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TECHNICAL REVIEW OF EXPERT REPORT

RE: UY
Date of Incident: January 31, 2014

Prepared for:

Ms. Sandra Kovacs
KazLaw Injury Lawyers
Suite 1900 – 570 Granville Street
Vancouver, B.C. V6C 3P1

Author: Amrit S. Toor, Ph.D., P.Eng.
Intech File: 14B005
Date: April 23rd 2019

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1.0 INTRODUCTION

This report was prepared on the instructions of Ms. Sandra Kovacs of KazLaw Injury Lawyers. It is concerned with the motor vehicle incident of January 31st 2014, involving a 2003 Honda Element operated by Johnberlyn Uy (the Uy Honda), and a 2011 Freightliner Tractor Trailer operated by Daljit Dhillon (the Dhillon Freightliner).

In accordance with the instructions of Ms. Kovacs, the purpose of this assignment was to technically review the "Vehicle Incident Report" authored by Mr. Trevor S. Dinn, P.Eng., of Forensic Dynamics Inc., dated August 14th 2018 (the Dinn report).

2.0 QUALIFICATIONS AND CERTIFICATION

2.1 Qualifications

Amrit Toor, Ph.D., P.Eng., is the author and is responsible for the contents of this report. Dr. Toor's qualifications are summarized as follows:

- B.Sc. in Engineering with first class honors from Coventry University, Coventry, United Kingdom (1980).
- Ph.D. in Mechanical Engineering from Coventry University, Coventry, United Kingdom (1986).
- Registered Professional Engineer in the province of British Columbia.
- Author and Reviewer of several peer reviewed publications in the field of Accident Reconstruction.
- Qualified and provided expert evidence as a Mechanical Engineer and Accident Reconstructionist in the Supreme Court of British Columbia, the Provincial Courts of British Columbia and Manitoba, and the Superior Court of Washington State.

A detailed copy of Dr. Toor's curriculum vitae, with professional affiliation, experience, and publications, is appended.

2.2 Certification

I, Amrit Toor, certify that I have read the Supreme Court Civil Rule 11-2 "Duty of Expert Witnesses" and I am aware of my duty under sub-rule 1. Specifically:

i.) I am aware that my duty as an expert witness is to assist the court and that I must not be an advocate for any party when giving my opinion to the court.
ii.) I have made every effort to ensure that this report conforms to that duty.
iii.) If I am called on to give oral or written testimony, I will give that testimony in conformity with that duty.

3.0 DATA PROVIDED

The following data was provided for the purpose of this report:

- Vehicle Incident Report authored by Trevor S. Dinn, P.Eng., of Forensic Dynamics Inc., dated August 14th 2018 (the Dinn report), and file materials.
- RCMP Fraser Valley Traffic Services file for file number 2014-3315, including:
  - BC Motor Vehicle Traffic Collision Police Investigation Report (MV 6020).

  - General Occurrence Hardcopy.
  - Photographs and sketch of the incident scene and involved vehicles.
  - Collision Reconstruction Technical Report of Cpl. Gen Dussault.
- Fraser Valley Regional Fire Dispatch Centre Report.
- Invoices for repair of the Dhillon Freightliner, various dates.
- Vehicle Inspection Report for the Uy Honda.
- ICBC FOI file.

Technical data that is utilized for analysis purposes is referenced with a description or endnote where required; thus, the research relied upon is referenced in this report where applicable.

4.0 FACTS AND ASSUMPTIONS

The following assumptions were provided for the purpose of this review:

1) The subject incident occurred on January 31st 2014 in the westbound section of Highway 5 (the Coquihalla Highway) at or near the Zopkios rest stop near Yale, BC.
2) The temperature at the time of the incident was below freezing and there was snow on the roadway.
3) Johnberlyn Uy was the operator of a 2013 Honda Element, travelling westbound in the far left lane.
4) Daljit Dhillon was also westbound operating a 2011 Freightliner PX-12 and pulling two trailers (a Super B Train). The lead trailer was 32 feet, and the rear trailer was between 28 to 30 feet. The shorter trailer was in the rear. The cargo weight in each trailer was about 20,000 lbs.
5) Mr. Dhillon merged onto Highway 5 from the Zopkios brake check. There were four or five tractor trailers ahead of him. Mr. Dhillon overtook a Super B flat-deck tractor trailer combination unit loaded with lumber that was travelling in the far right lane. He reports travelling at 30-40 km/h in the middle lane, downhill.
6) A collision occurred between the Dhillon Freightliner's cargo trailer and the Uy Honda.
7) Maria Cezzo De Leon was a front seat passenger in the Uy Honda. Ms. De Leon says the Freightliner's trailer "skidded" into their lane of travel. She says this caused Mr. Uy to take evasive action. Mr. Uy's evasive action caused the Uy Honda to yaw, but a collision resulted.
8) Mr. Uy suffered serious injuries as a result of the incident, including a traumatic brain injury and is now mentally incompetent.

