Ottawa Light Rail Commission

Greg Barstow
on Monday, May 9, 2022

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OTTAWA LIGHT RAIL COMMISSION

STV INC. - GREG BARSTOW

May 9, 2022

--- Held via Zoom Videoconferencing, with all participants attending remotely, on the 9th day of May, 2022, 2:00 p.m. to 5:03 p.m.

COMMISSION COUNSEL:

Christine Mainville, Co-Lead Counsel Member
Carly Peddle, Commission Counsel Member

PARTICIPANTS:

Greg Barstow - STV Inc.
Michael O'Brien, Esq. & and Theodore Milosevic, Esq., Tyr LLP - Counsel for Greg Barstow

ALSO PRESENT:

Carissa Stabbler, Stenographer/Transcriptionist
Alicia Sims, Virtual Technician

I N D E X

WITNESS: GREG BARSTOW

INDEX OF EXHIBITS

NUMBER/DESCRIPTION	PAGE/LINE NO.
(NONE MARKED)	

-- Upon commencing at 2:00 p.m. --

GREG BARSTOW: AFFIRMED.

CARLY PEDDLE: Mr. Barstow, the purpose of today's interview is to obtain your evidence under oath or solemn declaration for use at the Commission's public hearings.

This will be a collaborative interview such that my co-counsel, Ms. Mainville, may intervene to ask questions, and in this case, it will be me who will be intervening to ask questions. If time permits, your counsel may also ask follow-up questions at the end of this interview.

This interview is being transcribed, and the Commission intends to enter this transcript into evidence at the Commission's public hearings, either at the hearings or by way of procedural order before the hearings commence.

The transcript will be posted to the Commission's public website, along with any corrections made to it after it is entered into evidence. The transcript, along with the corrections later made to it, will be shared with the Commission's participants and their counsel on a confidential basis before being entered into

evidence.

You'll be given the opportunity to review your transcript and correct any typos or other errors before the transcript is shared with the participants or entered into evidence. Any non-typographical corrections made will be appended to the transcript.

Pursuant to Section 33(6) of the Public Inquiries Act, a witness at an inquiry shall be deemed to have objected to answer any question asked of him or her upon the ground that his or her answer may tend to incriminate the witness or may tend to establish his or her liability to civil proceedings at the instance of the Crown or of any person, and no answer given by a witness at an inquiry shall be used or be receivable in evidence against him or her in any trial or other proceedings against him or her thereafter taking place, other than a prosecution for perjury in giving evidence.

As required by Section 33(7) of that act, you are hereby advised that you have the right to object to answer any question under Section 5 of the Canada Evidence Act.

So as Ms. Mainville mentioned, if you

need any breaks, just let us know.

GREG BARSTOW: Okay.

CHRISTINE MAINVILLE: Thank you, Carly.

Mr. Barstow, you work for STV; correct?

GREG BARSTOW: Correct.

CHRISTINE MAINVILLE: Can you tell us what that company does?

GREG BARSTOW: Well, it's a large engineering company that guides agencies, authorities in the design of projects.

CHRISTINE MAINVILLE: And what experience does it have in rail specifically?

GREG BARSTOW: I believe there's about 80 people in the rail vehicle department, and I believe about 20 years of experience.

CHRISTINE MAINVILLE: Okay. And does that include you?

GREG BARSTOW: I have -- I started in 2008, so I have 14 years.

CHRISTINE MAINVILLE: You started in 2008 at STV or in the rail industry?

GREG BARSTOW: STV.

CHRISTINE MAINVILLE: Okay. So could you -- and am I right, I don't think we received a CV from you; correct?

GREG BARSTOW: You don't. You haven't.

CHRISTINE MAINVILLE: Okay. So can you tell us a bit about your background and experience?

GREG BARSTOW: Yes. I started in the industry in 1992 working for Morrison–Knudsen, which is a railcar designer.

In 1995, I went to Siemens, another designer of railcars. Ten years there. Then I went to Booz Allen Hamilton, which is a consulting firm on rail, for 4 years and now the 14 years at STV.

CHRISTINE MAINVILLE: And what's your title at STV?

GREG BARSTOW: Engineering specialist.

CHRISTINE MAINVILLE: And are you an engineer?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Okay. And could you -- I understand that STV had two main roles in Stage 1 of Ottawa's LRT project. Could you tell us if that's accurate to your understanding and whether you were involved in both aspects of that work?

GREG BARSTOW: I'm not sure what two roles you're speaking of.

CHRISTINE MAINVILLE: So it was involved in the design and engineering of the project and later -- support during construction in later phases.

GREG BARSTOW: I wouldn't say the design. I would say our role was to support the City in reviewing designs.

CHRISTINE MAINVILLE: Okay. So was that its main role on the project?

GREG BARSTOW: That was my main role on the project.

CHRISTINE MAINVILLE: Okay. So why don't you tell us about your personal involvement, the time frame for that and what it revolved around.

GREG BARSTOW: Started in early 2011. We were tasked to come up with a concept report for the vehicle. Then we -- once the car builder was selected, we reviewed -- received documentation, design packages and reviewed them, made comments.

My role started to phase down when the design was complete and the first vehicle was on-site, and I had limited involvement after that, which was, say, 2017, 2018.

CHRISTINE MAINVILLE: Okay. So if we

go back to 2011, what was the concept report for the vehicle that you would have worked on?

GREG BARSTOW: The concept report would be a precursor to the specification. The concept report puts together basically, like, a list of requirements for the vehicle. This list would be based on needs from the customer, Canadian standards for design, industry norms, et cetera.

CHRISTINE MAINVILLE: Okay. And I take it you have some level of expertise in rolling stock?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And what about light rail vehicles in particular?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And were you working mostly by yourself on that, or was there a team of you?

GREG BARSTOW: There was -- I had a partner, Peter Tabolt, and we worked for Scott Krieger. There was others on-site in Canada, Keith MacKenzie.

CHRISTINE MAINVILLE: All from STV?

GREG BARSTOW: All from STV.

CHRISTINE MAINVILLE: I take it STV was

part of a consortium at that point in time, Capital Transit Partners?

GREG BARSTOW: Correct.

CHRISTINE MAINVILLE: But STV was primarily responsible for the rolling stock?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And did you start out from anything in particular? Did you have a starting point when you were asked to devise this concept report for the rolling stock?

GREG BARSTOW: Well, we had the basic understanding of the framework of the project, type of vehicle that was desired.

