an award of \$5,910 to be reasonable, bearing in mind the chance of the second set of 20 sessions not being clinically indicated.

g) Sexual Medicine Services

[564] Dr. Elliot recommends 10 sessions with a sexual therapist at a cost of \$1,750, vibrator assistance at approximately \$250 every five years, lubricants at approximately \$200 per year, and if Ms. Huang resumes a sexual relationship, the positioning cushions or side bed rails, due to her weak shoulder and to reduce neck and back pain, at \$150 to \$250.

[565] I find Mr. Lin and Ms. Huang likely will attend marriage counselling to address the loss of their sexual relationship and Ms. Huang's loss of sexual function. Applying a large negative contingency to the estimated ongoing equipment costs, to account for the significant likelihood they will not be used or used infrequently as both of them age or the marriage breaks down, I award \$2,000 for this item.

h) Medical/Rehabilitation Equipment

[566] Ms. Chow recommends the provision of the following items: replacement of a four-wheeled walker (Ms. Huang currently has two because of her multi-leveled home, which she purchased in August 2014), every five to seven years at an

average cost of \$490; replacement of toilet safety frames in her main and ensuite bathrooms (\$67 each); replacement of a bath chair every three to five years (\$80); an allowance for two incontinence pads per day (\$11.99 for 66 pads); the cost of a Lifeline Alarm System (\$89.95 plus GST) and the monthly monitoring fee (\$57.95 plus GST), due to her increased risk of falls; and the cost of a power mobility device, such as a motorized scooter, from age 55 onwards that would require replacement every 10 years, given her high level of fatigue, and the risk of decline in function with age due to her spinal cord injury.

[567] Leaving aside a power mobility device which she has not recommended, Ms. Smith has included many of these same items, at slightly different costs, as well as some additional adaptive aids for household chores, all of which I accept are medically justified and reasonable.

[568] Dr. Anton opined that Ms. Huang needs a wheelchair for longer distances in order to access the community and in the future will probably require a power wheelchair and scooter as her mobility declines with aging.

[569] Ms. Chow's rationale for including a power scooter at age 55 is the expectation Ms. Huang will spend the next couple of years maximizing her ability to mobilize through ongoing therapy and exercise. At the same time, she is expected to age 15 to 20 years earlier than her cohorts. A motorized scooter would allow her to browse and shop for longer and over a wider range, at the local mall for example.

[570] Ms. Huang argues that including this item as of age 55 is not extravagant and entirely reasonable as well as medically justified, in light of these circumstances.

[571] Bearing in mind the profound impact of Ms. Huang's fatigue on her activity level and the fact Ms. Chow's recommendations do not include any amount for any device that would allow her to mobilize over longer distances and for longer period, I agree.

[572] Ms. Smith's recommendations include the cost of a foot drop brace to manage her left foot drop (\$178.49 every six years and \$60.00 for the elastic inlay every two years except the years in which the whole brace is replaced), which Dr. Anton also recommended. Dr. Hamm and Dr. Anton also suggested an ankle foot orthotic but there is no evidence about its cost.

[573] The plaintiff submits that on the basis of Ms. Chow's recommendations, \$14,519 is appropriate. I therefore grant \$15,000 to account also for Ms. Smith's and Dr. Hamm's and Dr. Anton's recommendations.

i) Homecare Support

[574] Again, Ms. Chow recommends a staged approach that would provide funding for four hours per day of homecare support until Ms. Huang is 55, six hours per day from 55 to 65, and then a live-in caregiver from 65 onward based on the risk of her functioning declining with age and more quickly than for an able-bodied person (55 as likely equivalent to 65 or 70), and the reduction in rehabilitation therapy over time. Ms. Chow suggests a live-in care giver largely for economic reasons, indicating daily care much beyond six hours is just as costly.

[575] Although Ms. Smith's recommendations do not address the risk of decline, the defendants acknowledge there is a real and substantial possibility Ms. Huang's function will decline in the future because of her spinal cord injury and she may require additional care as a result. The defendants submit that rather than providing for the cost of increasing levels of care, an additional lump sum amount of \$250,000 should be awarded to account for that possibility.

[576] They view Ms. Chow as significantly overestimating the risk, describing her assessment as consistent with the notion a decline in function is virtually certain to occur in the near future. Relying upon the evidence of Ms. Alford, the occupational therapist who provided outpatient services to Ms. Huang, and supported a reduction in homecare services to nine hours per week in or about March 2015, along with the absence of any evidence suggesting any decline in function since then, the

defendants argue Ms. Chow's recommendations are excessive, impractical and medically unjustified.