5.0 ANALYSIS

5.1 The Uy Honda

The Uy Honda was examined on February 20th 2014 at the premises of Jamie Davis Towing in Hope, BC. It was identified as a 2003 Honda Element two door sedan with a vehicle identification number (VIN) of 5J6YH17573L800861.

The damage was observed on the left side. The majority of the deformation was on the operator's door, the left fender, left side of the hood and left A-pillar. The left A-pillar damage has a horizontal circular impression pushed into the windshield and deforming the roof adjacent to the A-pillar. The rear left door was also damaged, but to a much lesser degree. The front left wheel was directed towards the right and the left headlamp assembly was missing. There were also damages observed to the rear left corner region. Figure 1 illustrates the damages sustained by the Uy Honda.

Figure 1: Uy Honda damages.

6.0 REVIEW OF THE DINN REPORT, DATED AUGUST 14, 2018

6.1 Review of Section *"1.3 Instructions"*

The Dinn report was instructed to comment on:

1) *The configuration of the vehicles at impact and whether the Freightliner tractor trailer entered the travelled portion of the middle lane.*
2) *Whether the Freightliner was travelling straight down the roadway or angled across the road at impact.*
3) *The Freightliner's approximate speed at impact.*
4) *Was the Freightliner likely encroaching on the Honda's travel?*

5) *Whether the Honda driver was likely avoiding an encroaching Freightliner or the Honda's pre-impact motion was likely due to a loss of control.*

The findings of the Dinn report with respect to the above objectives will be discussed throughout this report.

6.2 Review of Section *"3.1 General Incident Background Assumptions"*

The following assumptions were used by Mr. Dinn in preparation of his report:

1) *On January 31st, 2014 at approximately 2:25 am, the subject collision occurred on Hwy 5's southbound lanes south of the Zopkios pull-out.*
2) *Mr. Daljit Singh Dhillon was driving a 2011 Freightliner Cascadia PX125 TT with two Day and Ross Trailers southbound on Highway 5.*
3) *The Freightliner's VIN was 1FUJGLDR1BLAZ0489.*
4) *Mr. Johnberlyn Uy was driving a 2003 Honda Element southbound on Hwy 5.*
5) *The Honda Element collided with the back of the Freightliner's rear most trailer. It was initially travelling at about 75 km/h.*
6) *The roads were in winter condition and it was minus 10 to minus 15 degrees Celsius.*
7) *Mr. Dhillon reacted to the impact by bringing his tractor trailer to a stop.*
8) *The weather was clear.*
9) *The Day and Ross trailers were identified by the following:*
    - *Trailer 181306 was a 2011 Manac/Serial #2M5920915B1125949*
    - *Trailer 181307 was a 2011 Manac/Serial #2M5910881B1125951*

These assumptions will also be considered in this review of the Dinn report.

6.3 Review of Section *"3.2 Incident Scene"*

Mr. Dinn examined the incident scene on three different occasions: November 20th 2016, June 10th 2017 and June 22nd 2017. It appears that during one of these visits, Mr. Dinn surveyed the incident scene. The Dinn report correctly points out that at the time of the subject incident, the road surface was covered in snow and the lane dividing lines or the fog lines were not visible. As a consequence, the road surface had two regions; described in the Dinn report as:

> "*The police photographs portrayed a travelled bare-like road portion on the left hand side of the road, and a more snow covered portion to the right.*"

There is evidence of traffic flow on both regions of the road. The photographic evidence indicates the road was likely being used as a two lane highway at the time of the subject incident. The Dinn report included an incident scene diagram (reproduced as Figure 2). It is noted that Figure 2 of the Dinn report only illustrates the immediate vicinity of the incident.

The incident was at or near the end of a counter-clockwise curve and the beginning of a clockwise curve. Figure 3 illustrates the incident scene geometry leading up to the point of impact. The influence of the curved geometry on the subject incident has not been addressed by Mr. Dinn.