CHRISTINE MAINVILLE: And what was that?

GREG BARSTOW: Light rail.

CHRISTINE MAINVILLE: So did your team have any involvement in the decision to -- or the decision or considerations that went into selecting light rail as the mode of transit?

GREG BARSTOW: Not to my knowledge.

CHRISTINE MAINVILLE: So that was pretty much determined by the time you came on board?

GREG BARSTOW: When I came on board,

that was determined.

CHRISTINE MAINVILLE: Okay. And what other understandings did you have about the client's needs and basic requirements?

GREG BARSTOW: The main goal was to ensure that a service-proven vehicle was provided. The intent was not to have to redesign a new vehicle, and the vehicle had to be proven in the environment to which it would be delivered, climatically.

CHRISTINE MAINVILLE: And what was your view as to whether that could be achieved?

GREG BARSTOW: I was sure it could be achieved.

CHRISTINE MAINVILLE: Okay. Is it your view that it was, that the vehicle selected was service proven in this respect?

GREG BARSTOW: I don't believe that it had been.

CHRISTINE MAINVILLE: Sorry?

GREG BARSTOW: I don't believe that it had been service proven in the environment.

CHRISTINE MAINVILLE: And so do you have any knowledge of how it came to be selected?

GREG BARSTOW: Three companies were

selected, consortiums who moved forward with the project. I believe there was more originally, but three were selected to move forward with their proposals.

CHRISTINE MAINVILLE: And were these -- were they attached to a particular vehicle provider at that point?

GREG BARSTOW: I believe two had selected a vehicle. Possibly one had not, to the best of my recollection.

CHRISTINE MAINVILLE: Did you have any input into the proposals that were put forward in respect of the rolling stock?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Could you tell us about your input on these -- in respect of these three different consortiums?

GREG BARSTOW: I can't recall the acronyms for each, but two of the -- there was a Bombardier FLEXITY car that we felt wasn't proven in the environment, service proven with regards to -- part of the service proven in the environment requires a vehicle that has been proven to the performance that the vehicle would require.

This would -- was a high-duty type

system for light rail between acceleration rates, deceleration rates, top speed of 100 kilometres per hour.

So the FLEXITY we didn't see having that level of performance. There was a company named CAF out of Spain. We didn't -- to the best of my recollection, we didn't see the car proposed as service proven.

For the Alstom vehicle, they had proposed a type of vehicle called the Citadis Dualis. This car was proven in Nordic countries. It was service proven in that it, you know, was a design -- you know, it's a design currently in use, and we felt that it met the requirements, the Citadis Dualis.

CHRISTINE MAINVILLE: Okay. And I take it that that -- well, first of all, was it the Citadis Dualis that was put forward and not the Citadis Spirit?

GREG BARSTOW: The Citadis Dualis was put forward to meet the requirements of service proven in the climatic environment and the duty.

CHRISTINE MAINVILLE: And so let's just pause for a second. There were requirements in the RFP related to service -- the service-proven aspect

of the rolling stock?

GREG BARSTOW: I believe so for -- absolutely. I mean, I would have to go back and review the PA, but those were the requirements that we had on the evaluation, was to ensure those aspects were met.

CHRISTINE MAINVILLE: And can you just articulate what that would have been to the best of your recollection, the -- how that service -- what was the service-proven requirement or how it would have been articulated?

GREG BARSTOW: I don't recall the details. Probably a number of cars, probably age of cars, but I don't recall the details.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: Yeah, also, you know, we'd look at the -- the top speed is pretty extreme for light rail, so we'd ensure that was in place.

The acceleration and braking are also high end for light rails, so we would look closely at those. And the environment of Ottawa is not too common, so we would look closely at that.

As far as the design being service proven, as I say, there would be a number of factors that go into that.

CHRISTINE MAINVILLE: Such as?

GREG BARSTOW: As I said, I don't recall the details, but it would probably have to do with number of cars in service, age of cars, all in regards to the application that we have, so the top speed and the environment, the cold weather environment with top speed and deceleration, acceleration.

CHRISTINE MAINVILLE: Is there any standard definition for what is service proven, or you had to devise your own parameters?

GREG BARSTOW: As I said, I don't recall the details. I'm trying to give you some examples of things that would factor in.

CHRISTINE MAINVILLE: Yeah, but I'm wondering whether you were -- you recall being able to rely on some standard definition or whether you had to come up with criteria to be met.

GREG BARSTOW: For service proven?

CHRISTINE MAINVILLE: Yeah.

GREG BARSTOW: I believe you would find that in the PA, but I can't be sure.

CHRISTINE MAINVILLE: I just meant beyond this particular project and project agreement in terms of sources of information that

you would look to.

GREG BARSTOW: Oh, well, normally -- let's say this was part of the requirements for a bid. It would be stipulated, and generally speaking, we would look for the number of cars in service, the age. We'd want to have contact information from that authority. Essentially that would be it, yeah.

CHRISTINE MAINVILLE: You mean you would go and consult the other transit authority that would have these trains in service?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Do you recall doing this in this case for Alstom?

GREG BARSTOW: No, I do not.

CHRISTINE MAINVILLE: Do you know if someone else would, or would that have fallen on STV or yourself to do that?

GREG BARSTOW: I don't recall.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: Would it have fallen -- if we were tasked with that, we would have done it. It could be that others in the group were tasked with it. I know I wasn't tasked with it.

CHRISTINE MAINVILLE: Okay. And you

said the top speed in this case was pretty extreme for light rail. Was that something that Alstom met in terms of already having a light rail vehicle with the -- that achieved that same top speed?

GREG BARSTOW: I believe so. I can't be sure of what details they had.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: I know that it was proven in the Nordic countries. I know that it had the acceleration and deceleration. I don't recall the top speed.

CHRISTINE MAINVILLE: Okay. And does this -- did these particular requirements, the -- if I could put it this way, kind of test the limits of light rail, were those factors that created risk, any particular kind of risk in this project?

GREG BARSTOW: We know -- you know, I worked at Siemens for ten years and primarily light rail. These cars were 70 percent low-floor vehicles that could do and did do the requirements of top speed acceleration, deceleration. So I knew firsthand that this was achievable.

CHRISTINE MAINVILLE: So you said you knew it could be achieved. I take it you knew Siemens could achieve it?

GREG BARSTOW: I knew Siemens could achieve it.

CHRISTINE MAINVILLE: Okay. And were they not part of the proponents put forward?

