# RED HILL VALLEY PARKWAY INQUIRY

TRANSCRIPT OF PROCEEDINGS
HEARD BEFORE THE HONOURABLE J. WILTON-SIEGEL
held via Arbitration Place Virtual
on Thursday, February 23, 2023 at 9:33 a.m.

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| Rachel Laurion<br>Chris Buck | For Dufferin Construction |
| Jennifer Roberts | For Golder Associates Inc. |

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Arbitration Place Virutal

--- Upon resuming on Thursday, February 23, 2023 at 9:33 a.m.

MR. LEWIS: Good morning, Commissioner, Counsel, Mr. Karim. We have Mr. Dewan Karim today with us, and his evidence is going to be led by Mr. Chen for the City of Hamilton. Mr. Karim's report was filed pursuant to your decision of December 14th. And cross-examination will follow, and then potentially further evidence on a couple of points as I described on Tuesday, by Mr. Brownlee at the end of the day.

If the court reporter could please affirm the witness.

JUSTICE WILTON-SIEGEL: Is it the case we still cannot hear Mr. Karim?

MS. LAWRENCE: I wonder if we should, Commissioner, take a few --

JUSTICE WILTON-SIEGEL: Let's just go off-line for a few minutes, Mr. Registrar.

--- Recess taken at 9:36 a.m.

--- Upon resuming at 9:37 a.m.

MR. LEWIS: We're back. I understand Mr. Karim has dealt with the sound

problem so I think, Court Reporter, if we could do the affirmation.

AFFIRMED: DEWAN KARIM;

EXAMINATION BY MR. CHEN:

MR. CHEN: May I proceed, Mr. Commissioner?

JUSTICE WILTON-SIEGEL: Yes, please do.

BY MR. CHEN:

Q. Mr. Karim, before we get started, obviously it's not a court proceeding, but would you please confirm that you understand that as an expert witness you are to provide evidence that is fair, objective, and non-partisan?

A. I understand, yes.

Q. Thank you. And I understand you have hard copies of expert report in front of you; is that right?

A. That's correct.

Q. I should note you had mentioned that you have hard copies in front of you because you have an eye condition with respect to staring at the screen for too long?

A. That's correct. That's

why I prefer to look at the actual report instead of looking at the screen for too long.

Q. Thank you.

Mr. Registrar, could we pull up HAM64759 which should be Mr. Karim's report. Go to the next image. Mr. Karim, this is your report?

A. Yes.

Q. And you authored the report?

A. Yes.

Q. And you adopt the opinions that are made in this report?

A. Yes.

Q. One housekeeping matter. I understand there is a correction to footnote 51. And, Mr. Registrar, that's on image 28. If we can call out footnote 51 at the bottom.

So, Mr. Karim, what's the correction to this footnote?

A. The way it reads, it should be the ramp is actually included in traffic signal and stop sign is included. Everything else is still the same.

Q. So just to be clear, this footnote is supposed to indicate how you filter

collision data, which we will get into later in your examination, but you did not use a couple of the filters identified here which are the ramp collisions, stop sign and traffic signal; is that right?

A. That's correct.

Q. Thank you. So as I say, the filtering is relevant to the collision rate so the plan is to return to the relevance of that at the appropriate time.

JUSTICE WILTON-SIEGEL: Mr. Chen, just so I understand, so what was excluded were non-reportable collisions and intersection collisions; is that correct?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: Going at it directly rather than if you like the indirect way or the backhand way that was just presented?

THE WITNESS: That's correct. The --

JUSTICE WILTON-SIEGEL: The other way I can stop the footnote after the words intersection collisions?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: Yes?

THE WITNESS: Yes.

BY MR. CHEN:

Q. And then one other point, Mr. Karim, I understand, if we can go to image 31, figure 3. And please correct me if I'm wrong, but I understand you had intended on including a table that removed a particular filter from the data that you used such that there is a very similar -- a very similar figure that shows SMV and rear end collisions?

A. That's correct.

Q. And we'll come to that as well because the discussion is -- take a bit of time I assume. Okay.

So I would like to start now by going through your qualifications, and your CV starts at image 37, Mr. Registrar. And your CV of course goes on for a number of pages. Mr. Karim, does this CV accurately state your qualifications?

A. Yes.

Q. And, Mr. Commissioner, I plan only to highlight certain items. Of course there's a number of examples of his competencies.

Mr. Karim, you have a master

of engineering with a specialty in infrastructure planning from the University of Tokyo in Japan?

A. That's correct.

Q. You obtained that in 2000?

A. That's correct, yes.

Q. You also have a master's of applied science with specialty in civil engineering from Ryerson University?

A. That's correct.

Q. And that was obtained in 2006?

A. That's correct.

Q. You're a professional engineer of Ontario as of 2008?

A. That's correct.

Q. And you also hold the professional engineering designation in British Columbia, Nova Scotia and Alberta?

A. Yes.

Q. You are certified as a professional traffic operation engineer; is that right?

A. That's correct.

Q. Can you tell us what a

professional traffic operation engineer is?

A. Professional traffic engineer is a special certification that you have to go through a very long and difficult exam to qualify for and to become an expert on traffic operations, traffic safety, traffic maintenance, which is very different than the typical civil engineering expertise. It's an additional expertise that is recognized by this certification. And it's very similar to the Red Hill operation that we'll be talking today.

Q. Thank you. Turning to your employment history. If we can go to image 42, Mr. Registrar. In 2006 you worked at the IBI Group; correct?

A. Yes.

Q. What is the IBI Group?

A. It's an engineering consulting firm.

Q. And what was your role there?

A. I worked on traffic impact study as a result of development. Also worked on a number of transportation master plan which follows the environmental assessment

process.

Q. And maybe you can just briefly describe what a transportation master plan is.

A. Transportation master plan essentially looks at a very long range need for transportation facilities over time for a certain area or an entire city, and you take a look at the future growth of the city and increased demand will be generating an additional demand for transportation infrastructures. And the plan lays out those details, including the details of the roads and alignments or different kind of infrastructure like transit, walking, cycling, all types of infrastructure for longer term needs for a city or an area.

Q. And I think you had indicated that they follow the environmental assessment process?

A. That's correct.

Q. And maybe briefly, what are environmental assessments?

A. So environmental assessments is -- usually it looks at the plan and policies and programs of the cities or province or

other regulation and act in terms of the built environment, the natural environment, and their impact because of certain projects, which will be evaluated through the process. Master planning process, typically one refers to phases of the environmental process that it covers. Phase 3 and 4 are more detailed of those specific road alignment and phase 5 is detailed plans.

So phase 3 to 5 are not usually included in the transportation master plan process. And I have worked on large environmental projects like -- Eglinton LRT or IO 407, or -- there are several arterial, large arterial roads in Ontario and different places.

Q. Thank you. We can now go to images 40 and 41. If we can have the -- I think what we're showing right now is 41 on the left side and 40 on the right side. If we could invert that because it's easier to see. It's still showing up like that, Mr. Registrar, but that's fine.

On the right -- the page on the right side you'll see the City of Oshawa where you were employed as of 2009 in the role of a senior transportation planning engineer. Could

you describe that role, Mr. Karim.

A. It is a similar process or the type of the work I did in IBI Group, but specifically for City of Oshawa projects, for example, Highway 407 extension in Oshawa and the interchanges in Oshawa. I also worked on several other environmental assessment studies like Lakeshore east GO train expansion and a lot of arterials within the city that went through the environmental assessment process including the phase 3 to 5 of those other phases of the environmental assessment stages.

Q. If we can pull up images 39 first and then 40. I've skipped over one of your other -- the experience following Oshawa which I understand is another engineering consulting firm?

A. That's correct.

Q. But here you moved to the City of Toronto in 2013 in the transportation planning department. Was that a similar role to the City of Oshawa?

A. It's pretty similar role. It's just senior role in terms of position.

Q. And I take it the

projects would have been City of Toronto focused?

A. That's correct.

Q. Do you have any examples?

A. There are still a lot of highway and environmental assessment process that I have to work on as a lead reviewer, and coordinating with other department and reporting to the council. As an example, 401 highway interchanges were going through a lot of renovations and reconstruction. I was the lead of that process to work with the ministry of transportation. I also worked on Yonge Street, one of the largest environmental assessment process in the northern part of the city.

Q. Okay. Thank you. The first bullet for the City of Toronto experiences develop evidence-based safety Vision Zero approach for community planning. What's Vision Zero?

A. Vision Zero, it's essentially a new way to look at safety instead of just using guidelines and standards, which does not give a proper assessment in terms of how the way road perform and function when you look at the safety perspective. So it gives you different kind of perspective and analysis tools to reduce

the number of fatal collision and serious inquiry to zero. That's the target of the Vision Zero and that's why it's called as Vision Zero.

Q. And I think you said analysis tools; is that right?

A. That's correct. So it's a lot of analysis. The new approach came out in last ten or 15 years. That's one of the major change in the industry, to look at road safety or user safety and from different perspective.

Q. And perhaps you can just explain to us what your role with Vision Zero was?

A. I was involved on that process as part of the planning department contribution to the overall Vision Zero initiatives that started earlier before it becomes an actual program. I think in the last five years it becomes an actual department, but before that it was a process and changes and standards, and the safety assessment process has been going through a major approach and perspective -- a different perspective bringing into the transportation safety to improve safety of all users.

So it started very early, not

with a specific program, but later it become a specific program and becomes a City special department. So I was involved in the earlier part, in initial part of the program.

Q. Just jumping ahead, 30 Forensic Engineering, or short for 30FE, which is on image 39 on the screen on the left side. 30FE is an engineering consulting firm?

A. That's correct.

Q. And you are the practice lead in transportation safety?

A. Yes.

Q. And can you talk a little bits about the focus of the transportation safety group?

A. So in 30FE we worked on the post-collision incident, if it happened, or pre-incident when somebody is looking for reveal their facility in terms of safety improvements and other implementations to be made. When an incident happened we reviewed the design of the roadway operations, the roadway, and trying to figure out whether the geometric design or operational features contributed to certain collisions or not. We also review several private

and public entities when there is a litigation process or in general if anyone is looking for safety review of their systems or problems.

Q. If we could now pull up images 37 and 38. So I just want to ask you about a couple of the items under specialized proposal competencies, which is on the image 37 on the left side. There's obviously quite a bit of them related to transportation engineering, operations and safety.

The third bullet, assessment of traffic safety using local standards, manual and guidelines. Could you describe how that has arisen in your work.

A. So almost a daily basis we have to use the professional standards, guidelines, documents, special white paper or best practice documents to understand the local, provincial, and the federal level changes or recommendation and how it's been done using those guidelines which provides the details.

As an example, MTO design guideline or Transportation Association of Canada guideline provides details how the roads will be designed, operated, and it could be reviewed using

those documents.

Q. And the Transportation Association of Canada, that's the TAC guidelines that we've heard of in --

A. That's correct, yes.

Q. And the bullet under that, the fourth bullet area, safety studies for intersections, street segments and other roadway locations, how does that arise in your work?

A. So we use the guideline I just mentioned to understand what is the intersection design process or requirements as part of those guideline. We compare those information with the data collected from the actual site and compare whether they are in compliance of those standards or not, and if it's different, why it's different. And we try to look at the causes of the collisions. Or in other way, if somebody is looking for review, we look at the countermeasures to -- when we identify any safety issues to recommend those countermeasures.

Q. And so now looking at image 38, just going down the list, the second bullet from the top, visibility and safety assessment for road curvature, vertical crest on

roads and highways, can you talk a little bit about that?

A. Yes. So visibility or other safety assessment for example, in terms of horizontal curvature or vertical crest to superelevation, because of other obstruction the drivers' visibility on the roadway or highway could be obstructed. And we take a look at those restrictions or deficiency if it exist, and compare with the guidelines to understand whether at a certain location visibility is restricted or not because of the geometric features and so on.

Q. Are there any examples of city highways where you've done that type of work?

A. Yeah. So we have done a lot of visibility and safety assessment for Highway 401, Highway 407, other provincial highways, a lot city arterial and collector and local roads.

Q. And the last one I'll ask you about your professional competencies is near the bottom of image 38, standard of care of design construction related safety assessment. Maybe talk a bit about that.

A. Yes. So essentially

standard of care means what are the regulations in place in some location and what are the best practices or recommended guidelines and standards could apply. These are the combination of the sources, usually considered the standard of care. We take a look at those different locations, whether it's regions, intersections, roadway segments. In different location the standard of care or the sources of the standard of care is slightly different.

So we compare those with the current location that we are working with and try to understand what would be the best way to describe the standard of care of certain locations or certain types of facilities.

Q. If we could go to image 45, professional courses. I understand you teach as part of an organization called EPIC; is that right?

A. That's correct.

Q. What is EPIC?

A. EPIC provides engineering and technical training and process for professionals mainly across Canada. It could be public agency stuff or consulting firm, and over

the period of last five years I provided specific topics like road design, road planning, traffic coming, there are different topics that I provide, including Vision Zero courses, to the professionals, either in private or public consulting firm that they are looking for additional knowledge or upgrading their knowledge.

Q. I would like to turn now to your expert report and your opinions.

Mr. Commissioner, for the next little while I intend to go through Mr. Karim's report focusing on key parts as his report is relatively thorough, as well as his responses to points made by Mr. Brownlee in his report and of course it is evidence so far.

So section 3.1, which is at image 7.

A. Yes.

Q. That sets out your mandate and the issues that were approved by Mr. Commissioner back in I think December. And it talks about the intended use of geometric guidelines, expectancy violations raised by Mr. Brownlee, interpretation of collision data, and conclusions drawn from that data as well as

collision trends and ranking of potential contributory factors to wet road crashes.

Let's start with the use of geometric guidelines. If we can go to image 9. 8 and 9. My apologies, Mr. Registrar.

So you have section 3.4.1 on the general use of geometric guidelines that I'm not going to ask you to repeat everything. And the benefit of testifying later in the inquiry is a lot of these concepts and materials have been raised already. But perhaps very briefly, what are geometric design guidelines?

A. Geometric design guidelines refer to the visible features of a roadway or highway, and this, as you mentioned, it could be travel lane, it could be shoulder, horizontal curvature of particular alignment, slope, channelize (ph) traffic intersections and so on. And as an example, it will be applicable -- those features will be applicable to -- as an example to Red Hill Valley using as an example MTO design guidelines or TAC guidelines.

Q. And so the MTO geometric design guideline is what was used for the Red Hill Valley Parkway, right?

A. That's my understanding. That's correct.

Q. What is the difference between a guideline and a standard?

A. Essentially guidelines are the recommendations. It may vary under certain local conditions and local context or circumstances. For an example, if there is a curvature that needs to be considered at certain location because of the nature features or built environment, the curvature, instead of straight line we would look at to use certain types or geometric values of curvature in certain locations.

Standards are more restricting. In terms of application it is less flexible and it's not all of the items of geometric features are standards. There are a few of them are standards which the variation -- greater variation of standards may cause more severe safety consequences, and that's the reason standards are more precise and more restricted compares to the recommendation in the guideline.

Q. So one point that came up during Mr. Brownlee's evidence on Friday was the

distinction between standards and guidelines and whether one is more rigid than another, as I understand it. And I think he disagrees with that and he says that both standards and guidelines are good industry practice. What is your view on that?

A. I think there's slight misinterpretation what I have written in the report. I agree that both standards and guidelines are the best practices in the industry to use both. For the standards it is relatively rigid and the variation is small, variation that could be used, whereas the guideline has a longer and wider range of values depending on different conditions and local constraints. So that's mainly the difference that I was trying to explain my report.

Q. Thank you. And for the purposes of your report you're only dealing with guidelines and in particular a focus on the MTO design guideline, right?

A. Most of the cases that's correct.

JUSTICE WILTON-SIEGEL: Can I ask whether this interesting term, the logical

discussion, has any relevance?

THE WITNESS: In the case of if there is a variation in the local conditions or constraints?

JUSTICE WILTON-SIEGEL: No. Any relevance to the inquiry.

THE WITNESS: Yes, it is relevant.

JUSTICE WILTON-SIEGEL: Where is it relevant?

THE WITNESS: For example, the standards, I give an example like guardrail height is more rigid, so it's -- if --

JUSTICE WILTON-SIEGEL: No, you've misunderstood me. Sorry. And perhaps I can best explain by saying I don't think the words "guardrail height" have made an appearance in this inquiry as a matter of any concern. So what I'm asking specifically is, is there any significance to any issue which has been raised in this inquiry with respect to the Red Hill Valley Parkway to this distinction between guidelines and standards.

MR. CHEN: Mr. Commissioner, perhaps I can offer --

JUSTICE WILTON-SIEGEL: I

would be happy to have your assistance.

MR. CHEN: I understand that the section on the distinction between a guideline and a standard is really just to emphasize the purpose and use of a guideline rather than saying that there is a specific relevance to a standard and that we should be looking at a particular standard, but kind of underscore or highlight what the purpose of a guidance is.

THE WITNESS: I can elaborate if I may.

JUSTICE WILTON-SIEGEL: By all means.

THE WITNESS: So the relevance of this, as I have been going through the documents and especially Mr. Brownlee's report, it refers a number of times that meeting certain threshold or value it is -- results in compliance, but the guidelines, as I mentioned earlier, gives you a certain conditions that if this is the condition this would be applied, if this is the condition the other things could be applied. So in that context, the guidelines are more flexible depending on the local constraint. Those are not standards, so if it didn't met certain threshold

it doesn't mean that it becomes -- the roadway becomes unsafe.

So that's the distinction, the reason that we're discussing why recommendations from the guidelines has a flexibility; if it doesn't match certain values it doesn't mean that it becomes -- the roadway becomes unsafe.

JUSTICE WILTON-SIEGEL: I think that that's understood whether we're talking about deviation, if deviation is the right word, the exercise of discretion in the design process, whether that relates to standards or guidelines. There's no absolute concept of safety or unsafety based on whether the guideline or standards have been met in all circumstances. Put another way, if deviated that's the start of the discussion or analysis, not the end of it?

THE WITNESS: That's correct, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: So I don't know if, Mr. Chen, whether that would help in terms of focussing, even narrowing, some of the examination, but I have a sense that this whole area of design standards and guidelines and deviations and consequences are pretty well

understood at this point.

MR. CHEN: Absolutely. Perhaps I'll ask one or two other questions just in response to some of the things that Mr. Brownlee has said and then we can move on from the topic.

BY MR. CHEN:

Q. Mr. Karim, under the heading 3.4.2, process of design, design exceptions or design deviations. Just in the first sentence there you refer to design exceptions or deviations as being encouraged by the industry's professional documents, and Mr. Brownlee I believe has indicated that it's a stretch to use the word encourage. What is your view on that?

A. I think you have to read the few lines together in the report the way it is written. When I referred to encouragement, the previous sentence obviously describes the flexibility of the guideline meeting with natural human-made or other of constraint in the area that you are working on. So in the guidelines clearly indicated that it should be applied and in some cases even clearly indicated that those are

encouraged to reduce the negative impact on the existing environment.

So that's the interpretation of the encouragement is not literally that somebody is suggesting to deviate drastically from the recommended ranges of certain values of geometric features.

Q. And if we can go to image 10, Mr. Registrar. If we can call out the paragraph that starts with "once the reason for a deviation is documented."

Just looking at this, fifth line down it starts with a few geometric design decisions. So then you go on to say a few key geometric design decisions such as design speed of 100 kilometres which is slightly different than provincial highways.

So Mr. Brownlee disagrees with your comment there that 100 per kilometre design speed is slightly different than provincial highways as I understand it. What do you say to that?

A. I looked at that comment and also the difference between provincial highway, which I'm referring mainly the 400 series

which is very comparable or near to the operations and features in the Red Hill Valley Parkway. So typically on those highway design speed could be 110 across the province.