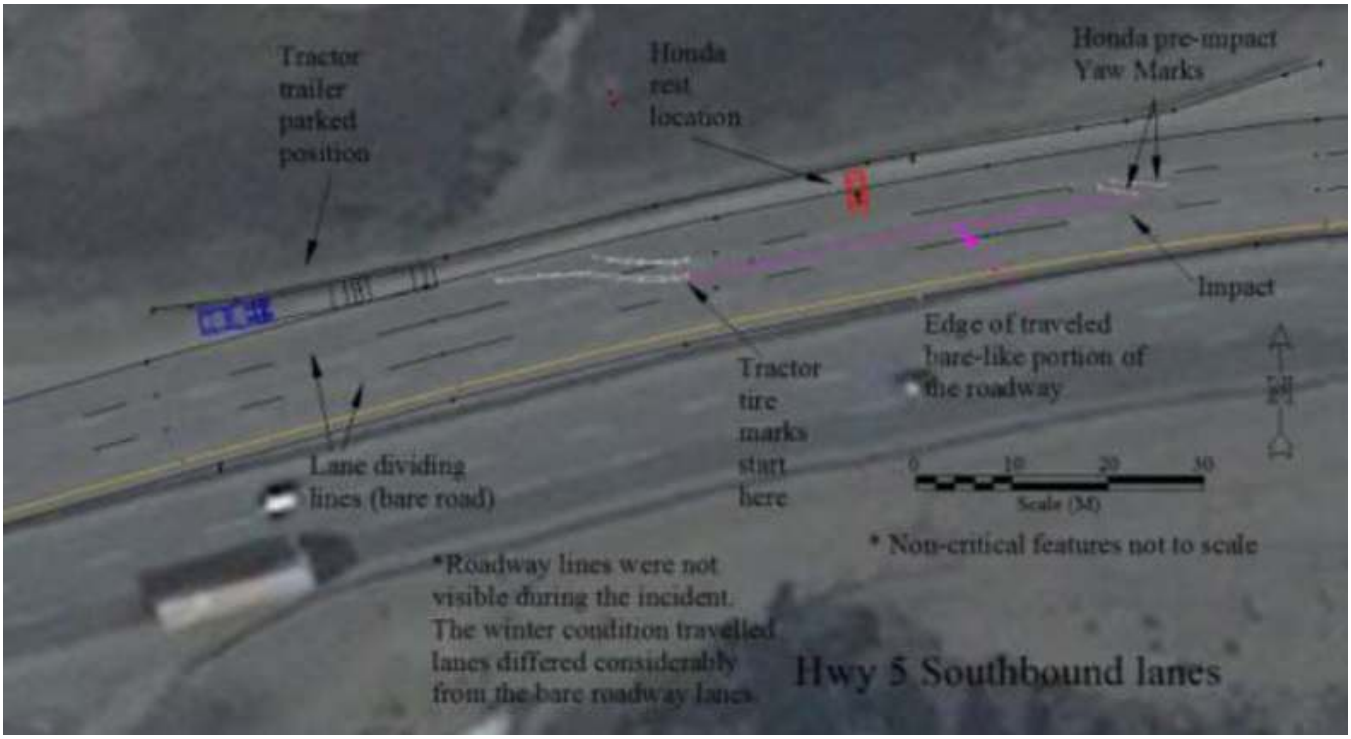


Figure 2: Incident scene diagram from the Dinn report.

Figure 3: Incident scene geometry.

6.4 Review of Sections *"3.3 2003 Honda CR-V" and "3.4 2011 Freightliner Tractor Trailer"*

The brief descriptions of the damages sustained by the Uy Honda and the Dhillon Freightliner are reasonable.

6.5 Review of Section *"4.0 Discussion & Analysis"*

Mr. Dinn assessed the incident scene evidence reasonably well; however, there are aspects of the incident scene evidence not addressed by the Dinn report. In particular, the police report notes:

> *"There was a tire scrub mark on the roadway about one lane width south of the shoulder barriers two sliding tire marks, starting west of the tire scrub mark, were continuous and led straight to the final rest position of Vehicle One's* [Uy Honda] *rear tires."*

The tire marks leading to the rear wheels of the Uy Honda were photographed (Figure 4). These tire marks appear on the west side of the debris field, while the tire marks illustrated in Mr. Dinn's diagram are illustrated on the east side of the debris field.

Figure 4: Tire marks leading to the rear wheels of the Uy Honda.

The Dinn report states:

> *"The Honda deposited two arced tire marks that led up to the point of impact as evidenced by the tire scrub mark on the roadway. These marks would have been created as the Honda arced toward the rear of the Freightliner's rear trailer. The left (or downhill) tire mark would have been deposited by the Honda's left front tire. The scrub mark at the end indicates the point of impact… Positioning the trailer and the Honda at impact indicated the trailer was straddling the lane divider, with its left side near the right edge of the bare travelled portion of the winter road. A diagram of the point of impact is visible in Figure 12.*

The Dinn reports' Figure 12 is reproduced below as Figure 5.