GREG BARSTOW: I believe they were part of one of the groups. Maybe that group that did not originally select a vehicle came in later with the Siemens vehicle, to the best of my recollection.

CHRISTINE MAINVILLE: Okay. You said that ultimately you don't believe the vehicle that was selected had been service proven in the environment. I'm not putting words in your mouth.

So can you walk us through that disconnect between the Citadis Dualis meeting the PA requirements but you having this view as to ultimately the vehicle not being service proven?

GREG BARSTOW: The vehicle eventually put forth was called the Citadis, not the Dualis but the Citadis, later named Citadis Spirit.

When we checked on the Citadis -- this particular vehicle, we found that it had been operated for a minimal amount of time in Paris and not at the speeds of the duty required, so we were in a position where those requirements were not

being met.

CHRISTINE MAINVILLE: And what was -- when was this -- when did this arise in terms of the time frame on this project?

GREG BARSTOW: It's difficult for me to remember this. I remember the evaluation with the Dualis. At some point in the future, we discovered that what was actually being presented bit by bit was not the Dualis. We found out it was a straight Citadis.

I have to retract something. I think I was confusing contracts. This Paris vehicle -- is it possible to retract?

CHRISTINE MAINVILLE: Yes, please correct anything you need to correct.

GREG BARSTOW: This Paris vehicle was a -- when I worked at Siemens, there was a vehicle that Siemens had built that worked in Paris, and there was just a few.

That's not the experience of Citadis. I mean, Citadis -- there is a lot of the Citadis vehicle throughout Europe. I don't know that there's any in the climate. I don't know that there's any that meet the top speeds, the acceleration and deceleration, but there's a lot of

them out there. That's for sure.

Okay, I was confused with another vehicle that was similar design that was a Siemens vehicle. Okay, so Citadis is proven as far as number of cars, but that would be it.

CHRISTINE MAINVILLE: So I -- but I think you said that the Citadis Spirit had been in operation?

GREG BARSTOW: I don't believe it was called the Citadis Spirit. I believe they named that for the North American market.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: That type of vehicle, Citadis, I know that that design is well proven itself. I don't know that it's proven in the environment or the duty.

CHRISTINE MAINVILLE: And what, sorry?

GREG BARSTOW: The duty, the acceleration, the top speed, the deceleration rates. That's what I'm referring to as "the duty."

CHRISTINE MAINVILLE: Okay. So just to be clear, the Citadis Spirit was new for all intents and purposes of the project?

GREG BARSTOW: Well, the Citadis Spirit was based on the Citadis that are used in Europe.

CHRISTINE MAINVILLE: Right. And is there -- did the Citadis Dualis meet all of the requirements that the City had?

GREG BARSTOW: I believe so.

CHRISTINE MAINVILLE: Do you know why the Dualis wasn't used as the model?

GREG BARSTOW: Can you repeat?

CHRISTINE MAINVILLE: Do you know why the Citadis Dualis wasn't used as the model ultimately?

GREG BARSTOW: I think it was used as a proposal because it met the requirements. It had that Nordic experience, which was key to the City.

CHRISTINE MAINVILLE: But do you know why they didn't follow through and simply use it?

GREG BARSTOW: I have no idea.

CHRISTINE MAINVILLE: Do you understand what modifications were made to that model, so effectively the main differences between the Citadis Dualis and the Citadis Spirit?

GREG BARSTOW: Well, as we reviewed the design and we looked at, you know, where it was running and what -- under what conditions, we saw that it was a stretch, in particular of the speed, the deceleration, the acceleration.

As far as the climate goes, we were told that the car builder would make changes to make it suitable for the environment, but we certainly had our doubts because this is more of a tram than an LRV.

CHRISTINE MAINVILLE: Okay. What do you mean by that?

GREG BARSTOW: A tram, you know, if you've been to Europe, these cars that run on the surface level. They tend to run fairly slowly. They don't accelerate, decelerate like a metro, for instance, and the LRV that was required would be more similar to a metro-type speeds, acceleration, deceleration.

CHRISTINE MAINVILLE: So when you say this was more a tram, do you mean the Citadis Dualis that was running in the Nordic countries?

GREG BARSTOW: No. The Citadis -- I don't know about the terms, what they called them, but the standard Citadis that had a lot of experience in Europe, we believe that it was more of a tram style than an LRV.

CHRISTINE MAINVILLE: And does that include the Citadis Dualis?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: Okay. So when you say it was a stretch, I'm just trying to understand what part and which train.

GREG BARSTOW: A stretch?

CHRISTINE MAINVILLE: Yeah, you said you thought it was a stretch to be running at this speed.

GREG BARSTOW: The Citadis that eventually was proposed, we were concerned to what level the Citadis could be taxed to meet the requirements of the City.

CHRISTINE MAINVILLE: Okay. And when you say the one that was proposed, do you mean the original one, the Dualis, or the ultimate one, the Spirit?

GREG BARSTOW: Yeah, this -- the Dualis was proposed. The Spirit was put forth. And how that came about, I don't know.

CHRISTINE MAINVILLE: Okay. Do you know when it came about?

GREG BARSTOW: Whenever the decision was made to go with RTG was when it was proposed as the Dualis. I don't know when we got wind of the fact that it was just the standard Citadis. I can't tell you when that was.

CHRISTINE MAINVILLE: But at some point, it was clear to STV and would you say the City that this was a different sub-model, if you will?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And the differences were understood?

GREG BARSTOW: It was clear that this 100 percent low-floor car was being proposed -- being delivered, and we were immediately concerned, yes.

CHRISTINE MAINVILLE: And when you say "we," who is that?

GREG BARSTOW: Everybody that worked with me in my company. We certainly passed this information on to our colleagues or the client in Ottawa.

CHRISTINE MAINVILLE: Do you know who in particular was your main counterpart at the City?

GREG BARSTOW: My counterpart at that time was Gareth Jones. I think there was a Craig. Craig -- was it Greg? I can't remember.

CHRISTINE MAINVILLE: Is it Gary Craig?

GREG BARSTOW: Gary Craig. Who else?

I can't recall the other names, but there was a couple other people that we corresponded with.

CHRISTINE MAINVILLE: Would you have corresponded with Steve Cripps?

GREG BARSTOW: Not so much. I believe Steve was more on the -- Steve wasn't really on the technical side. I believe Steve was more finance or something.

CHRISTINE MAINVILLE: Okay. And what were your -- what was the nature of your concerns?