As I understand, the Red Hill Valley used 100 kilometres per hour as a design speed. So 10 kilometre difference is not drastically different or significantly different. That's what I was trying to explain here. It's slightly different. I could have used other words, but I think the important point is it's not a significant difference between the two design speed as an example.

Q. I think we can move on to your discussion on design speed which starts at image 13 under the heading numbered 4.2.1.

So this again, Mr. Karim, design speed, we've heard about it from a number of people but perhaps just give us a quick definition of design speed.

A. Design speed essentially is a speed that a designer adopts to use it for selection of certain geometric features and values at certain location, and those are used -- the design speed influences those features obviously.

That's one of the reason that it's selected. For example, in urban area freeways design speed ranges recommendation from MTO is 80 to 120 kilometre. When a design speed certain location is adopted it is normally 10 or 20 kilometres higher than the posted limit would be used on the highway at the end of the process.

So it is heavily influential starting point of a design process. When it gets to the operation it takes a backseat. It is an important information all the time, but that's how we use the design speed and the meaning of the design speed.

Q. Okay. So I think that's a good jumping off point to section 4.2.3, image 15. In this particular section you respond to what Mr. Brownlee has said and you've excerpted that paragraph just in the middle there, had CIMA been advised of the actual design speed of 100 kilometres per hour on the RHVP they would have identified significant disparities between the posted design and operating speed and potentially adjusted their scope of assumptions and range/immediacy of potential remedial actions. And you have a fairly detailed discussion that

follows that, but what's your opinion on that statement?

A. I looked at that statement. I think the points that I disagree with some certain obviously reasons. One of the reasons is the TNS statement says that certain assumptions of remedial actions would be different if the actual design speed is known.

As I explained in the report that CIMA analysis would not have changed for certain analysis, that some of it is influenced by the design speeds but most of it is not. An example would be some of the features that is not influenced by the design speed, for example, lane width, shoulder, clearance, median, those are not heavily influenced by design speed so it's not going to change. Some other features for example of --

JUSTICE WILTON-SIEGEL: Can I just get you to enumerate those a little bit more slowly. Lane width, shoulder.

THE WITNESS: Shoulder, clear zone, median, those are like column features, geometric design features.

THE COURT: Clear zone median.

THE WITNESS: Clear zone and median.

JUSTICE WILTON-SIEGEL: Oh, and median.

THE WITNESS: Yes.

JUSTICE WILTON-SIEGEL: Would not change.

THE WITNESS: Would not change between the two design speed. Essentially when I looked at several guideline all design speed for 100 and 110 they are essentially same or similar.

The other features that has an influence more directly, for example, curvature, vertical hill, superelevation, those are all already built. If any engineer is assessing those items we would go and measure and recommend based on what is already built. So design speed is important to understand, but because it's already built we would be recommending -- any engineer would be recommending what is built.

The other items we probably will discuss later on. I will just mention that the speed and analysis example, design speed is not really important, although is -- but for sight distance design is important.

JUSTICE WILTON-SIEGEL: Design speed is important for what?

THE WITNESS: For sight distance or visibility.

JUSTICE WILTON-SIEGEL: Sight distance, yes.

MR. CHEN: Mr. Commissioner, do you have a further --

JUSTICE WILTON-SIEGEL: No, that's fine. Go ahead.

BY MR. CHEN:

Q. Mr. Karim, you had also mentioned in your previous response that I think design speed is not really important for a speed analysis; is that right?

A. As I say, speed analysis you could perform without knowing the design speed. We call it speed category, meaning you have a posted speed limit and we know the design speed is 10 or 20 kilometre higher. So that speed category, 90, 100, 110, you could perform a speed analysis without the need for design speed because 10 and 20 kilometre automatically covers design speed concept.

Q. And then when you say

speed analysis what does that mean?

A. It's review of the operational speed or existing speed in certain highways. For example, in Red Hill Valley, if you are reviewing speed profiles, which is essentially the speed of the vehicles that pass through a certain location, you collect those data, you compare with the posted speed limit and then 10 or 20 kilometre higher or above the posted speed limit, and you find a certain percent of exceeding certain speed category, and if it's too many people are exceeding 10 or 20 kilometre higher that is the tolerance range in terms of enforcement, then as an engineer we would recommend to take certain actions. For example, we would recommend to reduce posted speed limit because it's excessing number of people are exceeding or above 10 or 20 kilometre higher than the posted speed limit.

So you could do the safety analysis of speed without knowing that exact design speed. The speed category is more important, and speed category automatically includes design speed 10 or 20 kilometre higher than the posted speed limit.

Q. And have you done that type of analysis in your career?

A. Yes, I have done lots of cases for speed review of certain corridors. I have not used design speed; I always use the speed category as a process and theory that is suggested by the highway safety manual, and those 10 or 20 kilometre higher than the posted speed limit automatically captures the design speed of certain location.

We also have to keep in mind most of the road are built before the design speed concept came over. Most of the road in Ontario or similar places we don't know when it's built and what is the design speed of those roads or highway. So in that case only options for engineer is to go by the prescribed 10 or 20 kilometre higher than the posted speed and that's typically the speed analysis is performed.

Q. Now, I want to turn to your response to Mr. Brownlee's comments on speed and motorist expectations, which is the second comment you respond to. And that's jumping ahead in Mr. Karim's report to image 23 and -- 22 and 23, under the heading 4.4.1 design speed.

So the TNS conclusion or Mr. Brownlee's conclusion is set out at the bottom of image 22, and perhaps you can just describe your understanding of what Mr. Brownlee saying with respect to design speed and expectations.

A. As I'm reading -- actually I'll read from the report. It says the roadway is your prior expectation of acceptable operating speed based on observation of experience on driving on a range of freeway including 400 series.

So I think he's referring to the provincial 400 series are generally design 20 kilometre or more above posted speed limit as we explained or discussed earlier. He is probably referencing to 100 kilometres posted and design speed is 120 or 90 posted, 110 design speed, that situation. Specifically freeway [indiscernible] reflect the minimum design speed of 100 on a control access freeway facility would be expectancy violation to some road users, notwithstanding the 90 kilometre posted speed limit.

I understand from his description he's comparing the Red Hill Valley

design speed compared to the highway 400 series and he's referring that using a design speed would be an expectancy violation on the Red Hill Valley Parkway even though it's posted 90 kilometres per hour. That's my understanding. I can explain what my response to that.

Q. Please, go ahead.

A. So as I read it, it's slightly different than my understanding of the design speed between the two facilities. The reason I do not agree with his statements is motorist expectations, which is usually refers to the condition of the roadway and how it is communicated to the drivers. For example, the communication is usually done posted speed limit is an example. The warning signs, curvature, exit signs, ramp signs and other type of sign. Pavement marking. Those are the communication process.

So once we move from provincial highway to any other highway or city streets, that communication process is already installed and given to the driver and the driver would adjust their driving condition and operations based on the information that's given

to them. So it would not be violated -- it would be violated if you didn't provide all those informations to the driver. That's not the case in Red Hill.

So it's a different types of facility that if the proper information is provided, expectation would be driver adjust their operating speed or their behaviour under different highways. And that's why it's not actually violating anything drastically. Between the two facilities the changes are also not significant, but whatever is changed, it has been informed through those communication process.

Q. On image 23, that's where you set out three bullets for your disagreements. Can you talk about the last one, the refers the whom factor else analysis?

A. So essentially what I'm referring here, the driver expectation refers to the human behaviour under different conditions, and to understand that different facilities, different driver behaviour you have to perform an human factor analysis. That was not provided, so I was not sure the comment made in the TNS report was based on human factors analysis and not --

since it didn't explain those behaviour changes or expectancy which is under the realm of human factor expertise.

JUSTICE WILTON-SIEGEL: Are you saying that in order to make the statement that Mr. Brownlee did he had to conduct a human factors analysis?

THE WITNESS: That's the typical process of driver behaviour analysis, that's correct, Mr. Commissioner.

BY MR. CHEN:

Q. And just so I'm clear, to determine if that actually affects the driver or that's the mindset or expectation of a driver?

A. That's correct. So expectation of [indiscernible] is typically referring to the driver behaviour, which is a human factors expert, a different process that I'm not expert on that, would take care of the changes in the driver behaviour or expectancy of the drivers.

Q. Okay. And so I think that's it for design speed. The other geometric type criteria that you respond to is with respect to interchange spacing, and that starts -- I

believe it's 4.3 which is at image 16. And again we have the benefit of prior evidence on the definition, but if you could just for context tell us what interchange spacing is briefly.

A. Interchange spacing is the distance between the centre line of the cross road where the interchange is located along the highway.

Q. And if we can pull up image 17 which has figure 1. And interchange spacing is in figure 1 the top diagram; is that right?

A. That's correct.

Q. And what about the bottom diagram?

A. The bottom diagram is showing important element and a component of the interchange spacing, what we call it ramp spacing. It's essentially between the two on ramp and off ramp -- the distance between the two on and off ramp which is in successive order.

Q. So, Mr. Karim, there's agreement between you and Mr. Brownlee of course that the recommended interchange spacing under the design guide is 2 to 3 kilometres, though you

don't always -- but there are -- you can go under it for various reasons. You do make reference in your report other guidelines regarding interchange spacing distance. Could you describe those?

A. Yes. So I think you're referring to MTO design guideline, yes, that's what we are referring 2 to 3 kilometre or conditions under the 2 kilometre.

The other reference, it is actually a source document of MTO recommendation come from the original research and guidelines that published in the USA, which looks at the actual research of interchange spacing based on the local arterial network spacing. It's 1 mile, it's roughly 1.5 kilometre. I also looked at the other research, it looked -- it collected all the information from various countries and interchange spacing practice and they concluded that the interchange spacing generally falls between 1 to 2 kilometre ranges in urban area, especially where the land use next to highway is the denser or urban in nature.

Q. And just for the record, it's at image 19, Mr. Registrar, if you can just quickly turn to that. The heading "Other

Guidelines Commonly Used in Canada"; is that right, Mr. Karim?

A. That's correct, yes.

Q. The reference to the 1 to 2 kilometres, that's second paragraph in that section, "based on our overall review of the research study stated that interchanging spacing varies widely from 1 to 2 kilometres for urban areas," and you cite to a paper of the Federal Highway Administration?

A. That's correct, yes.

JUSTICE WILTON-SIEGEL: If I understand correctly, this is a statement of what the facts are, not what the guidelines or standards are.

THE WITNESS: The standards in MTO, Mr. Commissioner, you're referring to MTO design guideline?

JUSTICE WILTON-SIEGEL: Well, no, I'm -- if I understand your evidence, which I may not, I think you're saying that the NCHRP report accepted as a reality that in urban areas 1 mile spacing will often have to be accommodated.

THE WITNESS: That's correct, yes.

JUSTICE WILTON-SIEGEL: That doesn't mean it's desirable or that it's a standard. It's just a reality given the prior placement of arterial roads.

THE WITNESS: That's -- yes, I would just add as a clarification that 1 mile or 1.5 kilometre could be achieved other provisions that is also described in MTO design guideline which falls under the 2 kilometre, less than 2 kilometre provision. So that's what they are referring here. So essentially the 2 kilometre, less than 2 kilometre recommendation that is in MTO guideline came from the NCHRP research and other research, how to obtain shoulder spacing when there are constraint situation in urban areas. So that's actually part of the guideline and it is a standard.

JUSTICE WILTON-SIEGEL: Okay.

BY MR. CHEN:

Q. Mr. Karim, your report goes on to talk about interchange spacing and substantive safety, which is a concept that is introduced in your report and was talked about in Mr. Brownlee's evidence. What, if any, relationship exists between those two things,

interchange spacing and substantive safety?

A. So my understanding over my 25 years period and looking at all the resources and research and guidelines that there is not any definitive study or conclusions established between the interchange spacing -- various interchange spacing and their direct impact and outcome in terms of collision rates, as an example, the safety measures. There are different knowledge and tools are available for the weaving area, the ramp area, which is most commonly understood as most completing area. That's available knowledge and that has been used by the industry professional regularly.

But in terms of interchange spacing, it's very hard to quantify the impact of safety because of certain interchange spacing and change in the spacing in that environment and other factors influences the interchange spacing. For example, different roadway condition, urban conditions, urban network and all those kind of factors. So including those factors into the interchange spacing, it's very hard to quantify what would be the exact outcome of certain interchange spacing. So that's the difficulty.

Q. Okay. And I think you touched on this in your answer. Mr. Brownlee did raise that there are ways to assess interchange safety and he talked about the ISAT. Is that something you are familiar with?

A. Yes. We use the tools when is needed for review of the interchange spacing, especially the configuration of the spacing, the ramps, number of ramps and partial versus full interchange spacing and the ramp spacing, those are more prominent in that tool. That tool doesn't still -- as we discussed earlier, it doesn't give you a direct relationship between the interchange spacing and the quantitative outcome of the safety.

Q. And why not?

A. As I explained, that it's very difficult to point out, including all other influencing factor, to find out whether interchange spacing at certain distance has a definite safety outcome. It is generally understood that if it's further apart obviously it's less conflict; if it's too close then it will be more conflict, but we don't know exactly how further part and how close would result in a

certain quantity of collision rate changes.

Q. And you had mentioned influencing factors. What did you mean by that?

A. Influencing factors meaning when an interchange is decided to install certain locations it could be that just land use needed an access from the highway. It could be a nature and manmade constraint that would restrict to install a full interchange or it could be a partial interchange. And it could be also the congestion, if it is too far apart and we are skipping an important arterial to the community, then the longer distance would result in flowing too much traffic into certain location or certain streets which will increase the congestion and that street may not have the capacity to deal with those increased traffic.

Q. So with the interchange spacing guidelines under the MTO design guide in mind, what's your assessment of the interchange spacing differences on the Red Hill Valley Parkway?

A. Yes, we have done an overall assessment of the interchange spacing distance. We found that interchange spacing

generally ranges from 1 to 3 kilometre and that's only one interchange spacing just below 1 kilometre in Red Hill.

Q. And so you said 1 to 3 kilometres which is below the minimum of 2. Why were the guidelines unable to be met for the ones that are under 2 kilometre?

A. So under 2 kilometres are mostly in the Red Hill Valley. Interchange spacing, and when we looked at the type of interchange, it is a different kind of interchange compared to for example LINC in the Red Hill. So it's most of them are either partial or different configuration of the interchange was installed on Red Hill, which is one of the recommendations from MTO to deal with the less than 2 kilometre interchange spacing situation.

Q. Let me just break that down a bit. Under the MTO design guide there are exceptions for interchange spacing?

A. I would not say exception. It has two rules. When you have full interchange providing full access to the communities they recommend 2 to 3 kilometre. When you don't have that option they recommend to allow

less than 2 kilometre using different configuration of interchange or partial interchange.

Q. So when you say different configurations and partial interchanges, do you see that on the Red Hill?

A. Yes, definitely. You can see most of the interchange, for example Barton, Queenston, King Street, it has full ramps. Rest of the access is provided through the traffic signal, so you have to turn left to access to the highway. Greenhill, for example, it doesn't even have the loop. It has -- obviously west side of the highway in that location is a naturally constrained area and there is no road on the west side whereas it's only provided on the east side. That's an example. So it's a different configuration completely at the Greenhill.

And in terms of the full interchange, if you're comparing it with the LINC, which has constantly six ramps, full interchange, full complete access, Red Hill is not exactly the same compared to the full interchange scenario.

Q. So you also made reference to a traffic signal. Could you

elaborate on that?

A. Yes. So traffic signal, sometimes it's used at the same location. Instead of using a free ramp you could provide a traffic signal. For example, on Queenston and Barton, if you're on the east side of the roadway and you try to go to the northbound you have to access through the traffic signal. If you look at in LINC or provincial 400 series, the option will be provided direct ramp from that direction to the northbound direction. That was not the case in the Red Hill. They used a traffic signal to provide an access which means that you have to wait longer and that's an indirect access provided to the certain side or certain directions to the Red Hill Valley Parkway.

Q. So is the traffic signal supposed to assist with congestion and less than 2 kilometres?

A. It's part of it. So in addition to -- as we discussed, in addition to the configuration and partial interchange, the traffic signal provides or assists achieving more access but in direct way. So traffic signal is used essentially to provide an access with a limited

and constrained condition. That's an example.

JUSTICE WILTON-SIEGEL: Which intersections are we talking about in respect of the Red Hill Valley Parkway?

THE WITNESS: Traffic signal, I believe it is available at King Street, Queenston and Barton.

JUSTICE WILTON-SIEGEL: In which directions?

THE WITNESS: It mostly going to the northbound direction to the east of the highway. But there is one location I believe is the other side. That probably is the King Street. So I'm trying to remember the geometric. But I remember clearly that the east side traffic signal is the most common method in Queenston and Barton.

JUSTICE WILTON-SIEGEL: Okay.

BY MR. CHEN:

Q. Mr. Karim, at 4.3.5 of your report, which is image 20, and if we can also bring up image 21 as well. You provide a comparative analysis of interchange spacing, the RHVP and couple of other highways like the DVP, the 403, the 406 and the 7-85. Why did you undertake such an analysis?

A. When we performed the interchange spacing review of the Red Hill we -- to our better understanding we've had we will look at a comparable of similar -- closely, not exactly similar, the other highways in Ontario. And in terms of land use, road network and the geometric design features, using those three characteristics we selected this highway or portion of this highway that deemed to be close or similar to the Red Hill Valley to understand what would be the situation if it's an urban environment in terms of interchange spacing.

Q. And Mr. Brownlee had said that further substantive analysis could be done, which I understand him to be referring to the standard safety issues. Do you agree with that, before I go on?

A. That's correct. The analysis we have done is very high level overall nominal safety perspective. Substantive safety tools and method will give you precise information, quantification of the safety outcome of interchange spacing design or the type of interchange spacing is used. So those would be far more detailed coming out of the substantive

safety approach.

Q. Which of the comparators would you say is most like the Red Hill?

A. Based on very overall review of the interchange spacing on other highways described in table 2, it appears Don Valley Parkway and Highway 7, 8 in Kitchener are very close to the similar types of interchange spacing given they are mostly urban and frequent arterial spacing exists in those two highway.

Q. When you say the urban, I'm just looking at the chart, it's the Don Valley Parkway and Highway 7/8 Kitchener?

A. That's correct, yes.

Q. And just looking at the RHVP row and Don Valley Parkway, under the column "average spacing," which is the second-last column. The RHVP has 1.43 kilometres and the Don Valley Parkway has 1.64. Is there any significance in terms of the difference between 1.43 and 1.64?

A. I would say it's very similar. It's not really significantly different.

Q. When Mr. Brownlee was -- I believe he was shown this table, he had some

comments about the Don Valley Parkway. He had testified that you -- if you look at the from/to column, you cut off the Don Valley Parkway at Eglinton, and of course we know the Don Valley goes further north than that. Why did you do that?

A. To the north of Eglinton it's essentially mostly straight line highways and -- but real spacing is much great in the suburban northern part of the Toronto, which is not the case in Red Hill. Actually south of Eglinton is more similar.

If you compare, the network spacing is much closer and the curvature and geometric features are much closer to the Red Hill. So the southern portion of the Don Valley is mostly similar or close or urban condition road, network condition are close to the Red Hill. That's why we focused on the southern part of the DVP.

Q. So you had talked about the southern part of the DVP. Mr. Brownlee also raised that the DVP and some of the southerly areas are single ramps. What do you say to that?

A. That's correct. As I

mentioned, the selection of comparable highways are mostly because of urban area at network spacing of the roads and geometric features, but there could be a difference between the two highway, and if I try to match every features, then there would be no proxy highway that I can compare.

So it is different slightly in terms of the ramp configuration, but in terms of the key criteria that we select for proxy highway, those are close to the Red Hill Valley features.