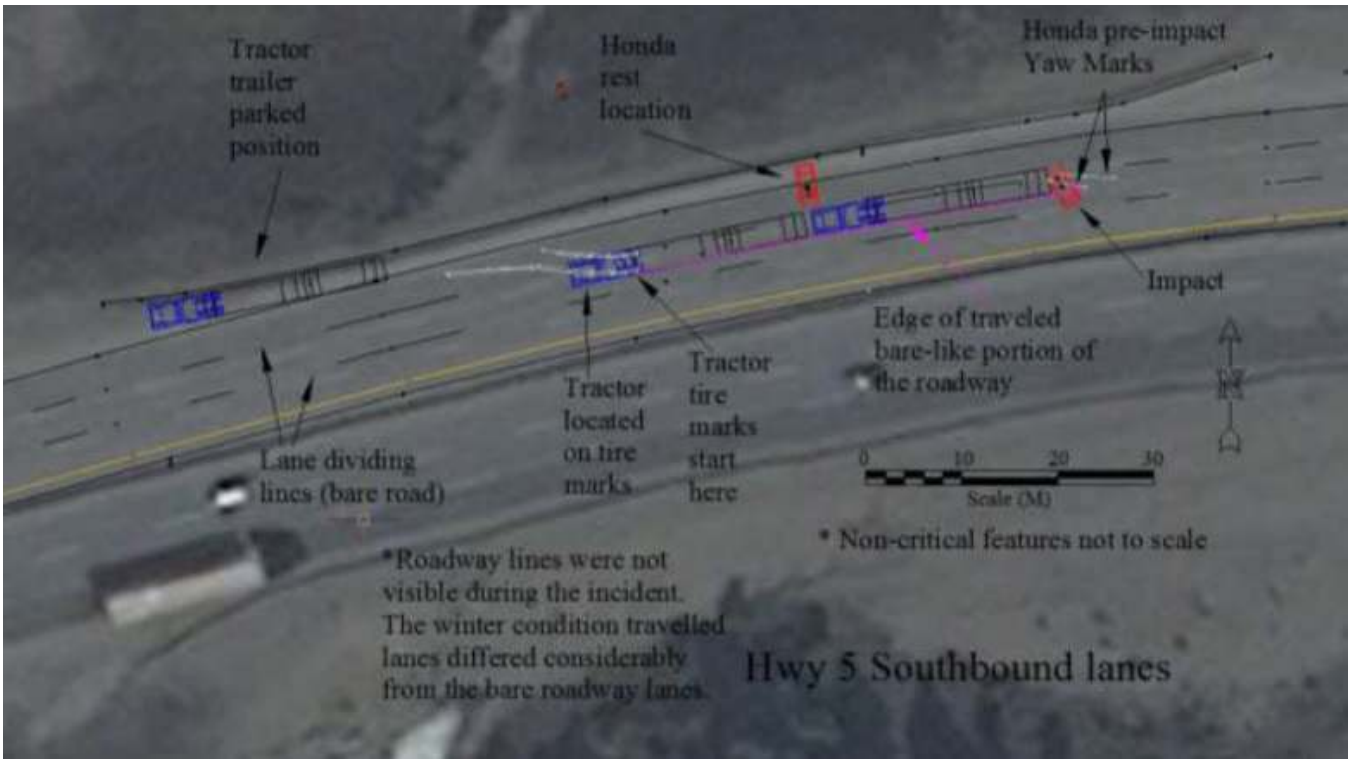


Figure 5: Dinn report Figure 12 showing point of impact.

The most important aspect to note is that the police did not measure the incident scene evidence; therefore, it is not possible to place the vehicles at impact with any fine degree of precision. The damage match or impact configuration (i.e. positioning the Uy Honda and the Dhillon Freightliner with respect to each other) can be assessed with a reasonable degree of accuracy. However, because the police did not measure the roadway evidence, positioning the vehicles at impact based on the roadway evidence will be subjected to a margin of error. In addition, the roadway evidence is not sufficient to accurately orientate the tractor trailer at impact. These margins of error are cumulative and apply to Mr. Dinn's incident scene reconstruction. Therefore, some variations of impact configuration with respect to the roadway will also conform to the physical evidence reconstructed by Mr. Dinn.

It is noted that the Dinn assumed/assessed impact orientation of the Dhillon Freightliner is illustrated in Figure 12 of the Dinn report and is shown to be relatively aligned with respect to the curve geometry and lane directions. There is no physical evidence to indicate or assess the specific impact orientation of the Dhillon Freightliner at impact. When a tractor trailer is steered, the trailer tires will either follow a turn path with a radius less than the tractor (in-tracking), follow the same path, or follow a path greater than the tractor (off-tracking). The amount of in-tracking or off-tracking is dependent on the tractor trailer geometry/characteristics (tractor trailer connections and load), the speed, friction values, and the steer input of the tractor operator. The amount of in-tracking or off-tracking can be significant; very rarely does the tractor follow the same path as the trailer, particularly with a B-train (double trailer) combination.

The impact orientation likely included some in-tracking or off-tracking of the Dhillon Freightliner. In addition, it is also likely that there was some angle of the Dhillon Freightliner with respect to the travel lane directions. It is likely that the Dinn report has simply assumed that the Dhillon Freightliner was aligned with respect to the lane direction. Due to the Dhillon Freightliner

negotiating a curve with winter/icy/snow road conditions, it is likely that there would have been some relative angle of the trailer units with respect to the tractor unit. In addition, the post-impact dynamics of the Dhillon Freightliner and the Uy Honda would have likely not significantly changed or differed if the trailers of the Dhillon Freightliner were angled at impact with respect to the lane direction. Thus, the analysis cannot determine if the Dhillon Freightliner was aligned or angled at impact. It is noted that the Dinn report was asked to determine "*Whether the Freightliner was travelling straight down the roadway or angled across the road at impact";* as described above, this is not possible from the available data.

Mr. Dinn assessed that the Dhillon Freightliner was travelling at 25 to 35 km/h and assumed that the Uy Honda was travelling at about 75 km/h. The Dhillon Freightliner was towing two trailers while traversing an arced path.

The Dinn analysis only considers the impact of the Uy Honda and the Dhillon Freightliner and the respective post-impact stopped positions. Thus, the Dinn analysis of the subject incident does not extrapolate to the pre-impact paths of the Uy Honda and/or the Dhillon Freightliner. This leaves two critical aspects of this incident as unknown:

1) The pre-impact path of the Dhillon Freightliner.
2) Whether or not the operator of the Uy Honda steered in response to recognizing the Dhillon Freightliner as a hazard.