GREG BARSTOW: Well, this 100 percent low-floor car has -- the fully low-floor car has less space to install the components required. These cars have a right-angle gearbox. The motor is on the outside, and the power is passed through a right-angle gearbox to the axle, whereas these partial low-floor cars, there's a much larger motor that's mounted directly near the axle.

Same thing with the brakes. The brakes -- there was no space. The wheels are a lot smaller on this car. There's no space -- there isn't a lot of space for braking or brake disks.

This is the problem with 100 percent low floor. There's really no space to install everything you need. The term "LRV on steroids"

was used.

CHRISTINE MAINVILLE: By that, do you mean that it pushed the limits of what an LRV can do?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Wasn't the 100 percent low floors a City requirement?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: What do you recall being the requirement in terms of low floor?

GREG BARSTOW: I don't believe that there was a low-floor requirement, but I do know that the concept report talked about 70 percent low floor.

CHRISTINE MAINVILLE: What referenced 70 percent, sorry?

GREG BARSTOW: The concept report.

CHRISTINE MAINVILLE: The concept report. Okay.

GREG BARSTOW: That concept report was later modified to include this 37-metre vehicle. I don't recall if the low floor -- I believe the low-floor requirement was opened up to allow the 100 percent. We were directed to modify the concept report to, shall we say, make this vehicle

acceptable.

CHRISTINE MAINVILLE: Okay. So do you mean after the change was made to the Citadis Spirit?

GREG BARSTOW: I mean before the spec was written, probably after or maybe during the evaluations. At some point, we were tasked, "Please open this concept report up to allow the base vehicle and the hundred -- the 37-metre vehicle, a 37-metre vehicle.

Maybe that was not specifically for the Citadis, but that was a change that took place early on where that standard 30 metre, 70 percent low floor was not going to be the only allowable-type vehicle that would be accepted or at least referenced in the concept report.

CHRISTINE MAINVILLE: And who gave that direction?

GREG BARSTOW: I knew you would ask. I don't know the process for which it went through. I know that I was given the task by Joe North, who was STV.

CHRISTINE MAINVILLE: Joe North you said?

GREG BARSTOW: Joe North, yes. I'm

not -- I'm not sure where he got this from or who directed it, but I remember him asking me to do it.

CHRISTINE MAINVILLE: And can you walk me through -- I take it the concept report would inform the RFP, and then the --

GREG BARSTOW: Yeah, the concept report, like I say, is a list of requirements. And the RFP, the PSOS they called it -- PSOS is operating specification. The specification, the vehicle, the PSOS, that was -- the starting point for that is the concept report.

CHRISTINE MAINVILLE: And so amending the concept report would have amended the requirements presumably?

GREG BARSTOW: Essentially.

CHRISTINE MAINVILLE: But are you saying by then the RFP period was over by the time the change was made?

GREG BARSTOW: I don't recall the timing.

CHRISTINE MAINVILLE: Maybe we could walk back a bit. Were you involved in the industry consultations that were intended to -- or that were a first step, as I understand it, to devising the requirements?

GREG BARSTOW: I was not involved in any industry consultation.

CHRISTINE MAINVILLE: Do you know of any taking place?

GREG BARSTOW: If so, it would have been before my time.

CHRISTINE MAINVILLE: Okay. And was there not a desire to have a low-floor vehicle because of the potential -- because of potential extension plans which would have the vehicle run effectively on the streets as opposed to on its own line?

GREG BARSTOW: I don't know the reasons behind the desire of the longer vehicle. If I recall, there was a belief that more -- maybe five 30-metre vehicles would have to be coupled, and RTG was proposing two of these 37-metre vehicles could meet the capacity requirements for less number of vehicles. This was something about it.

It was a sales -- it was part of the selling of this to the City, I guess. That's what I recall. That's -- it's just a fragment of the overall, but I recall seeing the design of the two car instead of the four, five car as being a factor.

CHRISTINE MAINVILLE: In their selection you mean?

GREG BARSTOW: In their selection, yeah, in accepting the -- well, that's what -- let me think. This is what wound up happening. Two-car consists would run instead of -- well, we expected to be four-car consists.

CHRISTINE MAINVILLE: Okay. So just going back to the original concept report, the -- I take it you believe the 70 percent low floor met the City's needs?

GREG BARSTOW: We felt with the requirement to go with an LRV, that we would put forth the vehicle that has met the duty, and that's what we -- that's the only thing that we put in it was the 70 percent low floor would -- we knew -- as I mentioned, we knew that at least these cars could have the space available for the equipment required to operate at those conditions.

CHRISTINE MAINVILLE: And 70 percent, does that allow the vehicle to interface with the city streets?

GREG BARSTOW: That design can interface with city streets, yes.

CHRISTINE MAINVILLE: Okay. Doesn't

need to be 100 percent low floor beyond the streets?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: Okay. What's the difference? Is it just the actual height between 70 and 100 percent?

GREG BARSTOW: Where the bogies are, that area would be high floor.

CHRISTINE MAINVILLE: I see.

GREG BARSTOW: So right around the bogies is where you have the motor and the brakes, and that area would be high floor to ensure that you had the space to put the required components.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: As I say, with 100 percent low floor, you have to move the motors on board to the side, and then there's a gear box which is just -- it's not the same level of performance. That's why you normally see them more of a tramway that slowly travels through the city. Normally on the surface level.

CHRISTINE MAINVILLE: Okay. So I take it 100 percent low floor is a more challenging endeavour?

GREG BARSTOW: It's more challenging to

use a 100 percent low floor in the City of Ottawa for sure.

CHRISTINE MAINVILLE: Why in particular in the City of Ottawa?

GREG BARSTOW: Because the City wanted 100 kilometres per hour. The City wanted braking rates, acceleration rates that we knew would be difficult for that style of vehicle to attain.

CHRISTINE MAINVILLE: Could the 100 percent low-floor requirement have been linked to greater accessibility?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: The floor height of the low-floor portion would be the same as the low floor, 100 percent low floor, and a design with respect to the platforms so that there would be no step.

CHRISTINE MAINVILLE: So you don't know where that requirement ultimately came from, the 100 percent low floor?

GREG BARSTOW: I don't know if that became a requirement or if that's just what was received. I know there was more talk about the length issue.

CHRISTINE MAINVILLE: Right. Yeah, so let's move on to that. So initially your concept report had four-car consists?

GREG BARSTOW: Mm-hm.

CHRISTINE MAINVILLE: And is that more common in the industry?