Q. I believe Mr. Brownlee had, in a separate discussion, talked about how you can't always get the exact comparator factors.

A. That's correct.

Q. Looking at Highway 403 and 406, the average spacing is obviously higher. What accounts for that?

A. If you look at the characteristics of 403 and 406, they are mostly either low density urban area and a longer arterial spacing. So that's one of the reasons they could achieve a longer interchange spacing. Their interchange are also very different compared to Red Hill Valley. Most of the case they have

full interchange. It's less of a constrained area located on those two highway, and that's my understanding, is the average spacing slightly longer than 2 kilometre could be achieved.

Q. Your report, and I won't take you to it, but Mr. Brownlee goes on to draw a connection between interchange spacing and motorist expectations, and he -- just to paraphrase, he states that the interchange spacing on the Red Hill results in motorists being ill-prepared to react to conflict, speed differentials, and congestion. What do you say to that?

A. In general if it is interchange spacing, full interchange we're talking about, that would be correct. The Red Hill Valley obviously not the similar condition that exist, so we have to recognize the designer when they choose a sudden constraint, they have to come up with a different set of configurations.

In this case, partial or different times of interchange they adopted to reduce the conflict area on -- or frequency of the conflict area. And any highway you cannot make absolutely safe even after trying to mitigate the

features that are available to the designers.

So if it's a straight highway and no constraints and interchange spacing are relatively far apart, it could be -- I would agree with Mr. Brownlee, but when there is a situation close to each other that the interchange has to be installed, then other way to deal with it is you reduce the number of conflict, which will reduce the drivers' expectancy to adjust with sudden condition. And again, like the speed limit that we discussed earlier, the ramp entry point when it's coming up, it's weaving area design. All the warning signs and everything was installed to prepare the drivers going through relatively constrained area of the highway, and when I looked at that, designers of the operations of the highway, they tried their best to address the situation with all the available tools.

Q. I see that it's 11:00, but I just have one or two questions on the weaving that --

JUSTICE WILTON-SIEGEL: Go ahead.

MR. CHEN: -- that Mr. Karim just raised.

JUSTICE WILTON-SIEGEL: Go ahead.

BY MR. CHEN:

Q. So -- I'm trying to locate that. You came to a conclusion, Mr. Karim, on the weaving sections on the Red Hill?

A. Yes, we looked at an overall ramp spacing or roving area.

Q. And what were your conclusions?

A. Our conclusion was except one location, the remaining of all the weaving location where on and off ramp are in successive order, they met the MTO's minimum recommendation, 600 metres, which is MTO design guideline preferred to achieve for weaving areas. Three of them are very close to 600 metre -- sorry, two of them. One of them just around 415, I believe, near King Street.

Q. And in your report following that conclusion, you said:

"This typically indicates the most critical element of interchange spacing was considered with greater care

and that efforts were made to minimize weaving conflict."

What do you mean by that?

A. What I mean by that is the most conflicting areas of weaving section, as we discussed earlier, which met a greater extent the MTO's recommendation, and it is also one of the area that they paid a lot of attention to reduce the conflict. Obviously we can perform far more analysis to conclude that, but from overall point of the compliance, it looks like they tried to minimize the conflict area using different tools, which is reflected in the ramp spacing compliance situation that we described earlier.

Q. Are you also comparing that relative to the interchange spacing?

A. Yes, so I -- that's my comments, that compared to the interchange spacing, which most of the case is less than 2 kilometre except one location, the ramp spacing is actually only one particular location cannot be achieved because of the constraint that are remaining was close to the MTO design recommended distance.

Q. So just to be clear, on

that last statement that you said, I think earlier you had mentioned there were three that were below the MTO minimum, three weaving sections that were below, but that two of them are very close to the 600?

A. That's correct.

Q. Under but close?

A. Yes.

MR. CHEN: Mr. Commissioner, I think now would be a good time for the break, subject to any further questions.

JUSTICE WILTON-SIEGEL: I have just a couple of questions, and I want to make sure I've got this note right.

So with respect to the weaving sections, there are three below the MTO guideline of 600 metres, but only one is significantly below. That's the 420 metres near King Street. Is that correct?

THE WITNESS: That's correct, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: And your comment about a lot of attention was paid. I've seen this, I know, in the report and then I didn't fully -- well, I had a big question about

it, and I'm going to pursue it right now. Where is that in the report?

MR. CHEN: It's on the screen, Mr. Commissioner, on the image 21. It should be on your right-hand side, top paragraph.

JUSTICE WILTON-SIEGEL: I'm having trouble figuring which is 21. It's page 18.

MR. CHEN: Sorry about that.

JUSTICE WILTON-SIEGEL: So that's a comment with respect to the weaving distances, correct.

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: But it says "this indicates the most critical element of interchange spacing." I see. So you're saying weaving sections being the most critical element of interchange spacing --

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: -- considered conceptually was considered with greater care, and the efforts were made to minimize weaving conflicts. Now the -- there's nothing you can do about the distances, so what you're saying is the interchanges were designed in

a way to reduce weaving; is that correct?

THE WITNESS: I think you were referring to the maintenance spacing, you cannot do anything about it because that's where -- how they're laid out. I understand that you're referring to the ramp spacing.

JUSTICE WILTON-SIEGEL: Well, okay. So I'll just step back and ask what does it mean that efforts were made to minimize weaving conflicts? What are the efforts you're referring to?

THE WITNESS: So I'm essentially referring to, as we were discussing earlier, the Highway Safety Manual specifically gives a lot more detail and quantitative and other detailed process of weaving area, how to deal with the weaving area. As the interchange spacing and the safety relationship are not really easy to understand, but this is easier, and when you look at their interchange ramp spacing and the recommendations from the MTO guideline, except in one location where there is still a constraint, the rest of the location they were able to achieve that critical recommendation from MTO. And when we look at all the signage and paving marking of

that area in general, the recommendation from those guidelines, how to design and operate the weaving area follows roughly what is built and currently operating in the Red Hill Valley in those ramp spacing locations.

So obviously the designer has less control in terms of interchange spacing, but they have more control and options which was applied most of the case wherever possible except one exceptions for ramp spacing or weaving area. That's what I was referring here.

JUSTICE WILTON-SIEGEL: Are we talking about the -- I go back to just trying to understand, efforts were made to minimize weaving conflicts. Are you saying efforts were made in the form of the physical location of the ramps?

THE WITNESS: Yes.

JUSTICE WILTON-SIEGEL: Okay. So it's not just the physical location, but it's the design of the ramps?

THE WITNESS: The design of the ramps in combination.

JUSTICE WILTON-SIEGEL: In combination with signals and pavement markings --

THE WITNESS: Yes, in the

ramps, that's correct.

JUSTICE WILTON-SIEGEL: Would I be correct in thinking that this issue of the design of the ramps goes back to the question of how do you deal with the interchange spacing --

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: -- which is, if I can use a colloquial term, quite tight given the existing arterial roads that have to be accommodated?

THE WITNESS: That's correct, yes.

JUSTICE WILTON-SIEGEL: It's all of a one, if you like. You're basically saying they -- by virtue of the less than 2 kilometre distance in interchange spacing, they had to design the on and off ramps, the interchange itself, in a way which was designed to reduce conflicts and primarily that is why partial exchanges in those three areas; is that correct?

THE WITNESS: That's correct, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: Thank you.

MR. CHEN: If I can ask one

quick clarification question, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: Go ahead.

BY MR. CHEN:

Q. Thank you. Mr. Karim, you had mentioned the Queenston and King Street weaving section, and that was about 415 metres or 420 metres. What's your view on that figure?

A. It's obviously much tighter than what is recommended, but it's -- as we discussed earlier, that threshold value for sudden recommendation doesn't mean that it becomes an unsafe. Obviously you can design in terms of pavement marking and the location of the ramp and the lane changes and so on, and to address the constraint situation. So you could -- even you make a lot of efforts to minimize it, as I say that there is not every location or section could be absolutely safe or same condition or same safety could have achieved.

So in that location, obviously there are a lot of attention paid to the weaving area and minimize the conflict and manage the expectation -- the drivers' driving expectation and their driving behaviour would be adjusted

accordingly. So those are made at that specific location using various tools.

MR. CHEN: Thank you.

JUSTICE WILTON-SIEGEL: It's 12 past. Let's return at 25 past.

MR. CHEN: Thank you.

--- Recess taken at 11:13 a.m.

--- Upon resuming at 11:26 a.m.

MR. CHEN: May I continue, Mr. Commissioner?

JUSTICE WILTON-SIEGEL: Yes.

BY MR. CHEN:

Q. Mr. Karim, turning now to section 4.5 of your report, "contributory factors." If we can turn up image 24 and 25. Mr. Registrar.

Mr. Karim, your report responds to Mr. Brownlee's statement that his experience and opinion is that reduced road surface friction will be the primary, i.e., highest ranking contributory cause, of an overrepresentation of wet road crashes. And as I understand it, Mr. Brownlee testified that he was not asked to do an overrepresentation analysis but that he relied on CIMA's analysis which uses

provincial averages. What do you say to that?

A. As I read -- actually I have to disclose that I'm not expert on pavement friction. We only use the pavement friction as a safety engineer for safety assessments, so my perspective here comments came from that background.

So my understanding is if you are calling an overrepresentation as is actually even noted, Mr. Brownlee's report in the footnote, you have to compare with the peer facilities to call that it is an exception, overrepresentation in certain locations. So that's not been done and compared with the other provincial facilities. And the provincial data that was referred was for all roads, it's not freeway, and the freeway has slightly different way the collision can happen. So I was not sure without those comparable reference, it could be called as an overrepresentation of certain types of crashes and linking to the contributory cause.

Q. So one of the points that you raise in your report is the need for an accident reconstruction analysis, and Mr. Brownlee was asked about that. As I understand it, he says

that safety professionals don't always have collision reports and it's usually more for the very serious accidents, so they rely on trends such as dominant collision types, and then he uses that data to determine if it's different than peers. What's your view on that?

A. In general I agree with that. What we described in the report is you need to do a modelling to understand which one is the highestly and lowestly ranked, and to do that modelling obviously requires the data, which comes from either police data or somebody -- an engineer looked at, for example, in this case pavement friction or other parameters that is used in the model.

So that's the reference we are making here. To understand the actual contributory factors, you have to go through a certain process, and this is the process that we are referring. So in general, yes, we don't have always an access to the data, all the data that is needed, but to make a proper conclusion that's what we need. So that's the different that we're talking about here.

Q. Mr. Brownlee was also

shown the Highway Safety Manual. Do you know what that is, the Highway Safety Manual?

A. Yes, I do.

Q. Can we pull up HAM64754.

JUSTICE WILTON-SIEGEL: Just before we do that. Mr. Karim, I take your evidence to be, in the last matter, with respect to the ranking.

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: Not the question of whether friction would be a contributing factor.

THE WITNESS: You're right, yes, Mr. Commissioner. That's correct. Pavement friction is a contributing factors. Whether that's a primary or it's number 5 or number 10, I think that mean a difference that we're talking about.

BY MR. CHEN:

Q. So I think that's a good opportunity to pull up HAM64754. This is the Highway Safety Manual, Mr. Karim?

A. That's correct.

Q. And I seem to have lost the reference, but it should be image 239 and 240.

So, Mr. Karim, as I understand it, the Highway Safety Manual provides the key contributory factors for various crash types, which is what this table shows, titled Exhibit 63, "Possible Crash Contributing Factors Along Roadway Segments." Is that your understanding?

A. That's correct.

Q. And under "crash type," the fifth one down is "wet pavement." As far as when I review that I don't see slippery pavement, and Mr. Brownlee testified that pavement design, so the first item in this category, so "pavement design, e.g., drainage and permeability," that's where slippery pavement would be included as I understand it. What's your response to that? Do you agree? Do you not agree?

A. Not fully agree. Pavement design and slippery pavement, which is in the same image that you are showing in the run-off road, is listed as one of the conditions, are different. They are interrelated but not exactly same. So pavement design, this clearly refers to the drainage permeability. The pavement, for example, mix of the asphalt and granular materials, size of the material, those are the

things. It is one of the objective of course to achieve certain friction. You will have a surface when you design a pavement obviously, but actual friction, slippery pavement refers to regardless of how you develop or design a pavement. Depending on weather, depending on wear and tear, depending on the type of the maintenance and policy of the maintenance and other operational condition, friction could still change regardless of how you design.

So that's the slippery pavement or pavement friction that we usually equate. So those are two different items. Pavement design basically achieves a certain pavement surface, including the material it goes into the pavement design. Slippery pavement, once you have a surface, it has other contributory factors that creates a lower, higher, medium friction and so on, and that's called slippery. Obviously the lowest one is called as a slippery pavement.

So it's -- essentially it is not equivalent to just say pavement design is a friction.

Q. You had mentioned

maintenance. Are you suggesting that slippery pavement falls under inadequate maintenance, just so I'm clear about that?

A. It could be part of the winter maintenance policy, how you perform and maintenance under certain weather conditions. That's -- so it's mostly maintenance in wintertime, but it could be also summertime that you don't allow to accumulate, for example, debris, looking at the cracks and potholes and other types of maintenance. So those are connected to the pavement surface or friction in terms of maintenance.

Q. The reference here to inadequate maintenance, are you saying that that's with respect to winter maintenance activities and not slippery pavement? I'm having just a hard time separating those two things from what you said.

A. So inadequate maintenance and slippery pavement are two different subject. They are interrelated. If you have a certain policy of maintenance, for example, winter maintenance, a certain threshold -- or certain time you initiate your salt treatment, as an

example, then if those are not met, that's inadequate maintenance. Because of that, there are certain time the road could be slippery. So it's not exactly the same thing. That's why they are listed as different items.

JUSTICE WILTON-SIEGEL: I instinctively think this is not a terminological discussion. Let us say that you have pavement that has been in use for 15 years, it's been -- it was fine when it started, but it's been highly polished. It exhibits, if tested, low friction qualities. I'm not saying this is the situation now; I'm just dealing hypothetically. Are you saying that all of that notwithstanding, it should not be included as a possible contributing factor under wet pavement, in respect of wet pavement collisions?

THE WITNESS: That's one of it, but it's on the key contributory factors. It's four of them are listed here, but obviously this list is longer when you look at in detail. So pavement friction could be one of it. It's probably not the top four. Top four is listed here. That's the difference that we're --

JUSTICE WILTON-SIEGEL: When

they say top four here, what kind of study lies behind all of this?

THE WITNESS: It's -- the highway designs safety manual is a series of what we call -- they have a database entire U.S. and Canada to generate models and the models give you the information in typical conditions. What are the typical contributory factors for wet pavement. Because of all those statistical models, they identify these are the top four as the main contributory factors related to pavement. Friction or even other contributory factors are also -- could be the cause, but it's not the top four. That's the summary that --

JUSTICE WILTON-SIEGEL: How you interpret this. Okay.

THE WITNESS: Yes.

MR. CHEN: Mr. Commissioner, okay to take this down now?

JUSTICE WILTON-SIEGEL: Yeah, sure.

BY MR. CHEN:

Q. Thank you. We can take that down, Mr. Registrar. If we can go to image 27 and 28 actually. That's probably better.

Sorry, of Mr. Karim's report, which is HAM64759. 27 and 28. Perfect. Thank you.

Mr. Karim, you provide a before and after collision analysis and ultimately concluded that, for various reasons, and we've heard about this earlier from Mr. Brownlee, that you can't draw any reliable conclusions regarding the collisions following the resurfacing. And you may have seen the evidence or watched the evidence of Mr. Brownlee, but he has reviewed your report and now he agrees with your analysis on that issue. And prior to that agreement, you had provided a lengthy discussion on how to conduct a proper before and after analysis. I do not plan to go through the majority of it now, but perhaps you can just tell us at a very high level what that study does.

A. This section we are describing how the before and after, after certain treatment or certain changes, major changes in the highway or roadway was implemented and if it resulted in a change in safety performance, obviously collision rate that I'm referring. And there are two methods to do it.

Highway Safety Manual

describes how to do those two methods. The first one describes before and after with a comparison safety group. As we discussed earlier, comparison group essentially referring to the similar facilities compared to the one that you are referring. And it describes how to do it in terms of data. For example, it requires three to five years of data, at least 10 to 20 sites, other sites, and some of the other details of the safety perform function which is one of the way to evaluate and perform this analysis.

The second method describes a specific type or target. For example, you are looking at single motor vehicle instead of overall collision. How to do that. And it's very similar. The only difference is within the same highway, different segments could be compared, and it also at the same time could be compared with that segment to a similar segment. And how many years of data and sites is needed is essentially very similar compared to the first one. And both methods giving you -- this is a very scientific process to evaluate before and after situation. For example, you're referring here the resurfacing on Red Hill Valley.

Q. From a data perspective, it's three to five years before and three to five years after; is that right?

A. Yes, that's correct.

Q. So obviously the pandemic is one of the reasons why the data after resurfacing is unreliable?

A. Yes. So after the resurfacing, which was done later part of the 2019 and before the first lockdown came in in March or April in 2020. So we have limited time, and it's less than six months that we can compare, which is not obviously sufficient data was available, and after that, as we all know, COVID came and altered the traffic volume, speed, and other condition drastically. So those data are not reliable any more, and that's one of the reason. Obviously before, sort of similar condition existed before the resurfacing, but after, that's the situation we're dealing with because of several reasons, including COVID.

Q. Just in terms of the after period and when we can start looking at the data again, I recall Mr. Brownlee saying in 2022, and I can't remember if he made a distinction

between the first half or the latter half. What's your opinion on when that data -- the post data can be looked at?

A. As we received instruction from Ministry of Transportation and other cities, they prefer or indicate the last part, later part of 2020 would be going to the normal, and obviously beginning of 2020 will be very similar, this year, that would be compared to the pre-pandemic conditions. And if you look at minimum three year, that will take us to roughly 2025, I would say, to have enough data to look at after conditions.

JUSTICE WILTON-SIEGEL: I think you probably misspoke. You said I think --

MR. CHEN: You may have said 2020.

JUSTICE WILTON-SIEGEL: -- 2020. And you meant to say the latter part of 2022?

THE WITNESS: That's correct. Sorry. Yes.

MR. CHEN: And starting 2023.

THE WITNESS: Starting 2023. Yes.

BY MR. CHEN:

Q. As part of your discussion on using an appropriate dataset, I understand you provided an example of that using both the Red Hill Valley Parkway and the assessment of collision rates before 2019. So my first question there is, why do you -- think it might be obvious from our discussion, but why do you only look at data before 2019?

A. So it's 2014 to '18 is before the pandemic, and it's also a requirement from the Highway Safety Manual to look at that range, so that's one of the reason we selected that period.

Q. We can turn up images 28 and 29. So you undertook a collision rate analysis. What conclusions did you come to?

A. We undertook a collision rate analysis for 2014 to '18 and looked at different segments and aggregated average of the entire Red Hill Valley, and we found that the collision rate is -- in the northbound direction is .69, and in the southbound direction is .43.

Q. If I can just stop you right there so we can pull up the table. That

might help a bit more visually. We can leave on 29 and image 30, actually, Mr. Registrar. Table 3 has the results, I understand.

A. Yes, that's the table 3 I was referring, so that's the results of the collision rate analysis, and on each column for each segment, collision rate is noted. Different segments in two different directions. And the bottom of the table 3, it gives you an average for two direction. That's the collision rate that I was referring earlier.

Q. So northbound average weighted is .69, southbound average weighted is 43. Correct?

A. That's correct.

Q. And on image 29, there's a paragraph, "after reviewing the collision rates, we found the RHVP achieved." If we can just call that out, Mr. Registrar, so it's a bit bigger. It's the fourth paragraph down on image 29. That's your conclusion there?