[577] Having provided outpatient services at GFS herself, Ms. Chow characterized Ms. Alford's recommendation and the reduction in homecare for Ms. Huang as system-driven. Ms. Chow explained there is pressure to reduce the hours given the limit of \$145 per week for homemaker services provided pursuant to Part 7 of the *Insurance (Vehicle) Regulation*, B.C. Reg. 447/83. She testified, and I accept, the goal if not the mandate when dealing with clients who have been discharged from GFS is:

... to see if we can get them by with this 145 a week. That's what we try and do. And it doesn't always work. It doesn't work most of the time when we have these catastrophic injuries. And we run out of Part 7 money, and we do what we can to conserve it.

[578] Ms. Chow also explained as an occupational therapist assessing the needs of an outpatient, she assumed family members were going to help whereas her cost of care recommendations do not factor in family support, consistent with the standard of care.

[579] Her estimate of four hours per day took into account a homecare worker accompanying Ms. Huang to medical appointments, grocery shopping, and on some leisure outings, as well as meal preparation and housework. Aware she attends appointment on her own when her sister or husband are not visiting, Ms. Chow was nonetheless concerned about Ms. Huang being alone and falling, in part having observed her scramble to get out the front door and down to a taxi, and how easily the front wheel of her walker catches on a difference in pavement etc. Most taxi drivers will help by taking the walker up and down the steps but they are not permitted to assist her physically.

[580] The defendants emphasize the evidence about when or how Ms. Huang's function may be impacted was uncertain, pointing to some of Dr. Anton's testimony on this point:

... the literature shows that if you look at the population generally that about half or a little more than half of people over the age of 75 have had enough decline in function that they're going to need some assistance. In people with neurological disabilities, that happens at an earlier age.

The dilemma is having said that I can't say when that decline would occur, because there's so many other factors that affect our function as we get older, it really difficult to quantify the risk just based on the spinal cord injury.

[581] However, Ms. Huang also faces the risk of worsening function due to her impaired cognitive function and her significant depression.

[582] Although I view the defendants' proposal as well below the requisite standard of care, I do not entirely accept the level of care proposed by Ms. Chow.

[583] I have not forgotten Dr. Anton's suggestion the amount of care provided by Ms. Huang's sister Bin is an appropriate measure. Ms. Chow's starting point of four hours including appointments and leisure activities falls below that level, consistent with my own finding in relation to the in trust claim. I agree with the defendants, however, that paid companionship is not a reasonable use of homecare service even though Ms. Huang has largely withdrawn from socializing with friends. In my view, it is unlikely she would be content to participate in leisure activities with a homecare worker. Despite the impact of her brain injury, she maintains the perspective and awareness of an accomplished person who is now also very sensitive and self-conscious. Utilizing her ongoing psychological treatment to work towards reconnecting with friends and or establishing new social connections strikes me as a better approach to meeting her need for meaningful social engagement.

[584] Although there is a risk Ms. Huang will fall when she is away from home, and Bin prevented her from doing so in the past, unless and until her function declines, I view it as reasonable for homecare workers to accompany her to appointments during inclement winter weather and otherwise to assist her as needed in getting to and from taxis. As discussed below, I have granted an amount for the cost of home modifications that is premised on her moving to a one-level home, with fewer if any outdoor stairs, that will better accommodate her physical limitations including the risk of tripping.

[585] There is no question Ms. Huang requires direct assistance with grocery shopping. Given her Asian diet, and the evidence Chinese produce and other food products are not available online, it is reasonable for her to shop in person, although over time I expect at least some online shopping will be a viable option for her.

[586] Even though Ms. Huang can perform light housekeeping tasks, such as small loads of laundry and some simple meal preparation, her impaired hand function, weakness in both her hands and legs, and her fatigue limit the number of tasks she is able to complete safely in a given day. I accept therefore she needs someone to prepare at least one daily meal for her and to complete many of the regular household tasks, as well as seasonal and any outdoor cleaning such as windows.

[587] Given all of these circumstances, I consider 21 hours per week as opposed to the 28 proposed by Ms. Chow to be reasonable, recognizing that some days may involve more hours and others less, and a varied focus on meals, cleaning and other tasks throughout the week.