GREG BARSTOW: I would say not. In my experience, light rail usually run two-car consists. Go ahead.

CHRISTINE MAINVILLE: No, no, go ahead.

GREG BARSTOW: You know, the original plan was for, I believe, 150-metre platforms in Ottawa, reduced by this two-car consists down to 120 or maybe less, but to run four cars together is fairly rare.

CHRISTINE MAINVILLE: So is there a reason you had not provided for two-car consists at the time?

GREG BARSTOW: To Ottawa?

CHRISTINE MAINVILLE: Yes.

GREG BARSTOW: No, Ottawa had a certain ridership requirement, and there's no way two-car consists would meet those requirements for ridership.

CHRISTINE MAINVILLE: But isn't that

what was ultimately produced?

GREG BARSTOW: Well, these are -- I would have to double-check. Is it 47 metres? I'm calling it 37, but excuse me, they may be 47 metres long. Maybe there's a way -- well, I'd just like to couch my 37 number. They may be longer than that.

CHRISTINE MAINVILLE: Yeah, so ultimately the consists that are being used are quite long; right?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And so did you simply not envision that in the original concept report?

GREG BARSTOW: No, we never envisioned a two-car consist at all.

CHRISTINE MAINVILLE: Is that because they're not normally as lengthy as they are in this case?

GREG BARSTOW: You won't find the 30 -- the 70 percent low-floor car in that design really is the issue.

CHRISTINE MAINVILLE: Okay. So if I'm paraphrasing, you didn't think you could meet the service-proven requirement by providing for a

two-car consist going at the speed required by the City?

GREG BARSTOW: Well, in -- you know, in reviewing what's available in the industry, we weren't aware of any vehicle that length.

CHRISTINE MAINVILLE: Okay. And --

GREG BARSTOW: You really won't find that. You don't find that in a light rail vehicle.

CHRISTINE MAINVILLE: And indeed the ones Alstom ultimately produced, is that part of what was new on this project?

GREG BARSTOW: These cars wasn't (ph) quite new on the project.

CHRISTINE MAINVILLE: Sorry, these cars were quite new?

GREG BARSTOW: These cars are -- like I said, these cars are European-based. I don't know if the -- what was ultimately this four-car concept, four-body section vehicle. I don't know -- I don't know that a car of this length -- I'm not -- I'm not aware -- I don't know what's happening in Europe, if there's cars of this length.

I know they have longer cars with multiple body sections, multiple articulations that

snake through the city at slow speeds. This car seems longer than the ones that I would be familiar with, but it could be. I certainly have never seen that kind of a car in a more urban LRV environment with subway sections, et cetera.

CHRISTINE MAINVILLE: Okay. Were you involved in the design consultations that were had with some of the vehicle proponents or vehicle suppliers?

GREG BARSTOW: I was involved with the evaluations. I don't know that we had such consultation. We looked at what they were proposing and sort of gave it a thumbs up or a thumbs down.

CHRISTINE MAINVILLE: So who do you recall giving the thumbs up to during your evaluations in terms of rolling stock supplier?

GREG BARSTOW: Well, I gave the thumbs down to CAF, whoever proposed CAF. I gave the thumbs down to the FLEXITY. I mean, not just me on my own, but I mean in a meeting.

I'm thinking that one of the car builders hadn't selected a vehicle but was pushing forward a 30-metre, 70 percent low floor. You'd have to look at the proposals that they put forth.

I think -- we believe that they hadn't selected a vehicle, so maybe that was difficult, but I believe one of them was selecting a 70 percent low floor.

And the Citadis Dualis was not a thumbs down. I just don't recall giving a thumbs up, but I know I didn't kick it out. Those other cars I said no. This Dualis, I don't know if we said yes to or what, but I don't recall a thumbs-up-thumbs-down kind of a mentality.

CHRISTINE MAINVILLE: Did you understand when Dualis was presented that there would need to be changes to what was being used out there?

GREG BARSTOW: No. Dualis it can (AUDIO GLITCH) to low-floor car as well, proven in the environment. I wasn't aware of any issues the Dualis would have in particular because the Dualis was so well proven in the Nordic environments, more than one city. It seemed feasible.

CHRISTINE MAINVILLE: Did you ever have meetings with Alstom representatives directly?

GREG BARSTOW: At this time, no, not me. We would have evaluation meetings. It was kind of a limited role. We came in; we had meetings with these consortiums. Maybe there'd be

a representative from the car builder, but there was no consultation per se. This evaluation would have taken place, and then the City would have made the decision, and then the project starts.

CHRISTINE MAINVILLE: Okay. So you don't recall any consultations or meetings with CAF?

GREG BARSTOW: CAF, no. I mean, these meetings, they propose these vehicles, and they were clearly not meeting the service-proven requirements.

CHRISTINE MAINVILLE: Do you recall Alstom entering the picture after CAF was rejected?

GREG BARSTOW: Is that what happened? They got rid of CAF and took Alstom? That may be.

CHRISTINE MAINVILLE: Do you recall Alstom coming in fairly late in the day after RTG had been selected?

GREG BARSTOW: I don't recall the timing.

CHRISTINE MAINVILLE: Who would have been in charge of this for the City, these various discussions and decision-making?

GREG BARSTOW: John Jensen was one, Gareth Jones, Gary Craig. There's others.

CHRISTINE MAINVILLE: And you don't recall how late or early in the day the change from the Dualis to the Citadis occurred or --

GREG BARSTOW: I don't know. I really don't know that.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: When meetings started, we found out. And I don't know how long it was, but I remember being surprised that this car was 100 percent low floor because that's not what was proposed.

CHRISTINE MAINVILLE: And did you or STV express concern about whether that met the requirements of the PA?

GREG BARSTOW: Oh, we absolutely did. I know you're going to ask me who did I say it to, and I don't know. It was kind of a firestorm. You know, it seems to me that it was a big deal that involved everybody.

CHRISTINE MAINVILLE: And the City, there were a lot of -- there was a lot of activity?

GREG BARSTOW: I believe that it was a big deal.

CHRISTINE MAINVILLE: Okay. And do you have any insight into how the City moved forward

from that or what decisions were made?

GREG BARSTOW: Well, it was accepted. I think the belief was that it could be made to happen, so it was accepted, you know, against our recommendations. Just because, you know, has anyone ever seen a low-floor car with that design perform at these requirements?

CHRISTINE MAINVILLE: And, I mean, we've spoken about the low floors. Can you just -- I just want to make sure we exhaust your view on this.