At the speed of 25 to 35 km/h, the trailers of the Dhillon Freightliner are likely to slightly in-track the path of the trailer. Accounting for in-tracking, arced path, and margin of error for the roadway evidence, leads to a much larger range of pre-impact paths of the Dhillon Freightliner. Therefore, the likelihood of the operator of the Uy Honda responding to the Dhillon Freightliner changing lanes is within the reasonable possibilities and cannot be ruled out with any reasonable degree confidence.

It is also noted that assumption #5 states that Mr. Dhillon overtook a Super B flat-deck tractor trailer combination unit loaded with lumber that was travelling in the far right lane. The width of the Dhillon Freightliner was likely the standard width of about 2.6 meters. Similarly, the Super B flat-deck tractor trailer was likely also 2.6 meters in width. Based on the impact position shown in Figure 12 of the Dinn report, there was likely only a distance of about 3 meters from the right side of the Dhillon Freightliner to the edge of the snow bank within the right shoulder of the road; thus, there would not have been sufficient room for the Dhillon Freightliner to safely pass another tractor trailer travelling to the right of the Dhillon Freightliner in the impact position shown in the Dinn report. Therefore, the Dhillon Freightliner was likely further to the left and into the left through lane before the impact between the Dhillon Freightliner and the Uy Honda.

6.6 Discussion

Assumption #5 indicates that the Dhillon Freightliner overtook another commercial vehicle and there were four or five tractor trailers ahead of him. Mr. Dhillion also indicates that he was in the middle lane. The snow cover on the road surface indicates that there was no clearly defined boundary for the middle lane. Furthermore, the road surface at the time was likely being used as a two-lane highway. The middle lane was likely divided between the two travel lanes. If the Dhillon Freightliner overtook or was overtaking another vehicle (assumption #5), the likelihood of it encroaching into the left (as used) lane is reasonable.

Assumption #7 indicates that *Ms. De Leon says the Freightliner's trailer "skidded" into their lane of travel.*" Any skidding by the trailer would have occurred prior to the point of impact. If the Dhillon Freightliner was in the process of overtaking another vehicle and encroached into the path of the Uy vehicle, then Mr. Uy may have initiated a steer maneuver as a hazard avoidance action, which ultimately led to his loss of control. While there is no physical evidence to refute or validate Ms. De Leon's recollection of the Dhillon trailer encroaching into the path of the Uy Honda, assumption #5 does provide a reasonable confirmation of Ms. De Leon's recollection.

7.0 CONCLUSIONS

The report prepared by Trevor Dinn was reviewed and it was concluded:

1) Mr. Dinn's analysis of the subject incident only considered the impact and post-impact phase of the Uy/Dhillon collision and Dinn's analysis of the subject incident does not extrapolate to the pre-impact paths of the Uy Honda and/or the Dhillon Freightliner.

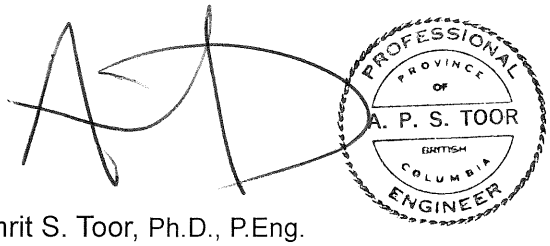
2) Mr. Dinn did not address two critical aspects of the subject incident:

   i. The pre-impact path of the Dhillon Freightliner,
   ii. Whether or not the operator of the Uy Honda steered in response to recognizing the Dhillon Freightliner as a hazard.

3) The snow cover on the road surface indicates that there was no clearly defined boundary for the middle lane. The three-lane highway was likely effectively being used as a two-lane highway.

4) Based on assumption #5 that Mr. Dhillon overtook a Super B flat-deck tractor trailer combination, indicates that the Dhillon Freightliner likely encroached into the left lane prior to the point of impact.

5) Assumption #7 indicates that *the Freightliner's trailer "skidded" into their lane* and Mr. Uy took evasive action, which led to the Uy Honda's loss of control. Assumption #5 does indicate that the Dhillon Freightliner likely encroached into the left lane prior to the point of impact.



Amrit S. Toor, Ph.D., P.Eng.
April 23rd 2019

KAZLAW INJURY LAWYERS

Our File No. 22604-1

Reply to: Sandy Kovacs
sk@kazlaw.ca

PRIVILEGED & CONFIDENTIAL

By Email: amrit@intech-eng.com; intech@intech-eng.com

February 21, 2019

INTECH ENGINEERING
201 - 12899 - 76th Avenue
Surrey,, B.C. V3W 1E6

Attention: Amrit Toor

Dear Sirs/Mesdames:

Re:	**Uy v Dhillon et al**	
	MVA Date:	**January 31, 2014**
	Claim No/Your File:	**U102902-3/14B005**
	Service Deadline:	**April 12, 2019**

We are lawyers for the plaintiff, Johnberlyn Uy, with respect to his claim for damages arising from the above-noted motor vehicle accident. We wish to engage you to prepare a written report in response to the report prepared by Trevor Dinn, P. Eng., dated 14/AUG/2018, a copy of which is enclosed.