[588] Turning to her future care needs, Ms. Chow proposes a staged response based on the risk that Ms. Huang's condition and functioning will decline in the future. As I have indicated, the defendants accept there is a real and substantial possibility she will deteriorate in the future, due to her spinal cord injury, thereby increasing her care requirements. The medical evidence satisfies me however, those requirements may also increase based on the additional risk her cognitive and psychological functioning will decline. I am required to assess the future costs associated with the real and substantial possibility of all forms of deterioration and their affects on her care needs according to the likelihood of those events occurring, again based on what is medically justified and reasonable.

[589] The medical evidence was uncertain about when and to what extent Ms. Huang may decline, making the assessment very much an exercise in crystal ball gazing. What is clear is that even relatively minor deteriorations in aspects of Ms. Huang's physical functioning, such as her mobility, could meaningfully increase

her need for homecare assistance. Doing the best I can with the available evidence, I am satisfied that from age 60 onward Ms. Huang faces a real and substantial possibility her level of function will decline causing an increase in her need for homecare, with the likelihood and extent of the risk increasing further from age 70 onward. In my view, the cost of future homecare is best assessed by awarding the present value of the cost of the current level of care plus an amount that attempts to balance the risk that she may deteriorate to the point of being dependent on a wheelchair and struggling with worsening cognitive impairments that limit her ability to live independently against the chance she may not deteriorate or decline significantly. My assessment of the future pecuniary loss must also take into account the possibility she may have required homecare assistance from age 70 onward absent the Collision, accepting Dr. Anton's evidence that a majority of able-bodied people require some assistance by age 75. Accordingly, I estimate the likelihood of a further deterioration and its impact on her need for homecare at 30% from age 60 to 70, and 50% from age 70 to 80.2.

[590] In the result, I award an amount equal to the present value of 21 hours per week of homecare assistance to age 80.2, at a cost of \$30 per hour, plus the present value of 30% of that cost from ages 60 to 70, and 50% of that cost from ages 70 to 80.2. I rely on counsel to make that calculation. They may appear before me in the event they cannot agree.

j) Home Modifications

[591] Ms. Huang seeks an award of \$300,000 for this item based on the opinion evidence of Mr. Stregger, a professional quantity surveyor with experience in pricing the cost of purpose-designed housing and special needs requirements. He calculates the probable additional cost of constructing a single-level home, based on Ms. Huang's needs, as ranging from \$250,000 to \$302,000. The defendants do not dispute that stairs are problematic for her but take the position nothing should be awarded for home modifications because she has not established a move to more suitable accommodation will result in increased cost.

[592] Mr. Stregger's recommendations are based on Ms. Huang's condition as described in the reports of Dr. Anton and Ms. Craig, and her dependence on a walker and or a wheelchair. Mr. Stregger estimates the difference in cost between constructing a "builder's style" one-level three bedroom (with den) detached home and one modified or purposely designed for Ms. Huang. In addition to the cost of making each room, the garage and outdoor patio spaces larger, his estimate includes the cost of an attached garage, multiple modifications that range from the replacement of towel and toilet paper holders with grab bars, to the replacement of regular kitchen finishings with adjustable and pull-down cabinets and special appliances, pull-down closet rods, an adjustable bathroom vanity, various specialized plumbing fixtures, and garage heating for example.

[593] Mr. Stregger did not estimate the cost of renovating an existing detached home. He testified the need for more space in each room due to the walker, cannot be achieved in most existing residences, and in any event renovating is more costly because when it exceeds 50% of the home's value, the home must be brought into compliance with expensive building code requirements.

[594] In cross examination, Mr. Stregger said he was unaware of the width of Ms. Huang's walker. He assumed she would need more space based on his experience with clients and family members who use them, specifying the width of interior doors and hallways are a problem. I was left unconvinced the size of every room was an issue for those using walkers or electric wheelchairs. Similarly, Mr. Stregger did not estimate the cost of modifying a single-level townhouse or condominium citing concerns about strata approvals for any external modifications. He suggested most one-level condominiums have an eight-inch step to the outside door and an eight-inch step from inside the unit to a deck or patio. He indicated in many instances permission to modify those steps, I assume with a ramp, has been refused by strata councils.

[595] I must say I found the prospect of a strata council refusing to accommodate a disabled owner in this way difficult to accept. Leaving aside the issue of any legal

obligation to accommodate those with disabilities, clearly many seniors come to depend upon mobility aids such as walkers, scooters and electric wheelchairs in their homes.