A. That's correct.

Q. You make reference to the initial planning collision rate:

"The RHVP achieved the safety

rate as per its initial planning collision rate."

Can you elaborate on that?

A. Between 1982, environmental report noted a 1.0 collision per million vehicle kilometres. That's the collision rate we are referring here for provincial freeways, and they noted that would be a general target for safety in Red Hill Valley. When we looked at our collision rate, it obviously falls under that target, so that's the conclusion I'm referring here.

Q. We said or used the term "collision rate" quite a few times, but to be clear, what's a collision rate?

A. Collision rate essentially gives you a normalized or neutral unit to compare in different segments or different types of roads. It is achieved by dividing collision -- number of collision divided by the segment of the road and traffic volume of that segment.

Q. Your conclusion goes on to talk about other highways. I take it your conclusion there is that the Red Hill, based on these numbers here, perform either similar or in

some cases better than other provincial highways, and those are the ones you've listed there; that's correct?

A. That's correct.

Q. So we can take that callout down, Mr. Registrar. On image 29, there is a mathematical formula there. Is that what you use to calculate the collision rate?

A. That's correct.

Q. And can you tell us what information you need, and I think it's set out there, perhaps describe the various pieces of information that you need to undertake that calculation?

A. So we need at least three information. As you can see, the equation is listed. Total number of collision for five-year period, which is noted as A. The length of that segment, of different segments in specific highway, roadway. And traffic volume. And traffic volume noted here is average annual daily traffic, which is noted as AADT, which is essentially a data that we received, daily traffic volume. I believe it was averaged for several days. That's how typically data is collected.

Over five-year period, we average the five-year data, and so that's the average daily traffic that we need for calculating collision rate for different segment or entire highway.

Q. Just on the traffic volume, you mention in your report at the top of image 29 what you just described, which is that you were provided with AADT, but you had some missing segments along the Red Hill, that you had to apply a volume balancing method. What is that?

A. So when we received the data, it was in the mapping software. When we looked at, it looked like there are smaller segments. The data was not collected. It's very normal. City doesn't collect every location of the highway. It collected certain locations. So that leaves a gap between the data locations that was collected. The easiest way to estimate is, for example, if there is an interchange or ramp there, off ramp, we will deduct it; if it's on ramp, we will add it to estimate the traffic volume of that missing segments. So that's the volume balancing method.

Q. Is the volume balancing method an accepted practice in the industry?

A. That's correct, yes.

Q. All right. So now I want to talk about the actual work to calculate those collision rates.

So here, Mr. Commissioner, there has been some back and forth with commission counsel on how the collision rate was calculated, including with Mr. Brownlee and his team. A misunderstanding on the methodology used by Mr. Karim given what was indicated in one of the footnotes that we had with talked about right at the start and how the collision data was filtered. That was the correction from this morning.

So for clarity, I intend to go into a bit more technical detail than may be desired in the course of a hearing and to pull up the actual spreadsheet Mr. Karim used just so that we can all see how he did it, and hopefully that adds the necessary clarity for any follow-up questions or cross-examination to take place by commission counsel.

JUSTICE WILTON-SIEGEL: So that I understand, this is with respect to the overall collision data or the overall collision rate -- is that correct?

MR. CHEN: Yeah, that's correct. The figures that were set out in table 3 on the screen, how the methodology to calculate those numbers.

JUSTICE WILTON-SIEGEL: Okay. Why don't we proceed. If there's any objection, we'll deal with an objection at the time.

BY MR. CHEN:

Q. So we have produced a document, HAM64783, and because we are going to show the steps that Mr. Karim took to do the analysis, my colleague Ms. Contractor will be sharing her screen with the spreadsheet, if that's okay?

MR. LEWIS: I would just -- I'm okay with that. What I would say is that this document was produced to us yesterday at -- sometime in the early afternoon, I think during the lunch break of the hearing yesterday. So that was the first time this particular document showing Mr. Karim's work was provided. So with that note --

JUSTICE WILTON-SIEGEL: Mr. Chen, I'm aware there have been discussions but no more than that. Certainly not the substance of

them. Can I ask -- could you jump to the conclusion for a moment so I understand where you're going?

MR. CHEN: Well, I can tell you, Mr. Commissioner, Mr. Karim's conclusions, the collision rate that's on the screen -- well, not on the screen any more, but table 3, are the same, and it really comes down to what was indicated in Mr. Karim's report in terms of how he did it to get to that number. So there's confusion there. Ultimately the conclusion is the same, and just because there's been back and forth on how it was done, I thought it may be necessary to actually show the work but --

JUSTICE WILTON-SIEGEL: So he stands by these numbers?

MR. CHEN: I understand that he does stand by them.

JUSTICE WILTON-SIEGEL: Exactly these numbers?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: And he applied this formula with which we are already familiar, I think, based on the fact that the same formula was used by CIMA when it did a similar

calculation. So the issue, then, is I assume about the data that's in or out; is that correct?

MR. CHEN: That's correct. What -- there's a spreadsheet that sets out -- go ahead.

JUSTICE WILTON-SIEGEL: So is the issue about the data that's in here, or is it with respect to the comparison between the data in here and the comparison -- the numbers generated for the comparator highways?

MR. CHEN: I'm expecting there to be an issue with both in terms of the use of the comparators, but I think there's also an issue about how the data was filtered, though --

JUSTICE WILTON-SIEGEL: In other words, what the data is that goes into these numbers?

MR. CHEN: That's correct. And I see Mr. Lewis on the screen, and I think he's in agreement with that.

JUSTICE WILTON-SIEGEL: That's fine. That helps. Then let's proceed.

BY MR. CHEN:

Q. If I can impose my colleague Ms. Contractor to pull up HAM64783.

Mr. Karim, this spreadsheet, perhaps you can just describe to us what this spreadsheet shows us.

A. So this spreadsheet essentially is same as table 3, and it just has a bit more few columns how the data behind it. So, for example, we have a length of the segment, we have a number of collisions, but the last column is collision rate, which, if you want to compare it, is essentially the same number is in the report. So that's basically it shows what is in this worksheet.

Q. At the last row, row 23, under column F, you looked at a total of 504 collisions for the period of 2014 to 2018, right?

A. That's correct.

Q. All of the raw data or the collision data is included in the tab titled, at the bottom left there, "Raw data with filter"; is that correct?

A. That's correct.

Q. So can you walk us through how you ended up with the relevant collisions for the 2014 to 2018 collisions that took place on the mainline of the Red Hill Valley

Parkway?

A. If you can go to the raw data and show -- and column D, location, if you click that little button arrow and if you deselect and only select the Red Hill only. So first two, you have to deselect those, and the rest, if you can scroll down, is Red Hill. So that's fine. That's the filter we use just to select the location. It's Red Hill, not LINC. So that gives you a number of -- certain number of collisions.

And then if you scroll to the right, the second filter would be accident year. So if you click that and deselect, only select 2014, '15, '16, '17, and '18. So that's the year that is reported, so that's another filter.

If you go right, accident location, and if you deselect at intersection. Yes, that's correct.

Q. Just so I can jump in there, Mr. Karim, you're deselecting intersection because?

A. There is no intersection of the Red Hill Valley. It's only interchange. That's the reason for exclusion.

The last one, that's the

classification of accident, and non-reportable, if you deselect that. It's non-reportable essentially referring to the self-reporting collisions that is under the threshold of PDO. PDO is property damage only. That's the category for self-reported data. The remaining data are for reportable, fatal, non-injury, and PDO. Those are reportable category.

Q. What's PDO?

A. PDO is property damage as per -- which is above the threshold indicated by provincial law.

Q. And in terms of terminology, non-reportable and self-reported, that's the same thing?

A. No. It's different. It's not PDO. It's categorized as per the provincial instruction as non-reportable, or sometimes referred as self-reported data. So it's a different category. Essentially if you have self-reported data, it is the fourth category you will see. If it's reportable data, you will see the first three category. That's the requirement, provincial process, and this is kind of the crash data qualification method.

Q. So maybe my question wasn't clear. But PDO, or property damage, is one category, right?

A. That's one category, the last category --

Q. And self-reported and non-reported are a separate category, right?

A. That's correct, yes. So if you selected, you will have -- if you look at the number of collisions at the bottom, you will have 499 crashes as you're looking at that number.

Q. And we know the total that you looked at was 504?

A. Yes. So what we did after this 499 crashes, we plotted in GIs to make sure that we are actually plotting the right data. When we plotted, there were five crashes, it appears, using the code names of -- the geographic code names which is listed in the last two column. Those five crashes are actually within the study area, meaning within the segment that we're analyzing. So we added those five just because from the actual location, it appears to fall within the study area. So that's why we have 504 instead of 499.

Q. Just as a cross reference, you were able to -- because the collision data provides I guess I'll call them the GPS coordinates, you effectively put them on the Red Hill map?

A. That's correct.

Q. And you compared that number, the total number of those plotted collisions, to the 499; is that right?

A. That's correct.

Q. And then you added back in the five I guess for greater accuracy?

A. Yes, that's correct.

Q. You'll recall when we talked about the footnote in your report, it said you had excluded ramps from the data. You didn't do that here, correct?

A. No, that was done for the crash type. So that's actually footnote for other section in the next --

Q. And I just want to clarify, though, and I think a lot of confusion, aside from the footnote, goes to the -- this road character as ramps. In this spreadsheet when you plotted the data, were the ramp collisions on the

ramp or the mainline?

A. So the confusion -- also we still have not fully understood the ramp categories listed here. When we plotted none of the data was inside the ramp loop. So that gives us an idea that it is not inside the loop, but most of them are in the mainline through travel lane, the straight travel lane, but few of them are still located within the lane that leads to the ramp. So ramp has two section, loop area, and the travel lane leading to the loop.

So few of them falls or close to those locations, and you have to keep in mind that when the GPS location are listed, it might be the collision where it happened or it could be where it landed.

So that's distinction will be few metres, and obviously travel lane is only three-and-a-half metre wide, so those interpretation of how the incident happened and how it was coded and collected by the police, might be some of them are still in the lane that is leading to the ramp. And that was obviously confusion why it was coded originally as a ramp, but as we understand looking at the actual data,

it did happen the lane in the mainline or the travel lane leading to the ramp but nothing inside the ramp.

So that's the reason we did not exclude it, but for other prospective, for example, crash type, if you are inside the ramp lane then it could be different types of crashes. So that's one of the reason maybe we'll discuss next section when it comes.

Q. For the purposes of the collision rate, those collisions that were identified as ramps, they are effectively mainline collisions in your analysis?

A. Yes. Yes, that's why we included those ramps data.

Q. So does that take us to the end of how you filtered to get the collision data which was then fed into the collision rate formula?

A. That's correct.

Q. There are also two other tabs in here, one that says available segments and one that says missing segments. Obviously a lot of numbers and equations, but these two tabs show your work regarding the segments and the volume

balancing method that we talked about?

A. Yes. So the missing segment is the volume balancing method, that's what is showing here. The available segments are the one that we have traffic volume, would those segments. So we try to differentiate where are those missing segments or the segments that the data is provided, and wherever we found the missing segment, we recalculate and we finish the entire corridor without any gap.

Q. So we can take that -- I think we're done with this spreadsheet. A question on non-reportable collisions. You had filtered those out. Why did you do that?

A. We actually plotted the non-reportable collisions, and one of the issue of the non-reportable, it is not done by police, for example, who is professional or in a standard manner. The way -- the self-reported is obviously reported by a driver who is involved in the collision, is typically what they do, they will look at the highway close to some cross street and they will say, well, it's close to Greenhill, instead of actually saying it's probably 153 metre from Greenhill, which is done by police usually

but not the typical person.

So if that is like a typical person does, what it creates a problem that you are -- when you're coded, that location is now added to the Greenhill, which is where not exactly the incident happened. So in terms of collision rate, it becomes an issue because we're trying to look at each section and which section is showing lower or higher collision rate.

So if the self-report is included and is the location data or other data that is not typically detail in the self-reported, it becomes an issue that if you add it to certain location that is not actually its high collision rate, inclusion of that, you will end up with high collision rate for a segment that doesn't actually need so much attention.

So it would lead to a different conclusion -- let's say King Street area is a constrained area. Instead of addressing that you will be addressing Greenhill, which is obviously a very critical factor in terms of crash rate analysis. That's one of the reason when we realized that's the situation.

There is a use of

non-reportable. You can use it for cash type. Obviously everybody knows how the crash happened. You can use it for insurance purpose. You can use it for cost benefit, and there are use of not self-reported data.

MR. CHEN: I forgot to mark the document as an exhibit, and I think that's why Mr. Lewis came on screen. If we can mark that HAM64783 as the next exhibit.

THE REGISTRAR: Exhibit 236.

EXHIBIT NO. 236: Collision Rates Analysis; HAM64783.

BY MR. CHEN:

Q. Thank you. Just following on the discussion about not including non-reportable collisions. We know in your report you go on to compare the Red Hill Valley Parkway collision rate that you calculated, which has removed the non-reportable collisions, with the collision rates calculated by CIMA in 2019 for certain MTO highways. We'll come to the document in a second.

As I understand it, the 2019 CIMA collision rate calculations for those MTO highways, they say that the collision rates

include self-reported collisions. So does that mean you are comparing a Red Hill Valley Parkway collision rate, which has excluded non-reportable collisions, with the collision rates of other highways, which have included? So not a apples-to-apples comparison.

A. It appears in that way if you're reading the CIMA report, but I do have a slightly different perspective of how probably it happened and what happened. Usually in my 26 years of data dealing with MTO, I have never seen the Ministry of Transportation disclose any self-reported data for professional use, so it's extremely rare, and I have never used or received the self-reported data.

The way to know it's their category, as we are discussing before, reported data are fatal injury in PDO. Self-reported has a different category. When we receive the data from MTO, we don't have the self-reported category. And in addition, we were provided with CIMA Excel worksheet. We looked at their traffic volume sources obviously slightly earlier, and those also showing three category, there is no self-reported. Based on --

MR. LEWIS: Is this something that's in evidence?

MR. CHEN: When you say "this," I take it you're referring to --

JUSTICE WILTON-SIEGEL: I'm going to suggest that I let Mr. Karim finish what he's saying, with the caveat that you should know right away that I have no idea how I can make any sense -- I can use what he's talking about, which seems to be -- and I don't mean this in a pejorative sense, I mean this in a purely descriptive sense -- speculative. It may be your best guess, but it is speculative.

THE WITNESS: That's correct. So it's my understanding. The third point obviously is in the report what we -- when we looked at CIMA average collision rates for different highway. In general, freeway falls less than one collision rate that we discussed at threshold. In this case their values varies from .6 to .9, in that range, and that's typically a freeway collision rate anywhere in Ontario. And it aligns with our findings, which is also very close to that range.

So my interpretation of their

data is it is a comparable. Highways and conditions and data could be compared with the Red Hill Valley collision rate that we estimated. It is the same thing -- in the CIMA report, is also reported with the self-reported data excluded. Collision rate was .69. As you can see, it still falls within the typical range of the freeway in terms of collision rate. So that's one of the reason we assume that those are comparable highways that could be compared with our collision rate results.

JUSTICE WILTON-SIEGEL: I'm just going to go back and ask you to repeat that because I totally did not get it.

If you can compress it to the essence, are you saying that you believe that the provincial numbers that go into the comparators do not include self-reporteds?

THE WITNESS: That's my understanding, as I have never received, or MTO has a strict policy, not including the self-reported data, and also the category that is reported data, it matches with the policy in the data that we looked at.

JUSTICE WILTON-SIEGEL: I've

got to stop you, make sure I understand the first one. Make my note for the first one. So you believe that the MTO numbers for the comparator highways also exclude self-reported accidents?

THE WITNESS: In general that's the case, that's correct.

JUSTICE WILTON-SIEGEL: In general. But we don't know that.

Then the second thing is you say the CIMA numbers, which I think we're talking about the revised CIMA numbers, 2019. Those are numbers with self-reporteds, correct?

MR. CHEN: Perhaps we can go to the document.

JUSTICE WILTON-SIEGEL: I'm just trying to understand what Mr. Karim thinks.

THE WITNESS: Yes. It is noted that non-reportable is included, but I was not sure that verified statement or not.

JUSTICE WILTON-SIEGEL: The CIMA numbers indicate that non-reportable are included?

THE WITNESS: That's indicated, but I was not sure that's a correct statement. Everybody made mistakes when writing a

report. We're all human being. That might be the case.

JUSTICE WILTON-SIEGEL: Well, except that they are expressly a revision of numbers that did not. But if we go one step further, then you said something about where their numbers fell relative to yours even if they were using non-reportable. But I think maybe I misunderstood. Maybe you're saying where their numbers fell indicate to you that they must have been using -- must have been excluding the non-reportables. Is that what you were saying?

THE WITNESS: Yes. So the number -- the range of the different highway, collision rates reported, it's usually the reportable collision rate range.

JUSTICE WILTON-SIEGEL: I understand that. I'm talking about your comment with respect to the CIMA numbers.

MR. CHEN: Yes, so although it mentioned that CIMA mentioned that it is included, but when we look at the rates and it's less than one, I realized that it's probably the typical collision rates for reportable collision data.

JUSTICE WILTON-SIEGEL:

Because their rates are below one?

THE WITNESS: That's correct, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: You think that they must have excluded non-reportables?

THE WITNESS: That's my understanding of the collision rate data was produced by CIMA.

JUSTICE WILTON-SIEGEL: Okay. I should allow Mr. Lewis to raise any question that he wants to raise at this point.

MR. LEWIS: I don't have any questions, and there may be some cross-examination on it. I would just note that it was not just in the January 18, 2019 CIMA collision review memo where the inclusion from the four comparator roads was noted to include self-reported collisions; it was also confirmed with Mr. Malone in his evidence on two occasions that that was the case, and that was not cross-examined on. I just note that.

JUSTICE WILTON-SIEGEL: Okay.

MR. LEWIS: Thank you.

JUSTICE WILTON-SIEGEL: So, Mr. Chen, do you want to proceed?

MR. CHEN: If I can just add one comment on that. I don't believe Mr. Malone was taken to the spreadsheet that Mr. Karim is referencing with respect to what he reviewed recently as showing the different categories of --

JUSTICE WILTON-SIEGEL: Well, okay, look. This is, if it's relevant at all, much more appropriate for summations a month from now.

MR. CHEN: The collision rate, and I won't press much more than this, but the issue really just surfaced in the expert phase, and the collision rate discussion has been ongoing in this inquiry, and so evidence we would say is very relevant to that topic.

JUSTICE WILTON-SIEGEL: Let's proceed.

BY MR. CHEN:

Q. Just for clarity, Mr. Karim, you did mention the spreadsheet that you reviewed. That was a CIMA document, correct?

A. That's correct.

Q. Can we pull up the native of that document, which is CIM10266.

MR. LEWIS: I do have

something to say on this, Commissioner. I don't know the purpose for which it is being introduced, but again it is not in evidence. It was not put -- it's a CIMA document. It was never put to a CIMA witness, it's not in Mr. Karim's report, and we received this document last night, informed by city council that this may be used today at 8:21 p.m. last night. So perhaps we could hear what the intended purpose of it is before I register an objection -- an objection beyond what I just stated.

JUSTICE WILTON-SIEGEL: What is the purpose of this? I assumed you were going to deal with single vehicle collisions. Is that correct or not?