What were the challenging aspects of the vehicle requirements -- or maybe I should phrase it differently -- of what was being produced ultimately by Alstom? What were the risk factors for you?

GREG BARSTOW: Well, as I said, the limited space available for the braking and propulsion, the motor, propulsion motor, the brakes, the limited availability of space is essentially really what it comes down to.

The wheels are very small on this car, not what you would -- not anything I was familiar with because this was my first 100 percent low-floor car. And the wheels are tiny, which, as

you know, isn't good for stability and, well, it's just a train that's more designed to go at slow speeds. I mean, I think -- I think that even Alstom would agree to that.

So when you have small wheels and limited room for a disk, you have difficulty in getting the braking rates because the disk can only be so large to sit underneath the low floor.

And the motor has to be, as I said, shifted to the side and out board and powered through a gearing mechanism that isn't the best for acceleration. So these are the factors that lead us to be worried about this design.

CHRISTINE MAINVILLE: When you say it's not good for stability, what do you mean by "stability"?

GREG BARSTOW: Well, standard wheels, a larger diameter have more of a self-steering capability. They have -- if you look at the particulars of the profile, there's a larger flange. There's a greater running tread width. The flange angle is different.

CHRISTINE MAINVILLE: What are the implications of that?

GREG BARSTOW: Well, I mean, the first

thing that comes to mind is -- you know, this is a question that I haven't really thought about. I -- I'm not -- I'm not suggesting that this is a probability of a derailment.

I -- you know, we would have to consult an expert on this wheel dynamics. I don't believe that the derailments were caused by the wheel diameter, but that wheel is about half the diameter of a standard railcar.

It's kind of a wheel that would go on a tram or a very low-duty type car. That's why it kind of looked like a tram. Tram -- you know a tram is a car that goes through the city at slow speeds. You see them in Europe. They usually don't go more than 10 or 15 miles an hour. That's what you're looking at.

CHRISTINE MAINVILLE: This change in these risks, did it impact the level of oversight of the rolling stock manufacturing that ensued?

GREG BARSTOW: Oversights? In what regard?

CHRISTINE MAINVILLE: Either by the City or STV in particular.

GREG BARSTOW: As far as I know, there wasn't any particular -- I don't know if you mean

QC on the shop floor. As far as the design goes, yes, I mean, every submittal of which there was hundreds were strongly reviewed and strongly disapproved.

CHRISTINE MAINVILLE: So is it Alstom's designs that were reviewed by STV?

GREG BARSTOW: Alstom's, yes.

CHRISTINE MAINVILLE: Okay. And how were they -- why were they disapproved of?

GREG BARSTOW: There's too many to list. You know, if I had the documentation, I could -- I could tell you that -- be more specific, but, you know, most aspects of the vehicle had issues. These were not all related to the duty. It had to do with the climatic adaptations for the City. But, again, it -- I would have to research the documents.

CHRISTINE MAINVILLE: Do you recall knowing whether Alstom would need to make adaptations to North American standards?

GREG BARSTOW: You know, they named this car the Citadis Spirit at some point throughout the process, and they started to talk about the North American-type vehicle would be the Spirit. Can you ask the question again?

CHRISTINE MAINVILLE: So did you know that at the outset when this -- for instance, when the Citadis Dualis was being presented, did you know it would need to be adapted to North American standards?

GREG BARSTOW: I knew that the Europeans would come in with their EN standards, European norms, and we always have a challenge trying to get the car builder to prove that the European norms meet the Canadian and American standards.

So, I mean, that's -- wouldn't be the first car that had these issues, but there would be some work to adapt the standards, if I'm answering you correctly.

CHRISTINE MAINVILLE: So you're saying -- am I paraphrasing correctly when I say that it was known that the Citadis Dualis was based on European standards, and there would be some adaptation required and some challenges related to that?

GREG BARSTOW: Yes, there should have been. I believe that they were accepted by the City.

CHRISTINE MAINVILLE: Sorry, what was

accepted?

GREG BARSTOW: Accepted as is with the European norms.

CHRISTINE MAINVILLE: So that when -- when the decision was made to go with Alstom, it was decided that they could use European standards or --

GREG BARSTOW: There was -- there was a lot of noncompliances that were accepted, okay, so rather than prove maybe the European -- this -- I guess I should back away because I don't really recall the details, but there was noncompliances that were accepted.

CHRISTINE MAINVILLE: I see. Noncompliances to the project agreement that were accepted by the City?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: So just to be clear, am I right that the vehicle requirements called for U.S. standards being --

GREG BARSTOW: There was a combination of U.S. and Canadian standards.

CHRISTINE MAINVILLE: Okay. And was there -- I may be confusing two different things. If you could clarify what needed to meet U.S. and

Canadian standards and whether that was a necessary part of having this project in Ottawa or whether some aspects of the European standards could have been used.

GREG BARSTOW: The European standards are relatively similar, I would say, and then there are differences.

CHRISTINE MAINVILLE: Which standards are you referencing?

GREG BARSTOW: Well, for instance, the car shell was to be made from ASTM, American Standard of Test and Measures. ASTM -- ah, shit. 558. There was -- I don't think the -- if I had the references -- I won't say B558.

It's a weathering steel that we had specified that would form a patina and not rust. So Alstom came up with a European standard for steel that didn't have the levels of copper, didn't have the weathering capabilities of the specified steel. And, yeah, that's what they used.

CHRISTINE MAINVILLE: Was it not the case that the steel that had been prescribed in the requirements was not available anymore?

GREG BARSTOW: No. It's a matter of -- I don't know why they refused to meet the spec, but

they did.

CHRISTINE MAINVILLE: Okay. Did -- let me ask you this: Were any of the requirements taken from the or informed by the earlier procurement that Ottawa had had that had seen Siemens be the vehicle supplier, which was ultimately a failed procurement?

GREG BARSTOW: I'm familiar with the failed procurement only in that it failed. I don't know any of the details of the PA. I wasn't involved at all.

CHRISTINE MAINVILLE: Were any of the requirements on this project informed by that earlier procurement?

GREG BARSTOW: Not that -- I'm not aware of that.

CHRISTINE MAINVILLE: Okay. Was it necessary for Alstom to -- was it necessary for the PA to provide for U.S. standards, or could a different set of standards have been used for this project?

GREG BARSTOW: You'd have to be more specific.

CHRISTINE MAINVILLE: Well, can you tell me about how these standards work and what

standards applied, what these standards are exactly?