Please note that a response report is intended to respond directly to the defence expert's report or to provide a critical analysis of his/her assumptions, methodology or opinion. It is not an opportunity to introduce new evidence.

Facts

In preparing your response report, please assume the following facts:

1. On January 31, 2014, the plaintiff, Johnberlyn Uy, was the seatbelted driver of his 2013 Honda Element, travelling westbound on Highway 5 (the Coquihalla Highway) at or near the Zopkios rest stop near Yale, B.C.

2. At the material time, the defendant, Daljit Dhillon, was operating his westbound 2011 Freightliner PX-12 tractor, the tractor was registered to the defendant, Day & Ross Inc. Mr. Dhillon was pulling two trailers, a super B train (the "Super B Train"). One cargo trailer was 32 feet, and the other between 28-30 feet. The shorter trailer was in the rear. The trailers were owned by Day & Ross. Mr. Dhillon was transporting auto parts.

3. Mr. Dhillon had earlier switched trailers with another driver in Blue River, where he also slept in his cab for five hours. He did not inspect the cargo he took over. The shipment was not sealed, but the tailgate was closed. He inspected the trailer from the outside before commencing his trip westbound to the Lower Mainland, through Kamloops.

4. The maximum load for both trailers was 44,000 lbs.

5. The load at the material time was roughly 20,000 lbs.

6. In the early morning hours of January 31, 2014, the temperature was below freezing. There was snow on the roadway.

7. Mr. Dhillon stopped at the Zopkios brake check to wait for the salt trucks to pass and travel ahead on a roughly eight-kilometre downhill section of the highway. There were between ten and 12 tractor trailers at the Zopkios brake check.

8. Dhillon merged onto Highway 5 from the Zopkios brake check. He alleges there were four or five tractor-trailers ahead of him. Dhillon elected to overtake a Super B flat-deck tractor-trailer combination unit loaded with lumber that was travelling in the far right lane. He reports he was travelling at 30-40 km/h in the middle lane, downhill.

9. The plaintiff's Honda Element was traveling in the far left lane.

10. A collision occurred between the Freightliner's cargo trailer and the plaintiff's Honda Element.

11. The plaintiff's girlfriend, Maria Cezzo De Leon, was in the front passenger seat of the Honda Element. Ms. De Leon says the Freighliner's trailer "skidded" into the plaintiff's lane of travel. She says this caused the plaintiff to take evasive action. Mr. Uy's evasive action caused the Honda to yaw, but the collision nonetheless resulted.

12. The plaintiff suffered serious injuries in the collision, including a traumatic brain injury. He is now mentally incompetent.

Format

If this claim proceeds to a trial, it will be necessary to file your report in evidence, and as such, your report must comply with the British Columbia Supreme Court Civil Rules. To ensure that your report complies, please include the following information:

> CERTIFICATION – Experts are required to certify they are aware of their duty to the Court, the expert report is written in accordance with that duty, and the expert will give testimony in accordance with the duty if required to do so. Please include the following statement in your report:
>
> *I am aware have a duty to assist the court and not be an advocate for any party. I have prepared this report in conformity with my duty to the court. If I am called upon to give oral or written*

testimony in relation to this matter, I will give that testimony in conformity with my duty to the court.

QUALIFICATIONS – Experts are required to state their name, address and area of expertise. Please state your qualifications, your area of expertise and attach your Curriculum Vitae as an appendix to your report;

INSTRUCTIONS – Experts are required to state their instructions in relation to these proceedings. Please ensure your report states the issues you are asked to address and attach a copy of this letter as an Appendix to your report as confirmation of your instructions;

OPINION – Experts are required to provide their opinion respecting each issue and, if there is a range of opinions on that issue, a summary of the range and the reasons for your own opinion within that range.

FACTS AND ASSUMPTIONS IN PREPARING OPINION – Expert are required to state the facts and assumptions upon which they base their opinion. Please state your reasons for your opinion, including:

i. a description of the factual assumptions on which your opinion is based;

i. a description of any research, if any, conducted by you that led you to form the opinion; and

ii. a list of all documents relied upon in forming your opinion.

Trial

The liability trial of this action is scheduled for 15 days commencing **June 3, 2019.** Please advise our office if you have any scheduling conflicts. If you have any questions or require further information, please contact me at your convenience.

Deadline

Kindly provide our office with your report by **April 12, 2019** and enclose your invoice. Please do not hesitate to contact us if you require any further information or wish to discuss this case prior to preparation of your report. We thank you and your staff for your assistance.

Yours sincerely,

KAZLAW INJURY LAWYERS

Per: **Sandra L. Kovacs, Lawyer**
SK/cm
Enclosure

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INTECH ENGINEERING LTD.