MR. CHEN: No, this is -- when you were asking, Mr. Commissioner, the various reasons that Mr. Karim thought what he thought about the collision rate that CIMA used, he had also mentioned I think there would be a fourth reason why he expressed his conclusion about whether the collision rate included self-reported data or not, and he in his explanation made reference to a document, a CIMA spreadsheet that he reviewed which contained collision data that

showed various categories but not the self-reported category. And so that, as I understand, was Mr. Karim's evidence a few moments ago, and so that would be the purpose of --

JUSTICE WILTON-SIEGEL: Well, if you're asking me to draw a conclusion from this document without it having been the subject of any verification or explanation or both by CIMA, I think that's unrealistic. You're basically saying here's the document upon which Mr. Karim relies based on his interpretation of what he thinks CIMA made of this document. I don't know how realistically I could reach that conclusion, so I don't think this document -- at its simplest, there is no CIMA verification and explanation of this document, much less any indication of what they actually did with it. I think it's too late to be introducing this document.

MR. CHEN: The document, it's been in the database. CIMA produced the document.

JUSTICE WILTON-SIEGEL: Right. Well, Mr. Chen, I'm not going to rely on it. Based on what I've heard, Mr. Karim is making a certain number of speculative assumptions, his best guess. They may be right, they may not be

right, but it would not be appropriate for me to find something about what CIMA did based on this document. May be appropriate on the other three reasons which he gave. I'll have to reflect on that. But I think this document is too late to introduce for the purpose for which it is being suggested.

MR. CHEN: Well, Mr. Karim has significant experience looking at collision data, and I would say it goes to a matter of weight at the end of the day. We say Mr. Karim should at least be able to present the various reasons and the document that he relies on to come to his conclusion on that point just to see what the basis of his opinion is.

MR. LEWIS: May I jump in for one moment?

JUSTICE WILTON-SIEGEL: Yes.

MR. LEWIS: If that is the purpose, that this is the basis on which -- a basis on which Mr. Karim reached his conclusion that it was appropriate to filter out the self-reported collisions, it was not in his list of documents reviewed for his report. So therefore it could not have been part of the

reasons for which he decided to take that approach.

MR. CHEN: You know, Mr. Lewis, you're well aware that a number of different developments have arisen in the last few days which have kind of clarified or crystallized a number of issues, and I appreciate your point and I agree with you in fact on that, but it was after the fact following the discussions that we had that this arose. So, I mean, we can have Mr. Karim talk about what his thinking was at the time of the report, but as a result of the discussions that we had, what additional steps were taken.

JUSTICE WILTON-SIEGEL: Mr. Chen, I believe some time ago I made a determination. Can we pass on?

MR. CHEN: With respect to the topics that Mr. Karim was entitled to or permitted to --

JUSTICE WILTON-SIEGEL: This document. There is neither a need nor a justifiable reason for this document to be introduced at this stage into evidence, so I think we should pass on.

MR. CHEN: Understood. Understood, Mr. Commissioner.

BY MR. CHEN:

Q. So now, Mr. Karim, I would like to turn to your assessment on collision types. Pull up the correct location in your report. It's at image 31 and 32.

Here you're responding to Mr. Brownlee's conclusions on the collision types on the Red Hill Valley Parkway, correct, Mr. Karim.

A. That's correct.

Q. Mr. Brownlee has not testified yet on this particular issue, but he has obviously spoken about it in his report, and I understand Mr. Brownlee to be saying that SMV collision proportions are higher than the provincial and city averages, with the most prominent impact type of accidents on the Red Hill is single motor vehicle accidents, which is unusual on a freeway facility. And finally, that there is an overrepresentation of SMV collisions, single motor vehicle collisions, on urban freeways. Do you agree with him?

A. No, I do not.

Q. Why not?

A. There are a few reasons. One is the provincial facilities it's referring, it doesn't make a distinction between freeways and other roadways. The data was referring -- is actually for all facilities, so it doesn't really give us any definitive answer whether SMVs is the dominant type in other types of freeway facilities in Ontario. So that's one of the reason I could not make a proper interpretation how that statement was decided.

The second reason is as we looked at and as showing in the chart, rear end in single motor, which are refer as an SMV, are most two dominant type, and if you look at the graphs, it becomes very evident that sometimes the rear end could be higher in certain year, sometimes the SMV could be higher.

And so that's the second reason that I could not find a specific reason to call SMV is higher under all types in all years. The actual data that's presented here, it doesn't show that clear trend. So I can explain later in detail. Also, when we look at this type of crashes, and two dominant types, are they close within the certain range of the two types. As you

can see, they're very close in terms of their proportion. It's sometimes 30 percent and 40 percent, so it's within very close range.

And if you look at the figure 4 which is the next page, typical variation of data. Because of his randomness, it fluctuates around the average value, and if that range is 10 or 15 percent, then it could switch back and forth between the two major types of --

Q. Mr. Karim, you're talking about figure 4. That's not on the screen.

A. Yeah, we can explain --

Q. That's on -- pardon?

A. I can explain that vehicle later on, but the reason I bring here is the range that we're looking at, they are very closely following each other, within the 10 percent range, and some years, as you can see in the figure, for instance, SMV is actually lower and rear end is higher in 2015, which is clearly noted, and if you're looking in that year, obviously you cannot call SMVs higher. If you're looking at 2012 or '13, then also they are very close to each other. 2011, again rear end is higher. So as I mentioned, that there's not

really any clear trend that SMV is the most dominant and is far away the higher proportion compared to the rear end collisions.

My conclusion is both are dominant type and because they are close to each other, they could switch back and forth in terms of the dominance in certain year or other year.

Q. At the start of your testimony you had mentioned that this goes back to the issue regarding with ramps in the collision data or without ramps, and as a result of those discussions with commission counsel, you produced a document yesterday that sets out or provides a further figure or line graph that includes graphs; is that right?

A. That's correct.

Q. So perhaps we can get some clarity by pulling up -- and this is another document, Mr. Commissioner, that my colleague will be pulling up. So it's HAM64784. If you scroll to the top of this spreadsheet, those are your results in rows 2 to 13?

A. That's correct.

Q. Obviously a lot of data here. Let's just break it down. Rows 3 and 4 and

6 and 7, just look at those first. Those are with ramp, except that rows 3 and 4 include reportable collisions?

A. That's correct.

Q. In that scenario, what's the result under column Q?

A. So with ramp and reportable data only, the average proportion of rear end is 27 and SMV is 46.

Q. And then what about rows 6 and 7? What's the difference there?

A. 6 and 7 includes self-reported data. NR means non-reportable or self-reported. That when we include that, it changes. The rear end average proportion is 42 percent, SMV to 33 percent, and obviously the reason is non-reportable are mostly like fender-benders, minor crashes, and mostly rear end. That's one of the reason likely rear end become dominant or higher than SMV.

JUSTICE WILTON-SIEGEL: So the rear end becomes 42 percent and SMV 33 percent?

THE WITNESS: That's correct, Commissioner.

JUSTICE WILTON-SIEGEL:

Because non-reportables -- because non-reportables are mainly rear end collisions?

THE WITNESS: Predominantly, that's correct.

JUSTICE WILTON-SIEGEL: Sorry?

THE WITNESS: It's mostly rear end. That's correct.

MR. CHEN: Sorry, did you have a further question, Mr. Commissioner?

JUSTICE WILTON-SIEGEL: No, Mr. Chen, go ahead.

BY MR. CHEN:

Q. If we can go to the -- on this spreadsheet, there is -- on the right side there's a line graph, SM rear end collisions with ramps. On the right side. Slight technical issue.

Mr. Karim, the graph on the -- the line graph on the right side, that's a visual representation of the results that we were just looking at; is that correct?

A. Yes, both on the left and right side. The left was figure of 3. In my report, the right side, we -- it was not in the report, but we analyzed it regardless. That's

correct.

Q. So for comparison purposes, there's four lines overlapping. It can get a little confusing and hard to read. But to make sure we're comparing the right line to the right line, we should be looking at the solid yellow line and the dotted orange line. Those exclude the non-reportable, right?

A. That's correct.

JUSTICE WILTON-SIEGEL: Sorry, let's make sure.

MR. CHEN: It's the solid yellow and the dotted orange. Those exclude non -- and the legend is at the bottom of the graph.

JUSTICE WILTON-SIEGEL: Let me just make sure I understand. So basically the solids are SMV, the dotted are rear end, correct?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: So the solid yellow is SMV excluding non-reportable, and the red is including non-reportable, so the comparable for the yellow SMV will be the dotted red. That's what you just said, Mr. Chen?

MR. CHEN: It would be the

orange, the dotted orange.

JUSTICE WILTON-SIEGEL: Okay, right. Will be the dotted. So on the left, that shows the yellow is higher apart from 2015; on the right, it shows the yellow higher. Is that correct?

THE WITNESS: Yes. Are you referring to excluding non-reportable?

JUSTICE WILTON-SIEGEL: I am, yes. I was looking at excluding non-reportables.

THE WITNESS: Yes.

JUSTICE WILTON-SIEGEL: So excluding non-reportables, single motor vehicle is higher than rear ends except for 2015?

THE WITNESS: In 2019 too. In '9 it goes below and rear end is higher.

JUSTICE WILTON-SIEGEL: Yeah, possibly, but I've got that part as blocked on my screen. That's not on the right side but -- sorry, on the right side, it's blocked on my screen. Then including non-reportables, the rear end is higher on the left screen generally?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: And similarly on the right screen?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: Okay.

BY MR. CHEN:

Q. Mr. Karim, just looking at the graph with ramps on the right-hand side, and in particular when we exclude non-reportable, so that again is the solid yellow and dotted orange. So in some cases we see one higher than the other, in some cases we see the two lines being relatively close to each other. What can we take from the data that is shown?

A. So it means that the two types of collision are -- in terms of proportion, they are very close. They both are dominant, and because they are so close and randomness of the collision, it can switch back and forth.

In certain years one type becomes dominant, other type becomes less than the other one. So it's actually not a dominant word that I would use to describe. It's both are very close to each other.

There's not really any clear trend over 10-year period from 2010 to '20 to say one type consistently higher than the other one. It switches back and forth because of the close

proportion of these two types in Red Hill.

Q. The same question when we include non-reportables. So that would be the dotted green and the red, solid red?

A. That's correct.

Q. When you say "that's correct" --

A. The line is correct. Do you want me to explain?

Q. Yes. What do we take from the -- are there any trends that we can see when we compare the dotted green and the solid red?

A. So in this dotted green and solid red, it's a very similar trend that we discussed before. Obviously it appears that the SMV is lower and rear end is higher, but as you can see 2013 it flips. So it's number of location (ph), it switches back and forth because of the closeness of the proportion as we discussed earlier. It doesn't really clearly shows that one type is predominantly and consistently very high compared to other ones. They are really close to each other, so both types, as I concluded, could be the dominant type, and it could change over

year. In certain years, certain condition, because of the randomness, it doesn't show any type is clearly dominated in the Red Hill Valley.

MR. CHEN: Mr. Commissioner, I see it's 12:54. I don't have much left, if anything. I wonder if we could take the lunch six minutes early, and then I'll review my notes.

JUSTICE WILTON-SIEGEL: Sure. You think you're otherwise through?

MR. CHEN: Yes, if I do have, I can't see myself being long at all; 10, 15 at best.

JUSTICE WILTON-SIEGEL: I hope not, because we'd like to make sure we get through both witnesses today. Let's take our break. We'll return at 10 past 2:00.

--- Recess taken at 12:54 p.m.

--- Upon resuming at 2:11 p.m.

JUSTICE WILTON-SIEGEL: Mr. Chen.

MR. CHEN: Thank you, Mr. Commissioner. I just have two questions, largely for clarification on the initial planning collision rate.

BY MR. CHEN:

Q. Mr. Karim, you concluded that the collision rate that you calculated is below the initial planning collision rate of 1.0 per million vehicle kilometres travelled for provincial freeways, and I appreciate that the rate is below 1.0, but what does that mean, could you break that down for us?

A. Are you asking things -- collision rate that we produced and comparing with that target rate?

Q. That's correct. Break that down for us a little bit.

A. Okay. So as we discussed earlier, the initial target mention the 1982 area report is 1.0 million vehicle per crashes per million vehicles, and that basically a target threshold for most of the highway in general. This is not a prescriptive or raised number. This is a typical crash rate target in general across Ontario, Canada or even USA, and when any rate falls below or close to that, we would have a singular conclusion that the highway that I'm dealing with or any other highway or expressway are performing close to the expected ranges of the general freeway collision rate.

MR. CHEN: So that's it for the questions from me. I do want to mark the document that we referred to previously, HAM64784, as Exhibit -- the next exhibit.

THE REGISTRAR: Exhibit 237.

EXHIBIT NO. 237: 2008-2021 LINC RHVP Mainline Collision. Data; HAM64784

MR. CHEN: Thank you.

JUSTICE WILTON-SIEGEL: Okay.

MR. LEWIS: Commissioner, I understand, unless something that's changed, that none of the other participants' counsel have any questions, but I know that's the case for Ms. Roberts. I would ask Mr. Buck and Mr. Bourrier just to confirm that.

MR. BOURRIER: I confirm no questions from the MTO.

JUSTICE WILTON-SIEGEL: Do we have Mr. Buck on the line? Or someone else representing Dufferin? Perhaps not.

MR. LEWIS: Mr. Buck is there. He had said he didn't think he had any questions, just wanted to reserve five minutes, and that hadn't changed the last time I spoke to him. I

guess I'll proceed then.

JUSTICE WILTON-SIEGEL: Do we have Mr. Buck on the line? We do. Well, let's proceed. It's possible that he is elsewhere right now. The computer is on. Why don't you proceed, Mr. Lewis.

CROSS-EXAMINATION BY MR. LEWIS:

Q. Thank you. I'm going to have a series of questions, and I know it's a little unusual, Commissioner, but Ms. Hendrie is going to ask questions on the two areas involving the collision rates and SMV rear end things given the complexities of that.

So I'll start off, and we may need five minutes just so we can set up our respective computers once I'm done. When we get there, we'll deal with that.

So, Mr. Karim, regarding your CV and your experience, you mentioned regarding your work at 30FE. At a high level, you spoke about post accident, meaning legal cases, and pre-collision matters, consulting for I think you talked about in general if anyone is looking for a safety review of their systems or problems, I think is what you referred to. That was in

general when you're speaking of that. But when you were asked for details on that, you spoke of the post-accident legal cases, and you did not mention, that I caught, any consulting assignments in that regard. Or in regard to safety reviews. And I think, and you correct me if I'm wrong, I think when you were talking about your 30FE experience, you were mostly on those topics only using the words "we at 30FE" rather than I, which is what you used when you spoke of your experience at the City of Toronto and the City of Oshawa before that and at your prior employer.

So have you yourself completed a comprehensive, substantive safety review for a municipality? And I ask because I don't see one in your CV, but I could be missing it, so I wanted to ask that question.

A. Not in the 30 Forensic Engineering, but with my previous employers.

Q. So back before you were at the City of Oshawa; is that right?

A. The City of Oshawa, City of Toronto, in between Genivar and -- yes, that's correct.

Q. Sorry. WSP?

A. Yes, in-house WSP.
Q. WSP Genivar.
A. Yeah, Genivar is WSP now.
Q. Oh, I see. 2012 to '13, so you were there for about a year; is that right?
A. That's correct.
Q. And you personally at that point about a decade ago, you were involved in a substantive safety review; is that right?
A. Yes, all the municipality that I work for, most of them I was responsible and lead of the transportation engineering and safety of certain corridors of streets belong to those cities.
Q. At Toronto and Oshawa?
A. That's correct.
Q. Right. But in those instances for those two municipalities, I think you indicated that those were primarily transportation planning responsibilities. Am I wrong?
A. Both. Engineering and planning. So I was a transportation planning engineer, so I have to work on both department.
Q. Right. I get it. And

the transportation engineering and safety of certain concern corridors and streets. That does not include the limited access freeways, for example? I mean, you referred to work on -- when you worked in the municipalities, on -- with the 407 and the 401 in relation to interchanges, but I inferred from what you said that that means the effects on the local arterials and so forth that arise out of the interchanges that are placed within the municipality; is that correct?

A. It's in general, mainline corridor and interchanges. We review all segments of the highway when it comes to us, especially from Ministry of Transportation, and they're responsible for any study that is given to us for verification or comments or any other input on those issue. But obviously interchange is the main focus, but we always also look at the other information is provided to us and comments on -- including the mainline issues as well.

Q. But you're not conducting the study yourself, though, the review yourself, it's reviewing what has been presented by the MTO; is that right?

A. Whenever we review

internally there is two process. We look at their documents and work with the engineers and planners, what would be the changes. But we also produce our internal document using, obviously, design and planning knowledge to provide sometimes even drawings and alternative drawings compared to what is submitted, and that becomes a basis of our comments to the council or to the stakeholder like MTO. So we do produce internal engineering design documents to perform that activity.

Q. I note the use of the term again "we" rather than "I", so --

A. Sorry, I. Yes, I was the lead for those process. When I say it's me, myself.

Q. And you have a professional traffic operation engineers designation; correct? That's what you referred to?

A. That's correct, yes.

Q. And there's also a road safety professional designation from the Transportation Certification Board, right?

A. That is correct.

Q. You do not have that; am

I right?

A. No, I have the overall PTOE which touches all types of issue. I didn't feel that I need to obtain another certificate which is time consuming and payments every year. PTOE covers all aspects of traffic operations and safety in general.

Q. Okay. And that is a more -- and I'm not being critical when I say this, but it's a more general designation which includes a number of other more specialized aspects; is that fair?

A. That's correct, yes.

Q. And the road safety professional designation included there?

A. That's correct.

Q. So the PTOE designation includes some traffic safety stuff built into it, but not as extensively as the road safety professional designation does?

A. Yes, it includes as part of the entire review of traffic engineering operation, maintenance inspection, all kinds of thing including safety, that's correct.

Q. It's included in there

but not in as detailed -- I mean, the whole point of it is it's like a specialty designation, if I can just put it that way, the road safety professional designation; is that fair?

A. That's correct.

Q. Thank you. A number of the CIMA people, you're aware that they have -- that worked on these projects have the road safety professional designations; is that fair?

A. Very likely. I'm not familiar with their background.

Q. Thank you.

Just on the design speed point, without going to it, Mr. -- I've heard your evidence on this, so I don't need to go back to too much. There's one particular point I want to just go to, so I'll just give the context.

Mr. Brownlee's report indicated about a potential effect on CIMA of having been advised of the actual design speed on the Red Hill rather than the assumed 110 kilometre design speed. You disagreed with his characterization to an extent, and if we can go to image 15 of Mr. Karim's report, please. This is image -- actually it's 15 and 16, which are pages

12 and 13.

So in 4.2.3 in the middle of the left-hand image, you quote from Mr. Brownlee's report about had CIMA been advised. Then you have a response to that, and in particular towards the -- in the last bullet on the left-hand page, you say:

In general, a safety assessment for existing highway speeds focuses on the posted speed limit and existing operating speed, not the design speed per the HSM."

In your footnote 36, it goes on both pages, and we can blow it up if we need to but -- maybe if we could do that, Registrar. It's the bottom footnote, 36, which runs onto the next page.

So you're referring to the HSM, as I understand it, as support for the proposition that a safety assessment for existing highway speeds focuses on the posted speed limits and existing operating speed, not the design speed per the HSM. That's what you're citing this for; is that right?

A. That's correct.

Q. It's actually the

footnote. I wasn't looking. It's the footnote that I wanted pulled up, Registrar. The actual footnote at bottom of the page running onto the next one. And on the next page. Thank you.

Mr. Brownlee testified that this reference, and we can go to the Highway Safety Manual, but he testified that this reference to the Highway Safety Manual is misplaced. He said that this section of the HSM is related to calibrating predictive methods for urban and suburban arterials, not a limited access to freeway facilities. Would you agree with that?

A. The theory provided, there is no specific theory for freeway, how to perform any method. HSM does not consider freeway anything specific that requires a special theory. The theory developed for any roadway, especially arterials, applicable to -- with some context to the freeway.

So exact theory what is referring here is the speed category we're using, whether it's existing or predicting the existing -- future performance of the existing facility. This is a method in general. It's described here to use and predominantly depend on

the posted operating speed, which is a typical process of analyzing speed for safety performance by the professionals.