GREG BARSTOW: Well, there's hundreds of standards that talk about everything from how the car steers and how much it -- how much it hunts back and forth on the rails. There's talk about -- I mean, you name it. Just how the glass is manufactured and what testing has to be done. Everything to do with the car and everything -- every test would be impacted by these standards.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: And it's not to say that they're completely different. The overall design standards were relatively similar. Also with the Canadian and American, they're very similar.

CHRISTINE MAINVILLE: And with this being a North American project, does that necessarily inform what standards have to apply, or do you have some measure of discretion?

GREG BARSTOW: Well, a normal procurement, we would require a North American -- our standards, North American requirements, European standards would not be so easily accepted. There would have to be a base justification made before any European standard would be accepted.

There would have to be a justification to prove the equivalence.

CHRISTINE MAINVILLE: So I guess what I'm trying to get at is was there some level of adaptation that Alstom needed to do that was a first for them based on what standards applied?

GREG BARSTOW: I don't recall any -- anything that they did that was a first for them. I think what they delivered is exactly what they would tend to deliver.

CHRISTINE MAINVILLE: What they what to deliver?

GREG BARSTOW: That they normally deliver. As an example, the steel. They normally use that steel, and they used that steel on this project.

CHRISTINE MAINVILLE: Didn't they have to --

GREG BARSTOW: Where it came to be something they'd have to reinvent or learn, they pushed back. They wanted to say that this is a design build maintain, so we do -- kind of do what we want to is kind of the mentality.

So there was multiple -- there was, you know, dozens and dozens of noncompliances to the

PA, the PSOS in particular for the vehicles where they just refused to comply.

We're allowed -- I don't know. All I know is that noncompliances just seemed to go away as issues or at least didn't impact anything.

CHRISTINE MAINVILLE: Didn't they have to devise new supply chains to meet the standards and perhaps the Canadian content requirements?

GREG BARSTOW: They had Canadian content requirements. I can't speak to whether or not that was met. I'm just -- I'm thinking. I don't know that they met the Canadian content requirement. Maybe the manufacturing, the shop there and the employees, but I don't know of anything else that met the Canadian content.

CHRISTINE MAINVILLE: Were you involved in -- previously involved in other P3 projects?

GREG BARSTOW: No, I have not.

CHRISTINE MAINVILLE: Did you understand the rolling stock requirements to be fairly prescriptive for a P3 project?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: Were they performance-based?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: You said STV strongly disapproved of the design submitted by Alstom. What was the response to STV's input?

GREG BARSTOW: Well, I suppose the comments would go to RTG. RTG would provide a reply. We would disapprove again. Eventually it would go away. I don't know what would happen. I would stop seeing those documents.

CHRISTINE MAINVILLE: What was the nature of your concerns? I know you said there were several items that you can't recall, but did it help you with perceived risks or challenges that it would create?

GREG BARSTOW: There was issues with maintainability, issues with performance, reliability, all aspects of the ability of the consortium to deliver on the requirements of the PA.

As you see today, the -- well, I mean, the availability of vehicles was never what it's supposed to be. Probably never has been or will be. These are all related to reliability, maintainability, et cetera.

So, yes, it does run the gamut, and these were all highlighted and disapproved for

these aspects.

CHRISTINE MAINVILLE: How would this input be provided? Is it documented somewhere?

GREG BARSTOW: Yes, the -- so the design package would come in with an Excel spreadsheet, and we would start to make our comments, and we'd go back, and they would reply. And this was the process.

CHRISTINE MAINVILLE: In writing you mean?

GREG BARSTOW: In writing, yeah.

CHRISTINE MAINVILLE: Michael, is this something that can be identified for us and produced if not already produced?

MICHAEL O'BRIEN: Yes, I believe that this set of documentation has all been produced, and what we will do is provide you with the document numbers. And we can of course, you know, see whether there's any other documents of this nature that should be produced, but it's my understanding that this is all previously produced.

CHRISTINE MAINVILLE: Thank you.

MICHAEL O'BRIEN: Christine, I'm just having a look at the time.

CHRISTINE MAINVILLE: Yeah, it might be

a good time for a break. Okay, let's go off record.

-- OFF THE RECORD DISCUSSION --

-- RECESSED AT 3:27 P.M. --

-- RESUMED AT 3:43 P.M. --

CHRISTINE MAINVILLE: Mr. Barstow, were you involved in the devising or reviewing the requirements for the signalling system?

GREG BARSTOW: No, I was not.

CHRISTINE MAINVILLE: Do you have any view as to the selection of Thales as signalling system provider to be integrated with Alstom's rolling stock, whether that created any particular risk?

GREG BARSTOW: No, I don't have any knowledge on that side of things.

CHRISTINE MAINVILLE: If Alstom could have provided the signalling system, would that be something that you would deem preferable or advisable to avoid -- to limit the number of interfaces?

GREG BARSTOW: I don't know.

CHRISTINE MAINVILLE: Do you know if -- let me rephrase. What information did you have about operations, planned operations and how the

operator intended to operate the train to inform the designs?

GREG BARSTOW: There was a couple guys that were involved at some time, Michael Morgan and Peter -- Mike Morgan's team I guess it was. At that time, he was in charge of the operations and very limited, but I think they had some input at times.

CHRISTINE MAINVILLE: Did you have a concept of operations early on in the process?

GREG BARSTOW: There was others like maybe Keith MacKenzie. There would be more of the specialists and operations interfaces.

CHRISTINE MAINVILLE: Is that something you would want to have to inform what's needed on the design front?

GREG BARSTOW: I mean, yes, some of their information would wind up in the concept report. Some of the requirements as a stakeholder they would review. Same with the PA, the spec itself, their input would be contained within the specification.

CHRISTINE MAINVILLE: Did you feel you would have wanted more information about that in the earlier stages?

GREG BARSTOW: Not particularly.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: I wanted more maintenance interfacing.

CHRISTINE MAINVILLE: In what respect?

GREG BARSTOW: Well, you know, the specification had been reduced in scope with a lot of reliability, maintainability aspects removed, and without these protections in the specification, I wanted the maintenance team to make comments to -- you know, to talk about what their role would be and what I saw as issues relating to maintenance, but they never had a role.

They never really replied. It's just RTM, I guess, is the group. They didn't seem to want to be involved. That's the aspect that I had issue with.

CHRISTINE MAINVILLE: At what stage of the project are you talking about, are you referencing?

GREG BARSTOW: My entire time there throughout the design.