Forensic Analysis • Accident Reconstruction

AMRIT S. TOOR, Ph.D., P.Eng.

CURRICULUM VITAE

ACADEMIC QUALIFICATIONS

Completed a course in Engineering at Coventry University, Coventry, United Kingdom, leading to the Degree of "Bachelor of Science" in Engineering (Mechanical). Degree was awarded in 1980 with First Class Honours.

Pursued a research program in "High Strain Fatigue—Cyclic Plasticity" leading to the Degree of "Doctor of Philosophy" in Engineering. The research was carried out at Coventry University in collaboration with Engineering Technical Applications Ltd. Degree was awarded in 1986 in recognition of the work entitled "Bi-Axial Cyclic Plastic Bending".

EXPERT TESTIMONY

Qualified and provided expert evidence as a Mechanical Engineer and Accident Reconstructionist in the Supreme Court of British Columbia, the Provincial Courts of British Columbia and Manitoba, and the Superior Court of Washington State.

PROFESSIONAL AFFILIATIONS

- Member of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)
- Member of the Society of Automotive Engineers (SAE International)
- Member of the Canadian Association of Road Safety Professionals (CARSP) (former)

FORENSIC ENGINEERING EXPERIENCE

Aug 1990 - Present — Intech Engineering Ltd., Surrey, BC
PRINCIPAL AND ENGINEER

- Technical reconstruction of numerous types of traffic collisions, industrial accidents, slip-and-fall incidents and fires
- Technical reconstruction of accidents resulting from component failure and/or design defects
- Failure analysis
- Technical review of expert engineering reports
- Development of technical software

Motor Vehicle Accidents:

- Analysis and reconstruction of accidents involving motor vehicles, motorcycles, bicycles and pedestrians
- Data collection:
  - Vehicle, scene and personal property examinations
  - Photographic evidence gathering
  - Detailed measurements of vehicle interiors, vehicle exteriors and scene geometries
- Preparation of scaled vehicle and scene drawings

- Assessment of collision circumstances including:
  - Vehicle dynamics
  - Speed analysis
  - Automobile component failure: stress analysis
  - Automobile tire failure
  - Tread separation
  - Sharp object penetration
  - Vehicle dynamics resulting from tire failure
- Rollover collision analysis:
  - Cause and dynamics
- Vehicle lamp examination:
  - Assessment of vehicle headlight or taillight use
  - Assessment of headlight/taillight benefit
- Fraud investigation:
  - Assessment of contradictory collision circumstances
  - Automobile driver identification
  - Vehicle damage matching
- Seat belt analysis:
  - Examination of seat belt assembly
  - Evaluation of occupant dynamics
  - Assessment of seat belt usage and effectiveness

Failure Analysis

- Component examination:
  - Photographic evidence
  - Detailed measurements
- Technical assessment of cause of material failure
- Assessment of appropriateness of component design

Slip and Fall Incidents

- Data collection:
  - Examination of incident scene, personal property (e.g. footwear) and floor coverings
- Technical assessment of ground slip resistance for particular footwear, floor covering and environmental conditions
- Assessment of conformance to applicable codes and standards

Fire Investigations:

- Technical assessment of fire origin, cause and spread dynamics

Research:

- Low speed collisions
- Sideswipe collisions
- Vehicle/pedestrian collisions
- Seat belt usage and effectiveness
- Real world pedestrian walking speeds
- Braking characteristics of passenger vehicles

PUBLICATIONS

- **Toor, A.,** Araszewski, M., "Practical Approach to Evaluating Collision Avoidance Potential". 11th International Conference of the Institute of Traffic Accident Investigators. Solihull, UK. 2014.
- **Toor, A.,** Araszewski, M., "Theoretical vs. Empirical Solutions for Vehicle/Pedestrian Collisions." SAE #2003-01-0883. Society of Automotive Engineers. Warrendale, PA. 2003.
- Araszewski, M., **Toor, A.,** "Head, Hip and Knee Velocities of Restrained Occupants in Frontal Impacts." SAE #2003-01-0884 Society of Automotive Engineers. Warrendale, PA. 2003.
- **Toor, A.,** Araszewski M., Johal R., Overgaard R., Happer A. "Revision and Validation of Vehicle/Pedestrian Collision Analysis Method." SAE #2002-01-0550. Society of Automotive Engineers. Warrendale, PA. 2002.
- Araszewski M., **Toor A.,** Overgaard R., Johal R. "Lane Change Maneuver Modeling for Accident Reconstruction Applications." SAE #2002-01-0817. Society of Automotive Engineers. Warrendale, PA. 2002.
- Araszewski, M., **Toor, A.,** Happer, A. "Knee and Hip Displacement of Vehicle Occupants Restrained by Seat Belts in Frontal Impacts." SAE #2001-01-0180. Society of Automotive Engineers, Inc., 2001. Warrendale, PA.
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- Harvey, S.J., **Toor, A.**"An Anisotropic Plasticity Model for Inelastic Multi-Axial Cyclic Deformation." Computers and Structures, Vol. 16, No. 1-4: 37-44, 1983.