So I would agree that yes, it's not in the section, and actually there is no section in Highway Safety Manual for freeway. All the theories they developed could be applied with context to any roadway.

Q. It doesn't say that, though, right? It's called predictive method steps for urban and suburban arterials. That's what it says.

A. Yes, but the theory doesn't change if it is a collector road or if it is a provincial highway or freeway. Theory is theory. It is the basic theoretical foundation for any safety performance analysis.

Q. I have your evidence. Thank you. And you said that a -- that's where you got what you're referring to in your evidence earlier about the speed categories, right?

A. That's correct.

Q. And then you said that a design speed -- you can take that down, Registrar, thank you -- that a design speed of 100 -- this is

what you said this morning -- is not significantly different from provincial highways, if I understood correctly, and that you indicated that that was changed from your report where you said it's just slightly different. But that's what you were referring to, right?

A. Yeah, I think the reference here is the difference between 100 kilometre and 110 kilometre design speed. The 10 kilometre difference, that's what I -- between those two speeds that you're referring.

Q. So you were referring, then, just to that 10 kilometre an hour difference between the two, right? Okay.

A. That's what I understand from Mr. Brownlee's report, that that's what he's referring.

Q. 400 series highways typically have 120 kilometre design speed. Do you agree with that? Typically?

A. Typically it ranges between 110 to 120. Depends on where and what type of facility you're talking about.

Q. QEW, and 403, do you know?

A. It depends on some of the locations are lower design speed. It's not a constant design speed across the corridors, so whenever there is a constraint situation, the design speed changes. It's not everywhere the same design speed.

Q. As between 100 and 110 design speed, just one of the effects of, as you indicated, design speed difference is the curve radius, and do you agree that under the 1985 MTO guide, the curve radius at a 100 kilometre per hour design speed is 420 metres is the minimum radius whereas it's 525 metres at 110 kilometre an hour speed? Do you agree with that, or do I need to go to the reference?

A. No, I agree with that. You're referring to the interior design guide, the curvature options for different speed.

Q. Yes, exactly. So that's a 105-metre difference, right, for the radius?

A. Yes.

Q. And you characterize -- just so I'm clear, that's when you say that that is not significantly different? Is that -- so I understand what your characterizing?

A. No, what I was referring significant is what is built already on the Red Hill is based on certain speed. Whether you use 110 or 1000 for different purpose and different analysis, the actual curvature on the Red Hill is not going to change, and the recommendation for that existing should be same for the same curvature, not for certain assumed design speed and assumed road curvature.

Q. Right. You're taking it as you find it that the highway is what it is at this time, but you -- as part of what you said is that -- for this is that the speed analysis isn't dependent on the design speed? Right?

A. Yes, you can perform a speed analysis assuming the speed category, as I mentioned earlier, 20 kilometre higher. That's a typical analysis of --

Q. Right. And --

A. That's correct.

Q. And CIMA here assessed the percentage of vehicles at or exceeding the assumed 110 kilometre design speed as being 15 to 22 percent, right?

A. That's what I understand

from Mr. Brownlee's report.

Q. And that -- you would agree with me that's rather different than 34 to 48 percent exceeding a 100 kilometre an hour design speed. That's the relevance of the design speed to the actual speeds being travelled, right?

A. In terms of magnitude, but in terms of recommendation, I'm not sure what would be the change in the recommendation because of those two difference. It would be, in my opinion, if you're attempting to recommend to reduce the design speed, for example, which was implemented later to 80 kilometre design speed, this percentage --

Q. Sorry, I think you mean the posted speed, just so we're clear.

A. Sorry, posted speed limit. This percent increase or decrease would not change that decision. That's what I was referring. Knowing 100 or 110, given the excessive amount of percentage, whether it's 20 or 30 or 35 percent as a kind of random number that I'm referring, it's not going to change that recommendation if it is 100 or 110.

Q. With respect to

interchange spacing, if we can go to images 18 and 19 of Mr. Karim's report. At the bottom of the left-hand image and the top of the right, you were excerpting from the MTO 1985 design guide about interchange spacing as where it says 2 to 3 kilometres, in the first two paragraphs. And in the third paragraph, which is over on the right-hand image, it says:

> "If arterial roads are spaced closer than 2 kilometres, it necessary either to omit some of the interchanges in favour of grade separations or adopt some alternative means of combining interchanges to service closely located arterial roads."

And so the options that are presented in there, in the MTO guide, and I appreciate one can deviate from the 2 kilometres, don't need to argue about that. They heard your evidence and Mr. Brownlee as well. But the -- in that third paragraph, when the first -- the thing that it's actually saying explicitly there is if you're under 2 kilometres apart, or if the

arterial roads are under 2 kilometres apart, one, the first things is, you know, omit an interchange, right, like do a flyover, whatever, so that you don't have an interchange for that arterial. That is one possibility, right?

A. That's correct.

Q. And then the second one that is given is that you do something, an alternative of combining the two so you could have one interchange for two arterials. That's the second one, right?

A. That's correct.

Q. So in terms of the explicit guidance that's given by the MTO guide on what to do when you've got arterials crossing the facility which are less than 2 kilometres apart, those are the two things that it suggests.

So it's not -- come back to what you said earlier today. It's not encouraging designers to space interchanges under 2 kilometres, but it's, as a general proposition, recognizing that it might be necessary as one of the design trade-offs based on the existing topography and existing street structure, right?

A. That's correct. That's a

constraint situation, how you deal with it. I would just add one more, that after this paragraph which noted in my report as well, it actually goes on further and explain there are other ways to do it, not just these two options. It could be a change -- partial interchange, or it could be the configuration of the interchange. So it actually explains further that a constrained area is how to deal with less than 2 kilometre. So it has lot more options. Obviously you can copy and paste the entire book. That was not the purpose here. The purpose is to look at all other options, and after exactly this line that you are reading, they also give an illustration with a picture of different configurations and partial versus full, those kind of comparisons and so on, which we discussed earlier was one of the way the Red Hill Valley interchange was laid out following that principle.

Q. Right. And you referred to the Greenhill interchange, for example, which is a different type of interchange than one might typically see. But then -- and this is what I wanted to get to, was you talked about traffic signals for the King, Queenston, and Barton

interchanges, and I just wanted to make sure that I understood completely and that the Commissioner has your evidence on this.

So did I understand correctly first of all that when you're talking about using the signalized interchanges, you're referring to having traffic lights at the entrance to a ramp off of the cross street, or vice versa when you're coming off of a ramp onto the arterial? Is that what you mean by traffic signals?

A. What I mean is intersection, it could be if its volume is high, then mostly obviously a traffic signal is used. Volume is low, it could be also used without the traffic signals, without different kind of devices. So traffic control device gives you an access to certain direction. Instead of giving a full ramp access, it could be in both direction. For example, on Queenston and Barton on the east side, whether you're coming from eastbound or westbound, at the traffic signal you can access the same ramp where the traffic signal is located or intersection is located.

Whereas if you go to the LINC, it will be both direction has their own ramp, and

that's the process that they try to limit the number of ramps if you compare the LINC and the configuration of those interchanges in the Red Hill.

Q. And the ones that you were talking about, if we could just -- just to make sure that we know the ones you're talking about, go to image 58 of Mr. Brownlee's report. This just has the drawing of the middle, part B section of the Red Hill. 58, please. Might be 59. Yeah, 59, there we are.

If you could expand from the road itself, so from just to the left of where it says Greenhill over to the right of Barton.

A. Yes.

Q. Yeah, there we are. Thank you. It's a little blurry. So in terms of the traffic signals on the -- you were talking about, am I correct, King, Queen, and Barton -- sorry, Queenston and Barton?

A. Yeah, I didn't check whether all of them are traffic signal, but I do know those are multiple direction access to -- through the same ramp.

Q. On each of those three is

what you're saying?

A. Yes, it has an option to provide an access, both direction traffic, onto the same ramp.

Q. Right. But you mean onto both exit and on ramps?

A. No.

Q. When you say "the same ramp," I'm just not sure what you mean?

A. For example, if I give an example to Barton Street, which is on the right side of this image, and if you look at there is a loop ramp, and direction-wise it would be southeast corner, that route plan could be accessed by the eastbound traffic or westbound traffic.

Typically that's not the case for full interchange. Full interchange would have their own ramp. So if you're coming from eastbound, you will have an eastbound ramp on the right side, on the opposite side of the loop, whereas westbound will use this loop. So it will be used by a different direction exclusively by different ramps. In this case, two-direction traffic is accessing the same ramp.

JUSTICE WILTON-SIEGEL: Mr. Karim, could I just interrupt you and Mr. Lewis for a moment and make sure that I understand.

If we look at Barton, that's a very good example, and I want to translate this into northbound and southbound because that's the -- those are the directions we've been using, northbound being towards the QEW? Is that what you refer to as eastbound?

THE WITNESS: I think I'm probably mixing up.

MR. LEWIS: Could I interject? I wonder if we could have the Registrar flip it, so rotate it once to the left.

THE WITNESS: Yeah, that will be easier.

MR. LEWIS: Is that possible, Registrar? Well, it turns it a bit, but at least it's going -- the top is north, and there's Barton Street.

THE WITNESS: That's correct, yeah.

JUSTICE WILTON-SIEGEL: Just bear with me and let me explain what I think you are saying, and you can tell me that I'm all

wrong.

If we were proceeding northbound and wished to exit at Barton Street, there is the usual ramp, which would appear to take us up to Barton Street, and I'm assuming at Barton Street there's a stoplight, and one can go left or right at the stoplight. If one were coming along Barton Street with the intention of entering the parkway going northbound, you would stop at that stoplight, if it was red, and then when it was clear, you would turn left onto that circular ramp that is indicated in black which would enter just a little to the west of the stoplight.

THE WITNESS: That's roughly correct, yes.

JUSTICE WILTON-SIEGEL: Is that correct? So you go around that semicircle 180 degrees and enter probably underneath the overpass that is Barton crossing the parkway; is that correct?

THE WITNESS: That's correct. So on both sides if you look at east --

JUSTICE WILTON-SIEGEL: And they have exactly the same configuration on the

south site.

THE WITNESS: That's right.

JUSTICE WILTON-SIEGEL: What you're saying is they have an entry and exit ramp, but they avoid anything in the northeast or the southwest quadrant?

THE WITNESS: That's correct. So there are supposed to be actually extra ramp if it is a full interchange. Instead they used an intersection, traffic signal, or different kind of devices to provide an access through that intersection instead of providing an additional ramp.

JUSTICE WILTON-SIEGEL: Right.

THE WITNESS: On those two corners there is no ramp, that's correct.

JUSTICE WILTON-SIEGEL: To take an example, rather than having sort of the equivalent to the off ramp going northbound, northbound of Barton Street they have the semicircle?

THE WITNESS: That's correct. So instead of two empty area, the two corners that we don't see any ramp, there is supposed to be a ramp, if obviously it was chosen to do that, to

avoid, or instead of that scenario they provided a traffic signal in the same ramp for both direction to access at the same location instead of another two extra ramp.

JUSTICE WILTON-SIEGEL: And for my edification, if I could be permitted one further question. How is that helpful in terms of interchange spacing? It seems to narrow the distance between the off ramp for Barton Street and what would otherwise be the on ramp for Barton Street where it would join the parkway.

THE WITNESS: So in terms of the interchange spacing and the ramp, number of ramps --

JUSTICE WILTON-SIEGEL: I think I should probably be talking about ramp spacing.

THE WITNESS: Yeah, I mean it's both. If you look at a certain distance, number of ramps are within certain interchange spacing. Using this configuration, you are reducing the number of ramps because you are constrained by the shorter spacing. So instead of two extra ramp which will introduce two extra conflict point, and obviously between the ramp to

ramp would be additional, so there is two issues, that has been not chosen at this type of interchange configuration explicitly, obviously, to deal with their constrained interchange spacing situation.

JUSTICE WILTON-SIEGEL: So if I can try to put that in terms of what I understand. You're saying in the normal configuration, you would have another on ramp --

THE WITNESS: Yes.

JUSTICE WILTON-SIEGEL: So you've reduced the number of ramps -- well, you've reduced the situation from one off ramp and two on ramps to one off ramp --

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: -- and one on ramp?

THE WITNESS: That's correct, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: And the one on ramp would be there in any event, so it's not as if you've tightened up any spacing, you've just eliminated the third -- the second?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: Thank

you. That's very helpful.

BY MR. LEWIS:

Q. Can you take that down, please, Registrar. Thank you. And then this morning -- both in your report and this morning, you indicated there aren't any -- you can take that down Registrar, thank you -- that there aren't any definitive studies or models to quantify the safety impact of interchange spacing, right, just to summarize?

And you said this morning, and I think I'm getting the quote right, that it's very hard to quantify what would be the exact outcome of certain interchange spacing. And you indicated that there were other -- there are other influencing factors that make it difficult or extremely difficult to find out whether spacing at a certain distance has a definite safety outcome. And -- but you also said it's generally understood that if interchanges are further apart, that there's less conflict, but what you can't tell is exactly how far apart these effects are felt for any particular spacing. Is that a fair summary?

A. That's correct.

Q. Having heard your

evidence and read your report, I just want to be then very clear on what you're saying. That although one can't make statistical conclusions about the exact effect of any particular interchange spacing on collisions, you do agree that interchange spacing makes the freeway more challenging for the driver, more work for the driver, closer, the interchanges are together directionally, and hence you're going to have a higher rate of collisions in all likelihood as they get closer, even if you can't make specific statistical conclusions about what particular spacing will result in a higher rate of -- in a particular rate of collisions; is that fair?

A. That's in general, but I would just want to add one clarification that when you have a shorter spacing situation and the steps are taken to reduce the conflict, a number of conflict location just like the one that we just discussed, that would minimize but not eliminate.

So I would agree with you that it's not going to be completely eliminate, but it will be managed to the degree that it's possible under the constraint condition, or minimized as far as possible. That's correct.

Q. And again, I'm not doing this to criticize a particular design decision under constraints. I just -- what are the effects.

And part of that is, and I appreciate you're not -- say that you're a friction expert, but to put it in another term, that when there's acceleration and deceleration and merging and lane changes and congestion at certain times and more braking can be required, there's more friction demand that's created because of those constrained -- of there being a constrained situation, subject to, you know, there's the mitigation effects you described, but directionally again that's the effect, right?

A. In general that would be the situation, if you have a more constrained situation.

Q. Thank you. With respect to the weaving distances, the ramp spacing, and you had indicated in your report that there were -- and you described today, but you described today that there are three ramp spacings which are under the 600-metre MTO guideline minimum. There are three of those, one of which is well under,

and the two others less so, right?

A. That's correct.

Q. In your report, though, you did describe it as -- you footnoted as the one being between Queenston and King being roughly 415 metres, that that was the one that was well below?

A. That's correct.

Q. But the other ones you didn't describe as being over or under, you just said -- the others are within 100 metres, 90 to 100 metres, right?

A. Yes.

Q. And then Mr. Brownlee checked and confirmed that in fact there are those three instances, and those are the one that you described, Queenston to King southbound. He thought it was about -- he measured about 425, you said 415, whatever. But that's the same one we're talking about, right?

A. That's correct.

Q. And that's the one that's well below. The other one is northbound Greenhill to King, which is about 500 metres; is that fair?

A. I measured 520 something, yeah, roughly.

Q. You said 520. Okay. And the other one, northbound King to Queenston, about 550?

A. Yeah, my measurement was 560. Yes, that's correct.

Q. I appreciate neither of you are on the ground measuring it out. Those three, just to then close it up, they are all in the area which we've all described where we have the lowest radius curves and the closer interchanges spacing. Is this again a fair summary of those?

A. That's correct.

Q. On design consistency and motorist expectations, you comment on a couple of things, and the first being design speed, which we've already discussed, but if we could go to image 23 of Mr. Karim's report.

Here you're disagreeing with Mr. Brownlee's comments in the first two bullets -- three bullets. The first two are the ones I want to focus on here. And you described these this morning as -- and consistent with your report is essentially if I can summarize it is, look, the Red Hill is not a 400 series highway,

and because it was designed with a lower design speed, the posted speed is different than 400 series highways. That is something which is clearly communicated via the posted speed and pavement markings and so forth, and therefore there's no expectancy violation. Is that a fair summary?

A. The summary, the last part would be that it's -- I didn't say it's no expectancy violation. It would be minimal or insignificant in terms of the expectancy violation from the users perspective. So it's very subtle changes which has been communicated through various communication process. So that would be the correct interpretation what I say.

Q. But is that not the definition of a nominal safety approach, that, look, the signage is there, drivers are going to see that, they know -- therefore they know it's different, and so it must be fine. Because you've got the posted speed, which is appropriately 10 kilometres an hour under the design speed, drivers are going to see it, they will behave accordingly. I mean, isn't that a nominal safety approach?

A. Partially yes, but also

substantive safety takes into account what has been communicated and provided and what would be the resulting outcome because of those information is provided. So the other part is substantive. So it's partially nominal, partially substantive.

Q. Right, but isn't what we know substantively is that we've got -- what is it? If I get the numbers right off the top of my head, 32 to 48 percent of drivers -- hold on for one moment -- that we've got 34 to 48 percent of vehicle speeds at or exceeding the design speed, and that's despite the posted speed, like that's what's happening, right?

A. Yes, and that I believe was the review of the safety performance which recommended to reduce the posted speed limit. As we discussed earlier, because of the percentage change, it would -- that decision would not be changed. It is not going to be increasing the speed, obviously. It's not going to be a 70 or 60 kilometre reduction in terms of posted speed. It will be still 80 kilometre reduction from the 90 kilometre posted speed limit.

Q. Last thing I want to ask before I hand it over to Ms. Hendrie, just give me

one sec --

JUSTICE WILTON-SIEGEL: While Mr. Lewis is asking that question, I would just like to understand that last answer. Could you repeat it.

THE WITNESS: I was referring to the decision came out of that percentage change. Whether it's 100 or 110, as we discussed earlier, to reduce the posted speed to 80, that's probably not going to change, let's say, an example --

JUSTICE WILTON-SIEGEL: The decision with respect to the posted change isn't going to -- the posted --

THE WITNESS: Posted speed limit changes to 80, that's correct, yeah.

JUSTICE WILTON-SIEGEL: And that's because?

THE WITNESS: So whether it's 30 percent or -- I forgot the number -- 22 percent, it's not going to change that decision that came out of that analysis.

JUSTICE WILTON-SIEGEL: Because at 22 percent it's still too high?

THE WITNESS: It is still too

high.

JUSTICE WILTON-SIEGEL: At 22 percent it's still too high?

THE WITNESS: Yes.

JUSTICE WILTON-SIEGEL: At that level they ought to have reduced the speed limit?

THE WITNESS: Regardless, to 80 kilometres posted limit, yes.

JUSTICE WILTON-SIEGEL: That would be your view?

THE WITNESS: That would be my interpretation and professional practice. I understand that's how --

JUSTICE WILTON-SIEGEL: If I understand correctly, and again this is just trying to put it in the context of the evidence, what you're really saying is that CIMA ought to have recommended a reduction in the speed limit back in 2015?

THE WITNESS: I had not looked at the details when it was suggested. I think the tables that you're referring is 2015. As I understand, when you do an overall review like professionals we do, we typically want to do a

complete speed analysis, which I think it was completed, if I'm not mistaken, 2019, which ultimately refers to the previous conclusion and decided. So that's a very normal professional practice, that you would recommend something from the preliminary analysis that requires a further study, and further study will 100 percent confirm that that's the recommendation would be put forward with a detail speed analysis which is completed later on. So this is a typical process that we follow.