[596] Aside from Mr. Stregger's anecdotal evidence, there is no evidence suggesting a one-level strata unit with few if any outdoor stairs is not a viable option for Ms. Huang. I accept however a number of modifications to any such unit would be required to accommodate her functional limitations and the risk of decline, bearing in mind the level of homecare service she will be receiving. I consider the cost of the following renovations medically justified and reasonable: grab bars, widening of some interior doorways, potentially enlarging or modifying the ensuite bathroom, adding an automatic door opener(s), electrical and plumbing modifications including raised outlets, a wheel-in shower (to eliminate steps), motorized blinds and kitchen modifications including a lowered counter area to accommodate Ms. Huang while sitting, an insulated sink, an induction cooktop to prevent burns, countertop mounted controls for hood fan, and ramps, etc. to address a potential step to the balcony or patio and the front of the home, if it has its own entrance. Bearing in mind some of Mr. Stregger's estimates, I assess those costs at \$90,000.

k) Home Maintenance

[597] Ms. Chow recommends 30 to 40 hours of handyman service per year at \$50 per hour in the event Ms. Huang moves into a one-level house as opposed to a strata unit, for outdoor tasks such as sweeping outdoor areas, yard work, gardening and small indoor tasks. Given my conclusion above regarding a one-level strata unit, no award is made for this item.

l) Vocational Needs

[598] Ms. Chow recommends a small amount for vocational counselling to facilitate Ms. Huang's participation in some volunteer work that would provide her with a sense of purpose given she highly valued her role as a working professional.

Ms. Chow testified that vocational consultants source possible volunteer opportunities in the community and provide coaching on site. She explained it can be more difficult with highly educated clients who may perceive a particular placement as comparatively mundane and yet there is a need to find meaning beyond rehabilitation and therapy involving a sense of productivity and contributing.

[599] Although none of the medical specialists recommended this, it is clear they were focused on the issue of Ms. Huang's employability. I accept that once Ms. Huang's more intensive therapy schedule lessens, and she has more time available for other activities, there is a real and substantial possibility she will have an interest in participating in volunteer work, very part-time. I view some assistance in securing a suitable position, given her functional limitations, as medically justified and a reasonable means of promoting her mental health. I award \$2,500 for this item.

m) Attendant Travel Costs

[600] Ms. Chow includes an amount for attendant travel costs once every four years based on Ms. Huang's interest and involvement in travel before the Collision. Although this cost item is modest and the rate of travel conservative, I am not satisfied it is something Ms. Huang will be prepared to do without a family member in the future. Since the Collision she has flown to and from Toronto once with Mr. Lin. She was afraid and therefore unwilling to use the washroom during the flight. This issue would pose a barrier to any overseas flights. I therefore make no award for this item.

5. Ministry of Health Claim

[601] The parties have agreed to a claim in the amount of \$133,898.46 based on the Minister's certificate filed pursuant to s. 16 of the *Health Care Costs Recovery Act*, S.B.C. 2008, c. 27.

6. ICBC Subrogated Claim

[602] Trevor Yerxa testified on behalf of ICBC regarding its subrogated claims for Part 7 benefits and insured losses paid to or on behalf of Ms. Huang. The parties have agreed to the amount of \$133,021.96.

7. Special Damages

[603] The parties agreed Ms. Huang’s special damages amounted to \$18,000 at the commencement of the trial. I award this amount subject to any further agreement that would include an additional amount based on expenses she incurred up to the completion of the trial five month later.

D. Conclusion on Damages

[604] In summary I award Ms. Huang the following amounts as damages:

Non-Pecuniary Damages	\$330,000
Past Loss of Earning Capacity	\$216,586
Future Loss of Earning Capacity	\$1,166,283
In Trust Claim	\$50,000
Costs of Future Care:	
Medications	\$48,000
Physiotherapy	\$23,071
Kinesiologist	\$73,662
Massage Therapy	\$13,000
Occupational Therapy	\$50,555
Psychological Support	\$39,240
Neurofeedback Treatment	\$5,910
Sexual Medicine Services	\$2,000
Medical/Rehabilitation Equipment	\$15,000
Homecare Support	* COUNSEL TO CALCULATE
Home Modifications	\$80,000
Vocational Needs	\$3,500
Ministry of Health Claims	\$133,898.46
ICBC Subrogated Claim	\$133,021.96
Special Damages	\$18,000

“Fleming J.”