LECTURES, PRESENTATIONS

- March 2019—Guest Speaker UBC Engineering Module APSC 450, Professional Engineering Practice. The University of British Columbia, Vancouver, BC.
- November 2018—Guest Speaker UBC APSC 450, Engineering in Practice: Forensic Engineering. The University of British Columbia, Vancouver, BC.
- January 2018—Guest Speaker UBC Law 435C: Law 435 Personal Injury. The University of British Columbia, Vancouver, BC.
- November 2016, March 2017, November 2017, March 2018—Guest Speaker UBC Engineering Module APSC 450, Professional Engineering Practice. The University of British Columbia, Vancouver, BC.
- April 2014—11th International Conference of the Institute of Traffic Accident Investigators. Presentation of paper on Practical Approach to Evaluating Collision Avoidance Potential.
- Mar 2011—Trial Lawyers Association of British Columbia. Wheels, Wings, Water and More: Non-automobile Injury Claims.Presentation of the technical aspects of slip and fall incidents.
- Mar 2003—SAE World Congress. Presentation of SAE paper #2003-01-0883
- Mar 2002—SAE World Congress. Presentation of SAE paper #2002-01-0550
- Mar 2001—SAE World Congress. Presentation of SAE paper #2001-01-0897
- Dec 2000—Trial Lawyers Association of British Columbia. The A-Z of Expert Witnesses seminar. Presentation discussing the uses and abuses of engineering evidence.
- May 2000—Continuing Legal Education (CLE) Personal Injury Conference Presentation discussing how to retain a forensic engineer.
- Feb 2000—Trial Lawyers Association of British Columbia (TLABC) Brain Injury Seminar. Presentation discussing requirements for seat belt analysis and the effectiveness of seat belts in preventing occupant injuries.
- 1989—International Conference on Bi-Axial/Multi-Axial Fatigue. Presentation of “Bi-Axial Cyclic Plastic Bending” paper. Stuttgart, Federal Republic of Germany
- 1985—America Society for Testing Materials. Presentation of “The Use of Anisotropic Yield Surfaces in Cyclic Plasticity” paper. Philadelphia, PA
- 1983—Coventry University. Presentation of “An Anisotropic Plasticity Model for Inelastic Multi-Axial Cyclic Deformation” paper. United Kingdom

PROFESSIONAL DEVELOPMENT

- Apr 2014—11th Int. Conference of the Institute of Traffic Accident Investigators, Solihull, UK.
- May 2011—ARC-CSI Crash Conference 2011, Las Vegas, NV.
- May 2009—Bosch CDR Technician Course, Langley, BC.
- Mar 2003—SAE World Congress, Detroit, MI.
- Mar 2002—SAE World Congress, Detroit, MI.
- Mar 2001—SAE World Congress, Detroit, MI.
- July 2000—SAE TOPTEC, “Heavy Vehicle Rollover”, Richmond, BC.
- Mar 2000—SAE World Congress, Detroit, MI.
- Dec 1999—SAE TOPTEC, “Accident Reconstruction: State-of-the-Art”, Costa Mesa, CA.
- Mar 1999—SAE World Congress, Detroit MI.
- Feb 1999—World Congress for Whiplash - Associated Disorders, Vancouver, BC.
- Oct 1997—SAE TOPTEC, “High Speed Rear Impact Test”, Tempe, AZ.

REVIEWS

- Reviewer of SAE manuscripts, since 2000
- Reviewer of “professional experience” for applicants applying for registration as “Professionals Engineers” with APEGBC, since 2001

OTHER ENGINEERING EXPERIENCE

Feb 1989 – Aug 1990
MacInnis Bigg Associates Ltd., Vancouver, BC
ENGINEER

- Analysis of motor vehicle accidents, including examination of vehicles and accident scenes

Apr 1986 – Jan 1989
Comex Marine Services Ltd., Coquitlam, BC
PROJECT ENGINEER

- Stress analysis of various structures, analysis of water jet cutting tool, design optimization and weight reduction, developed test procedures for off-shore robot deployment and recovery, initiated studies to develop a tool to machine a precise weld profile and optical aligning device

Aug 1983 – Jan 1986
Coventry Lanchester Polytechnic, Coventry, UK
EXPERIMENTAL OFFICER/ASSOCIATE LECTURER

- Research in "High Strain Fatigue-Cyclic Plasticity,” post-graduate and undergraduate teaching in computer aided engineering and computer aided design analysis, developed "finite element" and "finite difference" teaching software

Mar 1982 – Aug 1983
CanOcean Resources Ltd. (formerly known as Lockheed Petroleum Services Ltd.), Delta, BC
ENGINEER

- Stress analysis of various components (linear and non-linear large displacement problems)

Sep 1980 – Jan 1982
Engineering Technical Applications Ltd., Hinkley, UK
ASSISTANT ENGINEER

- Design and analysis of a rig to test industrial clutches to destruction, stress and modal analysis of various structures

Oct 1974 – Jun 1977
Lockheed Petroleum Services Ltd., Delta, BC
DRAFTSMAN

- Design of special purpose mechanisms for off-shore oil equipment