JUSTICE WILTON-SIEGEL: But in 2019 the recommendation of CIMA, with essentially the same information, was to maintain the speed limit.

THE WITNESS: Yeah. I understand that part, but I think there is also discussion at some point --

JUSTICE WILTON-SIEGEL: One of the three recommended a lower speed limit at least for a certain portion of the parkway.

THE WITNESS: That's correct. That's the one I was referring, yes.

JUSTICE WILTON-SIEGEL: I see. And that's what you would have relied on in 2019?

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: That's what you would have considered -- okay. Let me just make a note.

MR. LEWIS: While the Commissioner is writing, Registrar, could you pull up image 26 from Mr. Karim's report, and then I'll wait.

JUSTICE WILTON-SIEGEL: Okay, thank you.

BY MR. LEWIS:

Q. Last thing I wanted to ask before I hand it over to Ms. Hendrie, and, Commissioner, I guess it's about 5 after 3:00, so maybe when I'm done this it might be a good time to take the afternoon break.

So you critique Mr. Brownlee, and he ultimately agreed with you, as you describe, that using the pandemic era collision statistics to make comparisons with pre-resurfacing and pre-counter measures period, that that was unreliable, right?

A. That's correct.

Q. And then here there's point 1 and 2 at the bottom, and you -- in point 1

you note that pre-pandemic but in the short period in 2019 after the resurfacing pre-pandemic where CIMA had noted that the proportion of wet weather -- that they appeared to be significantly lower in Q4 of 2019, that even though they were lower, that that's not a sufficient dataset to make any conclusions from, right? And so you --

A. That's correct.

Q. -- discounted that as well, right? Okay.

A. That's correct.

Q. Right. And Mr. Brownlee has agreed with you on that as well. But then in the second point, you go on to say that:

"The proportion of wet condition related collisions was already declining between the 2014-2018 and 2015-2019 periods."

That you know, right? And the -- here between those two periods, really what you've done -- not you, but what happens is one year gets changed. 2014 gets dropped and 2019 gets added, right? It's one year of the five-year period is swapped out, right?

A. Yes.

Q. And the swapped-in year is 2019, right? And that's the year that includes the period with the drop which you have indicated is not statistically significant, right?

A. That's correct.

Q. So you're discounting for one purpose, of course, that time period as not being statistically significant, but then here you rely -- for the second point, you rely on it for -- to show that there's a beginning anyway of a drop in the collisions?

A. Yes, I'm not sure it's statistically significant to make a conclusion, so I didn't make a conclusion that it is declining. It needs further study. As I described, the entire report, rest of the report, that that kind of slide changes may -- could well go back to increase.

Q. That's fine. I just wanted to clarify.

A. That's not my interpretation. This is what I understand Mr. Brownlee's referring, that it has started to decline, and I just noted that that is the

starting point of the decline, but doesn't mean that it actually has an impact of certain things or not as a result of certain treatment or not.

MR. LEWIS: Okay. That's fair. Thank you. I don't have any other questions, and so I'm going hand it over to Ms. Hendrie, and as I said, I think perhaps this would be a good time to take the afternoon break.

JUSTICE WILTON-SIEGEL: Sure. I wonder if we might reduce the break to 10 minutes and come back at 3:20.

MR. LEWIS: I looked over at Ms. Hendrie and she indicates that's fine with her.

JUSTICE WILTON-SIEGEL: Stand adjourned then until 3:20.

--- Recess taken at 3:10 p.m.

--- Upon resuming at 3:20 p.m.

MS. HENDRIE: May I proceed?

JUSTICE WILTON-SIEGEL: Please do.

EXAMINATION BY HENDRIE:

Q. Good afternoon, Mr. Karim.

A. Good afternoon.

Q. The first thing I would like to talk to you about is the collision rate analysis that you prepared and that is set out in your report at table 3. And you spent a fair amount of time explaining the steps that you took to get the collision number and the rate that you provided, and you went through the spreadsheet with counsel for the City this morning.

So I don't intend to take you through all parts of that, but there are some questions that I just want to confirm things that weren't covered.

A. Okay.

Q. Registrar, if we could call up HAM64783, and that's the Excel spreadsheet so it will have to be called up in native.

Mr. Karim, while we wait for the Excel spreadsheet to come up, the filters that you spoke about this morning with Mr. Chen that you said you applied to this spreadsheet to get the collision number that you did, that included filtering out the non-reportable collisions and among some other filters, correct?

A. That's correct. Non-reportable and three more just to get the

right highway year and excluding the intersection related crashes, that's correct.

Q. So I've applied the same filters to the spreadsheet, and perhaps, Registrar, we could -- I may ask you to go to the sheet that's called "Raw data with filter," but this is fine for now. Mr. Karim, I can take you to the spreadsheet -- yeah, thank you, Registrar.

So at the bottom there it says 499, and you talked about this number with Mr. Chen this morning. This is the number of collisions that come up when you apply the filters that we just talked about?

A. That's correct.

Q. So when I apply the same filters but include non-reportable collisions, which is in column AW, the total number of collisions is 1,003?

A. That's correct.

Q. That's consistent with what you -- the total number you've seen in the spreadsheet when you don't exclude the non-reportable collisions?

A. That's correct.

Q. By my math that

difference is 504 collisions?

A. Roughly, yes.

Q. Well, it is 504?

A. Yes, yes, that's correct.

Q. So as I understand it, that means that there were, at least according to this data, 504 self-reported or non-reportable collisions on the Red Hill Valley Parkway between 2014 and 2018?

A. Self-reported data, that's correct.

Q. Well, I believe the filter that you applied was to exclude non-reportables but --

A. That's correct, yes.

Q. And 504 is also the number of collisions that you report in the crash rate summary spreadsheet?

A. Yes.

Q. Right? That's the total number of collisions that you found?

A. That's correct.

Q. And I believe you explained this this morning that the difference between the 499 number here that we see and the

504 number that you report in your chart in the other tab, that's based on the GIS plotting that you did?

A. Yes, I mean, we made a decision -- or I made a decision when I looked at the GIS plotting, there are roughly 10 or 15 crashes at the end and the beginning of those, and roughly 4 and 5 are very close to the start and end point. So we added those collisions to the calculation process. It could be -- if you ask me in another time, I'll probably add another four or maybe I'll add six. It's not a precise science in terms of locations, which is very difficult to say which one exactly is inside the study area because the interchanges itself is so huge.

Q. Okay. We'll come back to the plotting in a moment. I just want to focus on the numbers for a minute. So if my -- again, if my math is correct, it sort of the inverse. There's -- if your total is 504, there's 499 collisions that were excluded from your calculation of the total Red Hill collisions between 2014 and 2018?

A. If I understand correctly, you're referring the self-reported data

is excluded?

Q. Yes.

A. That's correct, yes.

Q. But you'll agree there's 499 collisions that don't make it into your total?

A. 499 is used for the collision rate analysis. The self-reported is not included in the collision analysis.

Q. Okay. Maybe we can go piece by piece. The number that the spreadsheet returns when you exclude self-reported collisions -- or when you include self-reported collisions is 1,003?

A. Yes, I think we agreed with that point.

Q. Yes, okay. But the number that you include in your total, which I know excludes self-reported collisions, that's 504?

A. Yes.

Q. So the difference between that is 499?

A. Yeah, if you compare with the non-reportable and reportable or self-reportable, that would be the difference.

Q. 499 is about half of 1,003?

A. Roughly, yes.

Q. You'll agree with me that excluding the non-reportable collisions, you've excluded roughly 50 percent of the collisions that occurred on the Red Hill mainline in that five-year period from 2014 to 2018?

A. There is reason the non-reported is not included. I think I explained in the morning. If you want me to repeat, I can repeat that.

Q. No, I've got your reason. I just want to talk about the numbers. So I don't think you actually answered my question that you'll agree with me that by excluding the self-reported collisions, there's approximately 50 percent of the collisions on the Red Hill mainline that were excluded from the total?

A. Yeah, it was excluded because of the unreliability of the locations that is in the self-reported.

Q. But it was excluded?

A. It is excluded for unreliable information.

Q. And you'll agree with me that directionally, by excluding that 50 percent of collisions, that would also have the effect of reducing the Red Hill collision rate that you calculated by approximately 50 percent? If there's half the collisions, half the rate?

A. That might be the way you're looking at. I'm looking at the reportable collision perspective, which has far more detailed information which will be farther accurate compared to the non-reportable data which is, for example, Greenhill has a lot of non-reportable. If I include that, it will show the Greenhill section is much higher collision rate, which in reality that may be just an error of coding or whoever information is provided.

So in general, professional practice, whether it's Ministry of Transportation, City of Toronto, where I work all my professional life that I worked on all types of collision, we make a decision based on the reportable collision data, not always --

JUSTICE WILTON-SIEGEL: Mr. Karim, I appreciate that you want to explain this, but we've been over this. I should say this

isn't about -- it's not an attack on you personally, if I understand this line of questioning. But it's going to make the afternoon very long, so I think it's just a numerical exercise on the part of commission counsel right now, if I understand correctly, and I think it would be helpful if you could just answer the specific question that's put to you. Mr. Chen will have an opportunity as well to ask any re-direct questions that he thinks might be helpful to the commission. Thank you.

THE WITNESS: In terms of, yes, mathematics, yes, it will be reduced. It will be different rate compared to the self-reported.

BY MS. HENDRIE:

Q. Thank you. And just to go back to what my question was, it would be about a 50 percent reduction? If you're taking half the collisions, it would be about 50 percent?

A. Roughly, yes.

Q. Thank you. Registrar, we can close out this spreadsheet. If we can call up Mr. Karim's report at images 29 to 30. And, Commissioner, that's pages 26 to 27.

So you spoke about this with Mr. Chen earlier today, the collision rates that you calculated for the Red Hill, and that was 0.69 for the northbound and 0.43 for southbound?

A. That's correct.

Q. In that same paragraph, the last sentence, you go on in that paragraph to talk about the comparable highways and those collision rates, and then the last sentence there says:

"When compared with the RHVP overall collision rate, we conclude that RHVP safety performance was similar or in some cases better than other provincial highways."

So you don't actually state what the RHVP overall collision rate is in your report. When I look at it, my understanding would be that it would be some combination of the northbound rate and the southbound rate.

A. That's correct, it's roughly .56 or .57.

Q. Just to sort of backtrack about what the steps would be, you take the

northbound and the southbound and then you'd find the average of those two?

A. Yes, weighted average, that's correct.

Q. You said .56 or .57, right?

A. Yeah, around that. I don't remember the exact number, but it will be around that numbers.

Q. You know, as we just discussed, just talking about the numbers here, if we added back in the self-reported collisions into the calculation -- sorry, let me just take one step back.

So we talked about before the number here that you calculated, that's based on roughly 50 percent of the mainline collisions when you exclude the non-reportables?

A. In terms of number of collisions, but in terms of number of collision rate, that could be not exactly proportionately increased. Because there is a traffic volume that you were dividing.

Q. Well, as I understand it, the traffic volume would be the same regardless of

what collisions are included or excluded?

A. Traffic volume the same, but the distribution of the number of collision when you include self-reported, it will be different for different segments. So you will be dividing same traffic volume to different collision. So your rate would be obviously not 50 percent increased. It will be somewhere probably close to .9 or something like that. I'm just making an educated guess. So around that. Yeah, it's not double.

Q. But it's -- you know, 56 to .9, that's almost double?

A. The number is number, so it's -- I don't know it's double. Point 56 if you double it is 1.12, so in terms of number, no. But it will be increased. That's definitely for sure in terms of math that it will increase.

Q. I can take you to CIMA's 2019 collision memo if you would like, but I can also put it to you, and if you would like me to call up the report, I can. Am I --

A. The report helps.

Q. Should be I think pages 4 and 5.

A. Yes.

Q. So am I right that in CIMA's 2019 memo, CIMA calculated a rate of 1.01 for the Red Hill for 2013 to 2017?

A. When self-reported is included. They also noted when it is excluded it's .69 for Red Hill.

Q. Recognizing that you don't have the exact number, I take it you'd agree with me that when self report collisions -- if self-reported collisions were added back in to your calculation, the overall rate that you calculated would be pretty close, not exact, but closer to what CIMA got in its memo?

A. Yeah, it's both cases actually -- for example, the amount we completed without self-reported is actually pretty close to what they produced, is .69, and if you give and take the year difference -- because it's not the same year, right, we're talking about a different year -- it will be very close. If we use the different kinds of traffic volume data, there is a difference because of that. CIMA estimated traffic volume with some assumption which probably will increase, so the rate would be slightly

higher than on this. But it is within the ranges. Only .12 difference between what CIMA produced and what we produced.

Q. Thank you. Registrar, we can close this -- Mr. Karim's report down. I'm happy to take you to the spreadsheet if you would like, Mr. Karim, but you spoke earlier -- or we just looked at the spreadsheet of your collision rate analysis, and there was a sheet titled "Crash rate summary," and you went through that with Mr. Chen this morning as well. And that table set out your calculations for the Red Hill collision rate per segment, and there was the total number of collisions, 504 for the northbound, southbound, and we also talked about that. And as we talked about, that number is different from the number that you get, 499, when you just apply the filters?

A. That number is five crashes additional when plotted. That's the reason it's slightly higher.

Q. Yeah, the difference is based on the plotting?

A. That's correct, yeah.

Q. And I believe you

testified this morning that you did that using a GIS software, that you identified the number of collisions in each segment using the GIS software?

A. For each segment, we use the GIS software to count accurately using the coordinates, that's correct.

Q. That's the X and Y coordinates that are provided in column CH and CI of the raw collision data?

A. I don't remember the column number, but I believe it's the last two columns, yes.

Q. I just want to confirm, I know that there's a field in the collision data that has segment IDs, and those are listed in the City's database, but you didn't do your plotting for your segmentation using the segment IDs, you did it using the GIS?

A. Yes, the segment ID for collision and segment data for traffic volume is different, as we discussed in the morning. If you want to calculate collision rate, it has to be the same segment, so it has to match correctly for both. That was not possible because of the data format that is given to us, so we had to plot it

to match the exact same segment as the same number of collision in the traffic volume data provided. So that's the matching exercise is only possible to do through the GIS, because traffic volume, I cannot change it because it's already given. What I can change and plot and count are number of collision in the segment matching the traffic volume.

Q. Am I correct that to verify or to check the number, the collision totals that you listed in each segment in your table and in that summary chart, you'd need to refer back to that GIS plotting?

A. Yes, roughly that's how it was produced, number of collision for each segment.

Q. And your -- the GIS plotting that you used when you were putting those numbers into your chart, that hasn't been produced to the inquiry as part of you're underlying analysis?

A. I did not say that. It was the purpose of exercise to count the number of collisions.

Q. You didn't say that?

A. No, we plotted so many data and mapping. It's just impossible to keep track of all the data. We plotted self-reported, we plotted non-self-reported. I don't specifically remember whether I saved it or not. I just know that we looked at the screen and the mapping, how many collisions are there and so on. We looked for that mapping data file. I couldn't find it, but it is very easy to reproduce. Anybody can plot it using the GIS coordinates. It's very easy.

Q. Sure, sure. I mean, you did -- I think you said earlier that if you had asked -- if I asked you another time, you might add -- you said you might add four or six to another location or six and it's not a very precise science in terms of location?

A. Yeah, it's very difficult to pinpoint exactly which is the end point of the study area because the interchange is so large, it could be off by a few metres automatically. If you ask for another person, they will probably pick 10 collisions. But it's not going to materially change the collision rate estimation.

Q. Mr. Karim, I anticipate

that Mr. Brownlee, he will testify that his firm has attempted to recreate your GIS plotting based on the information that was provided yesterday about the process that you employed, and that they did so using the new filters that we've spoken about today that we were advised about on February 20th, and that they haven't been able to recreate the analysis. I also anticipate that Mr. Brownlee will testify that they tried to recreate the analysis using the old filters or the original filters that were advised about on February 10th, that excluded collisions with characteristic of ramp in either road 1 or road 2, and collisions at intersections and collisions with traffic control as traffic signal and stop sign, and that they also haven't been able to recreate or confirm the analysis.

So out of fairness to you, I wanted to just put that to you and to confirm that you stand by your analysis?

A. Definitely. When -- I should add just one clarification that if the exercise that we have done to count the number of collisions segment by segment, it would be always different, slightly different, so it could be some

people picking 10 collisions for certain segment. When I look at, I will probably say it's 12 collision and other segment is eight collisions. So there will be always a mismatch when you actually plot it, depending on the person that looking at that data, but alternate collision numbers would not change or it will be very close to the collision rate that we produced.

Q. Staying on the segment piece of your analysis but slightly different focus.

Registrar, can we call up Mr. Karim's report at images 29 and 30. Commissioner, this is at pages 26 and 27 of Mr. Karim's report.

As I understand it, the table 3 here, that sets out what the limits of your analysis for the collision rate was, right? The place on the Red Hill that you started and the place on the Red Hill that you stopped.

A. That's correct.

Q. So that's the Dartnall on ramp at the south end and the Barton off ramp at the north end?

A. That's correct.

Q. Registrar, if we can call

up CIMA's 2019 collision rates memo which is HAM54494. Believe it's at image 3.

So, Mr. Karim, just keep those -- I can't do them both because your chart straddles --

A. I have them in front of me.

Q. Great. Registrar, let me know if you need me to call out the doc ID again.

You'll see here CIMA does something similar in its collision rate chart and it sets out the limits that it uses for the Red Hill. And that's the LINC at the south end and the CN Railway overpass at the north end.

A. Yes, CIMA had one extra link after Barton.

Q. And that's an extra link that's on the Red Hill mainline?

A. Yes, we didn't have the traffic volume of that section, so we couldn't calculate that segment collision rate.

Q. So that segment collision rate isn't included in your analysis?

A. We didn't have the data estimate that, that's correct.

Q. That's not -- just to confirm, that isn't stated anywhere in your report.

A. The segment is listed so I believe it's very easy to understand, the segment from our table.

Q. Just to confirm, any collisions -- and you might have already touched on this -- but collisions that occurred in that segment between the Barton off ramp and the CN overpass, those aren't captured in your collision rate?

A. Yes, we didn't have the data to calculate that collision for that segment.

Q. Thank you, Registrar, we can close this down.

The last area that I just wanted to touch on, Mr. Karim, is that SMV rear end collision plotting that you did. You talked at length about it in your examination earlier. And when you were talking about it with Mr. Chen one of the things that you commented on was the randomness of collisions. In a year you might have a spike up or down of a certain type of collision.

A. That's correct.

Q. And that's -- that was what showed up when you plotted the SMV and rear end collisions. There were spikes year over year?

A. Yes, it goes up and down around the average values which is because of that randomness of the nature, it has a certain range that it fluctuates between that range.

Q. So in his report when Mr. Brownlee was making reference to the proportion of single motor vehicle and rear end collisions and there was some plotting in figure 17 of his report on those trends, and that plotting was based on the 2017 and 2021 annual collision reports that the City prepares.

A. Sorry, can you please repeat the number.

Q. It's page 25 of Mr. Brownlee's --

A. Mr. Brownlee's report, yes.

Q. So the annual collision data that Mr. Brownlee plots out that is obtained from the annual collision reports, that's based on -- those data points are all based on five-year

collision averages, right? So for the 2017 annual collision report it's based on the average from 2013 to 2017?

A. Yeah. I think the difference between what we did and Mr. Brownlee did is the average value of some in year for each point. That's a different approach to plot.

JUSTICE WILTON-SIEGEL: Sorry, you want to give me that again. What's the difference?

THE WITNESS: The difference is in our report we plotted every year data. We did not average in number of year data. Mr. Brownlee's reporting figure actually is figure 18, not 17, that -- you're referring to 18, right.

MS. HENDRIE: 17 and 18, both, plot five-year collision.

THE WITNESS: I can see the year, it's an average likely -- I would assume is an average of those four-year data is one point. Now a case we plotted each year data. We did not take an average multiple year to --

JUSTICE WILTON-SIEGEL: One-year average versus five-year average.

THE WITNESS: One-year data

versus five-year average, that's correct.

JUSTICE WILTON-SIEGEL: Yes.

BY MS. HENDRIE:

Q. My understanding is it's industry good practice to use data points that are comprised of three-to-five year or multiple years of data, the average for that, when you're assessing long term or sustained collision trends. Do you agree with that?

A. Yes. This is a different issue though. This is not -- we were talking about before and after. Before would be one way to calculate and after there is another five year and so on.

Q. Okay. But part of the reason that it helps to look at a three to five year average over a sustained period of time is because it helps to normalize some of the randomness of collisions.

A. I think we're talking about different subject. If you're talking about before and after we have a process that produces (indiscernible) or safety performance function, we call it. It produces an expected value before and it is producing after completely separate, so it's

not connected. It's completely separate after certain number of years. And there will be gapping between when certain implementation was done in terms of safety improvement. So it's two equations, so would be compared with before and after.

What we're talking about, this is completely different process. This is not a before and after study. This is a plotting exercise averaging certain years, and that's not the same thing. I'm just trying to explain that those two are different.

MS. HENDRIE: Commissioner, just give me a moment just to check my notes. Thank you, Commissioner, those are all my questions for Mr. Karim.

JUSTICE WILTON-SIEGEL: Thank you. I think Mr. Chen has a right to re-examine. Do you have any questions, Mr. Chen?

MR. CHEN: I do, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: Go ahead.

MR. CHEN: If I can just raise one point, Mr. Commissioner, coming out of Ms.

Hendrie's cross-examination regarding a new analysis by Mr. Brownlee, which was not produced to us at all following a discussion with Mr. Brownlee, and I wonder if anything would be forthcoming or whether Mr. Karim would be entitled to actually review that analysis and provide his comments.

JUSTICE WILTON-SIEGEL: Well, I'm not sure what analysis you're talking about.

MR. CHEN: With respect to Mr. Brownlee's attempt at plotting the --

JUSTICE WILTON-SIEGEL: I think all that is premature. We haven't heard it. A question was put and we're a long way from seeing any analysis of Mr. Brownlee's evidence. We can revisit this, Mr. Chen. We're not going to deal with it right now.

MR. CHEN: Okay. We'll put a placeholder there. Understood.

EXAMINATION BY MR. CHEN (CONT'D):

Q. Mr. Karim, you were asked some questions by Ms. Hendrie about what happens if you include the non-reportable collisions, and I'm just trying to understand on the fly a little bit, but I understood the nature of those

questions is whether including non-reportables would result in a proportional increase in the collision rate. Do you recall that set of questions?

A. That's correct.

Q. And there was a discussion about mathematically 50 percent or doubling the collisions by 50 percent would result in a 50 percent increase and in the collision rate. I appreciate that mathematical point. But from a traffic safety perspective and looking at collision data, do you agree that including self-reported collisions would result in a proportional increase in the collision rate?

A. It would result in increase of collision rate but I -- as we discussed and explained earlier it's not going to be exactly same increase in terms of number that -- for example, 50 percent increase. The collision rate might increase 40 percent, 35 percent. I don't have the exact number to give you. That's because we have the traffic volume which would be dividing the collision numbers. And when you include the self-reported numbers the distribution of the segment and the collision in

different segments would be different.

So you would not be dividing the same number of collisions with the traffic volume from different segment, right. So because of that difference it's not going to be double. The collision rate is not going to be exactly double. It could be something less than 1.0. I can't really give you exact number what would be the self-reported including collision rate at this point, but it's not going to be exactly double. That's not mathematically as possible.

Q. In your response you had talked about the reliability of self-reports. What, if any, connection does that have with the analysis?

A. So when we're assigning the collision -- number of collision for different segments because of the location on liability and its concentrated the self-reported data at certain crossroads, you would end up with some of the section very high collision numbers and if you divide by traffic volume of that section you end up with some of the section that is probably because of done reliable nature, you end up with higher collision for a certain segment.

I give you an example, is Greenhill to King Street. It's one of the location that the self-reported data is six times higher than the reported data. In that section if you include self-reported data you end up with very high collision rate which may not be in reality is a safety problem. In reality it's somebody choose to decide reported data close to Greenhill instead of actual location. And that segment, if you go by that you end up recommending your client, the Greenhill to King Street, or near Greenhill, has safety problem. And that's a very big departure from where actual safety problem lays, as we discussed in the morning, is probably not of King Street or around King Street and Queenston.

So you're shifting your focus from King Street, or the constrained area, to a less constrained area because of self-reported data. And if City invested the money and resources to correct the apparent safety problem using the self-reported data that's probably -- you're investing money and resources to the location is that doesn't exist or doesn't require that kind of attention.

JUSTICE WILTON-SIEGEL: I think you're just repeating what you said this morning.

THE WITNESS: That's correct.

JUSTICE WILTON-SIEGEL: The question asked was more specific, was the relationship --

MR. CHEN: I think perhaps it was a product of the -- I'll admit a question that's not specific. Mr. Karim seems to be answering why plotting self-reports may be unreliable.

BY MR. CHEN:

Q. The question is, and I thought this is what you had said in your evidence, why are self-reports in and of themselves unreliable?

A. That's correct.

Q. Why is that?

A. Self-reported data?

Q. Correct.

A. That's one of the reasons, as I mentioned, is location. The other reasons are self-reported doesn't come with the details of the collision, so it's maybe the

surface condition is not listed, it may be the weather information is not listed. There are a lot of other details that collected by the police is not included in the self-reported.

So if you are analyzing, for example, wet road pavement using self-reported data, you will have partial information for some, including road condition, but because the other are not reported you would be excluding the wet road for the self-reported. So it will be a partial view, and it's obviously unreliable when those attributes of the collisions are not listed or coded properly or reported properly.

Q. When it comes to self-reports and the involvement of I guess different individuals how many self-reports are usually generated from a single accident?

A. That's also another social fund reliability. For example, if three person in the car they might produce three different self-reporting. They might do one or they could do three, and that could be another source of error in terms of the way that self-reported is logged and registered and recorded later on.

Q. I guess tying it back then, we have the number that was mentioned being 504 self-reports. I think what you're saying is that doesn't mean it results in 504 collisions?

A. I don't know the answer. That might be less than 504 if it was incorrectly coded or reported. Reported data would be correct is verified by police, there will be no changes in the reported data collision numbers.

MR. CHEN: Those are my questions.

JUSTICE WILTON-SIEGEL: Thank you. Mr. Karim, just before you go I have one question which I wouldn't even dignify as mathematical, I would say it purely arithmetic.

When we talk about the numeric effect of adding in 504, whatever, you're basically saying because you're doing this on a weighted average, segment by segment basis, or segmented basis, the distribution of the non-reporteds will differ from the distribution of the three other classes that have already been incorporated into the calculation.

Do I take it that the distribution of the non-reporteds, as you believe

it to be, would fall more heavily on the more heavily trafficked areas? Is that why the number would be less than simple doubling?

THE WITNESS: Yes. So one of the reason is difference in traffic volume now that you have a different distribution.

JUSTICE WILTON-SIEGEL: I'm just -- I think that's the only variable that we're talking about, isn't it?

THE WITNESS: That's correct, yeah, different traffic volume that you're dividing.

JUSTICE WILTON-SIEGEL: You're saying the traffic volumes of the non-reporteds you think would be higher than - sorry, the distribution in favour of the high traffic volume areas would be greater with the non-reporteds.

THE WITNESS: I don't know it will be traffic volume is higher or lower. What I explained earlier -- for example, King and Greenhill. Their self-reported data is heavily concentrated on that location.

JUSTICE WILTON-SIEGEL: But for that to have a mathematical impact --

THE WITNESS: That will have a

mathematical impact because you're dividing by traffic volume, yes.

JUSTICE WILTON-SIEGEL: Right.

THE WITNESS: Not necessarily -- the self-reported data occurs in the less or heavily traffic.

JUSTICE WILTON-SIEGEL: No, no, I wasn't suggesting that. But they would tilt more -- less than one or less than 50 percent, you would have to have a greater distribution in the higher traffic volume areas I think mathematically --

THE WITNESS: That's -- yes.

JUSTICE WILTON-SIEGEL: Okay, thank you.

I think unless anyone has any issue that we have to raise, I want to thank Mr. Karim both for your report and you're the time that you've spent with us today, it has been very helpful to the inquiry.

THE WITNESS: Thank you everyone. Have a nice day.

JUSTICE WILTON-SIEGEL: And you're excused. You're welcome to stay on if you also want to watch, but the next witness will be

Mr. Brownlee. I think we'll take five minutes to arrange for Mr. Brownlee to be brought on-line, so let's adjourn until 4:15.

MS. HENDRIE: Just one thing, Mr. Commissioner, I wanted to note. Mr. Brownlee has a hard stop at 5:15 so I'll try to keep my questions brief, but he does have a hard stop at 5:15.

JUSTICE WILTON-SIEGEL: So we'll stand adjourned until 4:15.

--- Recess taken at 4:07 p.m.

--- Upon resuming at 4:15 p.m.

PREVIOUSLY AFFIRMED: ROBERT BROWNLEE;

EXAMINATION BY MS. HENDRIE (CONT'D):

Q. Mr. Brownlee back to finish his examination. He was previously affirmed last Friday but I just remind him of that.

Mr. Brownlee, I understand you listened to Mr. Karim's testimony today and you've also reviewed some of the spreadsheets of analysis that we went through with him today.

A. Sorry, Counsel, I'm getting a lot of feedback.

JUSTICE WILTON-SIEGEL: I

wonder whether it makes sense if Mr. Brownlee signed off and signed back on.

MS. HENDRIE: Maybe Mr. Brownlee could you try unplug your headphones first. Any better?

THE WITNESS: Okay. Can you hear me well?

JUSTICE WILTON-SIEGEL: Yes.

THE WITNESS: I can hear as well.

BY MS. HENDRIE:

Q. So perhaps I'll just repeat with the benefit of less feedback on your end.

I understand that you listened to Mr. Karim's testimony this morning and this afternoon and that you've reviewed some of the spreads of analysis that -- you're shaking your head.

I take it you still have feedback? So perhaps, Commissioner, may we should have Mr. Brownlee sign back off and back on?

JUSTICE WILTON-SIEGEL: I think that's one possibility.

THE WITNESS: So I'll leave.

JUSTICE WILTON-SIEGEL: I think you better do that. I'll just go on mute.

MS. HENDRIE: If we could just go off the live feed.

(DISCUSSION OFF THE RECORD)

MS. HENDRIE: Thank you, Mr. Commissioner. We have Mr. Brownlee back. Less feedback on his end.

Q. Mr. Brownlee, as I said before, it's my understanding that you listened to Mr. Karim's testimony this morning and this afternoon and that you've also obviously reviewed his report and reviewed some of the spreadsheets of analysis that he was taken through today.

A. Yes.

Q. And so I want to start first with some of the evidence that was discussed earlier about collision rates and non-reportable or self-reported collisions.

In your experience, is it good industry practice to include non-reportable or self-reported collisions in addition to police-reported collisions when calculating collision frequencies or collision numbers for a collision rate?

A. Yes. I would like to make one clarification first in terms of the terminology that we've been using today. A self-reported or a non-reportable collision in a database does not necessarily mean it's a self-reported collision by an individual at a reporting centre. Those are two different terms.

A self-reported collision is, yes, somebody whose gone into the reporting centres. A non-reportable collision refers to the lack of an injury and below a certain dollar value, which in Ontario is currently $2,000 worth of damage that needs to be reported if it's above those levels or there's an injury.

So to just give a quick example, not to belabour it too much. If a police officer shows up at a collision and there's less than $2,000 worth of damage and there's no personal injuries, he may conclude that that is a non-reportable collision and still may fill out a motor vehicle accident report.

So to use -- and vice versa as well. Somebody could go to a collision reporting centre and report a collision and it could become an injury or a property damage collision. So to

interchange those two as if they are in the exact same occurrence is fundamentally incorrect.

Q. Thank you. So just to sort of confirm that I understand that. You could have a non-reportable collision where there was a police report prepared. It just didn't meet the threshold for a reportable collision?

A. Correct.

Q. And just to go back. I think you said yes to my question, but to go back to my question before. Is it industry good practice in your experience to include non-reportable collisions when calculating collision frequencies for collision rate?

A. Yes. These are collisions that have happened. They under a specific threshold but if somebody gets rear-ended it's an actual collision. To take them out of a collision rate calculation is discounting the conflict that's on that corridor.

Q. So what effect would there be if you exclude non-reportable collisions from the collision frequency component of a collision rate?

A. The inquiry has heard

today, in this case it's a very substantial portion of the collisions that have been taken out of the analysis or excluded from the analysis.

Q. In respect of the Red Hill rate?

A. Yes.

Q. Thank you. Mr. Karim in his testimony spoke about unreliability or inaccuracies in non-reportable collisions or self-reported collision data. Are you familiar with some of the inaccuracies that he identified?

A. In self-reporting collisions, yes. As he indicated, there are specific attributes that aren't even picked up on a self-reporting collision form. So when we're looking at those specific attributes we're going to shy away from the self-reported type collisions to create those trends. However, the presence of a collision and generally the impact type, and I think Mr. Karim agreed to this wording, that would be more reliable, would be impact type, we would include those self-reported collisions in that scenario.

Q. You may have touched this before, but from your perspective is there any

utility to plotting or doing a collision rate analysis when you exclude non-reportable collisions?

A. It's going to under-report the conflict and the collisions that have occurred on that corridor.

Q. Moving now to the SMV rear end collision plotting in Mr. Karim's report, and that's at figure 3 of his report, which is on -- Registrar, we don't need to call it up but, Mr. Brownlee, I can if you like. It's on page 28 of Mr. Karim's report which is image 31.

And today in his evidence Mr. Karim also was taken to another spreadsheet of analysis that he prepared in respect of the SMV rear end collision plotting. So Mr. Karim's plotting sets out the proportion of SMV and rear end collisions for each year from 2008 to 2020 at least the figure 3 in his report does.

In your experience, Mr. Brownlee, what is industry best practice when you set out or assess long term or sustained collision trends?

A. I think it's been well-documented today, and in Mr. Karim's report

that we generally would look at a longer term analysis period, three to five years is what's recommended, we get more where things are -- all else is equal we'd love to get 10 years worth of data to look at long term trends.

Q. Why is that?

A. In looking at the plots created for the 30 FE report, you can see collisions are random. He's done a good job of proving that. From year to year we're going to have fluctuations at intersections, collision types you name it. We understand that in the industry and -- but what we have to ensure is that we're not looking at those short term trends, that we're aggregating the data over a longer period of time so we can get rid of what we call regression to the mean, which is essentially -- account for it so that we can establish that those trends actually exist or not.

So looking year over year, yeah, all collision data is going look that random, it's not any surprise to anybody whose practice is in the industry.

MS. HENDRIE: Thank you. Just one moment, Commissioner. Thank you Commissioner.

I said I would be brief and I was. Mr. Brownlee, those are all my questions for you.

JUSTICE WILTON-SIEGEL: I'm expecting that the only counsel that will would have interest would be Mr. Chen.

MS. HENDRIE: I was just going to say I haven't canvassed other counsel so I'm not aware but --

JUSTICE WILTON-SIEGEL: Why don't we check in with the other counsel right now. Anyone for Golder?

MS. JENNIFER ROBERTS: Commissioner, thank you. No questions.

JUSTICE WILTON-SIEGEL: Mr. Buck for Dufferin.

MR. BUCK: No questions.

JUSTICE WILTON-SIEGEL: Mr. Bourrier?

MR. BOURRIER: No questions, thank you, Commissioner.

JUSTICE WILTON-SIEGEL: So over to Mr. Chen.

MR. CHEN: May I ask for just five minutes as the evidence that Mr. Brownlee just provided is very fresh and I expect I need to

pull up a spreadsheet.

JUSTICE WILTON-SIEGEL: All right. We'll return in five minutes.

MS. HENDRIE: I did say this before but just as a reminder, Mr. Brownlee does have a hard stop at 5:15.

JUSTICE WILTON-SIEGEL: Let's stand adjourned until 25 to 5:00.

--- Recess taken at 4:29 p.m.

--- Upon resuming at 4:35 p.m.

JUSTICE WILTON-SIEGEL: Mr. Chen.

MR. CHEN: Thank you, Mr. Commissioner.

EXAMINATION BY MR. CHEN (CONT'D):

Q. Mr. Brownlee, you talked about the difference between self-reported and non-reported collisions just moments ago.

A. Yes.

Q. Is it fair to say that most non-reportable, non-reported collisions are self-reported collisions?

A. There would be a good size of overlap between the two, yes.

Q. Do you know how that

applies to the collision data that you've seen and that Mr. Karim has relied on?

A. Self-reported was not identified in the collision data that Mr. Karim relied upon, it was only reportable or not.

Q. There was only --

A. Sorry, they were classified as fatal, injury, property damage only, and not reportable.

Q. I just want to understand. It's probably best we pull up the spreadsheet. Impose on Ms. Contractor again. A slight technical issue, I apologize. Maybe we can start with the accident number column, Mr. Brownlee. Column B?

A. Yes.

Q. So you'll see looking at -- just freeze there -- row 2 for example. There's the accident number, so B2, 2013 684437. Do you see that?

A. Yes.

Q. And row 3, the accident number is a bit longer. Do you know the distinction between -- what the difference is between those two?

A. Not on this particular database, no.

Q. So I understand that police reports actually have 10 digits to them so that would be the shorter number. Does that help out at all?

A. I'm not familiar with looking at the exact accident numbers, no.

Q. Okay.

A. Again, I look at the data.

Q. So I put it to you though that's what the 10 digits represent, the police-reported collisions.

A. That's what you're suggesting. I don't know otherwise.

Q. Well, let me just take you through the exercise. If we can just add a couple of filters to search for the Red Hill collisions. Same filters you've seen before. 2014 to 2018.

Before we filter out the non-reportables, if we can go back to the accident numbers to see which category comes out.

So as I understand it the

police reports are the shorter numbers. What's left now after we only show the non-reportables, and we can scroll down if you would like, but those are the accident numbers which are longer.

A. Okay.

Q. You see that?

A. Yes.

Q. As a result of that exercise I put it to you then that all non-reportables are actually self-reports.

A. We would have to look back at the other combination to see if that -- but it appears that that's a large trend, yes.

JUSTICE WILTON-SIEGEL: What's the number of accidents at the bottom of this list?

MR. CHEN: 504.

JUSTICE WILTON-SIEGEL: Do you want show it to us.

MR. CHEN: It's the very small number at the bottom left of the screen where it said 504 of 3,482 records.

JUSTICE WILTON-SIEGEL: I see.

BY MR. CHEN:

Q. We can also -- I think

Mr. Brownlee is in agreement, but we can filter it the other way and show the police reports, but I don't think that's necessary is there. We are on the same page, Mr. Brownlee?

A. Yes, we are.

Q. Those are our questions.

JUSTICE WILTON-SIEGEL: Okay. Ms. Hendrie, any --

MS. HENDRIE: No thank you, Mr. Commissioner.

JUSTICE WILTON-SIEGEL: Thank you. Then, Mr. Brownlee, thank you very much. It's been a long day. We appreciate your standing by in particular, but we also appreciate your report and your testimony. It's is very helpful to the inquiry.

You're excused and the rest of us will stand adjourned until 9:30 tomorrow morning, and I guess we'll have our last witness. Have a good evening everyone.

--- Whereupon at 4:43 p.m. the proceedings were adjourned until Friday, February 24, 2023 at 9:30 a.m.