CHRISTINE MAINVILLE: So you would have wanted more information about how maintenance intended to operate for design purposes?

GREG BARSTOW: Well, I wanted them to chime in on issues that I saw in maintenance, but I didn't have any power because those sections were moved from the specification.

CHRISTINE MAINVILLE: What issues did you see on maintenance early on in the project?

GREG BARSTOW: I mean, you name it. Removing, installing any component. Maintenance was not really considered, and it seemed like the mentality is it's not our problem because this is being done by Alstom, so don't worry about it. Same with reliability, don't worry about it. It's their problem.

CHRISTINE MAINVILLE: Who was conveying this?

GREG BARSTOW: IO did a lot of that.

CHRISTINE MAINVILLE: Sorry?

GREG BARSTOW: Infrastructure Ontario.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: Yeah, more so Infrastructure Ontario. They -- they reviewed our spec and removed a lot of these sections that the P3 was supposed to cover essentially. The DBM, the design build maintain, we shouldn't care about maintenance because it's not our purview.

So I got a lot of pushback from RTG and Alstom to even -- to even look at these things because it's protected by the PA, but I thought that in the long run, the City would get the black eye even if RTM has to pay the price.

CHRISTINE MAINVILLE: What kind of things did you think ought to have been included about maintenance in the PA that were not?

GREG BARSTOW: Well, in our normal projects, we have more like a 700-page spec, and we had about 50 pages for the vehicle. And so all aspects of mean time between failures, mean time to repair, these are requirements that are normally in the spec, and that would cover just about everything that you would have to maintain. So it's about reliability and availability.

CHRISTINE MAINVILLE: Did you think there ought to be -- well, what did you think about the incentivizations for maintenance to be performed properly as provided for in the PA?

GREG BARSTOW: Personally thought it was a disaster waiting to happen.

CHRISTINE MAINVILLE: Why is that?

GREG BARSTOW: Well, first of all, RTM never played a role. It didn't have any interest

in how the design was progressing with respect to maintenance. You know, IO didn't care about reliability because they felt that the incentivization would be in place to someone's in-force reliable vehicle. These kinds of aspects of the P3, a lot -- I think contributed to a lot of the problems.

CHRISTINE MAINVILLE: I take it you think the maintenance requirements or specifications need to be a bit more prescriptive?

GREG BARSTOW: I think if you leave it to the car builder, you're going to get the most cost-effective design that they can give you.

CHRISTINE MAINVILLE: Which may complicate maintenance?

GREG BARSTOW: Which complicates everything. Impacts reliability because as an example, the steel that they use, it will rust. The steel that we specified would not. This is -- you know, this is impacting the life of the vehicle.

To say that Alstom is incentivized to produce a good vehicle, just wasn't -- it's not borne out, in my opinion.

CHRISTINE MAINVILLE: So what have you

seen done? Is it greater incentivization in terms of penalties, or is it more about just prescribing certain base requirements?

GREG BARSTOW: I don't think the incentives really made a difference. I think it's more about enforcing the requirements that you have, not providing waivers and holding -- yeah, having a more prescriptive spec and requirements that are in force. I don't think the incentivization works or worked in this case.

CHRISTINE MAINVILLE: Where did -- did you see waivers being provided here where you didn't think they ought to be?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: In what regard?

GREG BARSTOW: I don't have the list in front of me, but, I mean, there was dozens of waivers, and I didn't agree with any of them.

CHRISTINE MAINVILLE: You're talking about maintenance specifically?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: You mean to the vehicle manufacturing?

GREG BARSTOW: Yeah, all aspects of the whole project. Waivers would be passed by me, and

I would say absolutely not, and then they would be approved. That's what I experienced.

There's a guy, I think his name is Grant. Somebody was there to sign off on all the waivers.

CHRISTINE MAINVILLE: For the City?

GREG BARSTOW: For the City.

CHRISTINE MAINVILLE: You don't recall his full name?

GREG BARSTOW: I don't. I think it was Grant, but I can't be 100 percent sure. But there was an individual in charge of signing the waivers, and they always got signed, as far as I could tell.

CHRISTINE MAINVILLE: Was this someone in the implementation office?

GREG BARSTOW: Yes. Again, I think the thinking and the logic behind it was falling back on these incentives. As an example, the steel, it would be up to RTM to touch up any chipped steel that -- chipped paint to prevent corrosion, but I just didn't think that was realistic. I'd rather have the steel that doesn't rust. So it was very frustrating at times.

CHRISTINE MAINVILLE: Was it understood on the City's end that there would be -- in light

of these waivers and decisions, there would be increased pressure, if you might say, on maintenance following revenue service?

GREG BARSTOW: Can you repeat it?

CHRISTINE MAINVILLE: Was -- from your perspective, did the City understand that given these waivers and decisions that were being made over the course of the build -- design and build, that there would be increased pressure on maintenance following revenue service?

GREG BARSTOW: I believe that that was clear, but once again, it was not so concerning because they have a maintenance contract.

CHRISTINE MAINVILLE: They're not responsible for it you mean?

GREG BARSTOW: Right.

CHRISTINE MAINVILLE: In terms of the number of trains that would be required for service to meet demand, what was your understanding or your input about what that looked like?

GREG BARSTOW: First I should say that 47 metres is the length.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: 37 was in the concept report. 47 is what we wound up with.

As far as the operations and passenger loading, you know, this was more Larry Gaul and Keith MacKenzie would be involved with those.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: And that would be -- possibly Gary Craig was involved with that. These were on a higher level.

CHRISTINE MAINVILLE: Were there other disagreements with Infrastructure Ontario or the City's other advisors that you're aware of?

GREG BARSTOW: I wasn't aware of any other advisors. I just experienced Infrastructure Ontario.

CHRISTINE MAINVILLE: Did they have any rail experience on their team?

GREG BARSTOW: I understand they were civil.

CHRISTINE MAINVILLE: And do you think the disagreements or the different perspectives stem from -- of course there's specialization in P3s, but from your perspective, was that informed by your experience with rail, that you thought these incentives may not be sufficient on the maintenance front?

GREG BARSTOW: Well, I know Alstom, and

I know how they like to keep costs down, and I just felt like this would be not in their -- in front of their view. The priority is to keep the costs down and worry about the maintenance costs later is the way I experienced it. They didn't seem too concerned.

CHRISTINE MAINVILLE: So it's not necessarily that the penalties or deductions were insufficient. It may just be that it's not what's going to do it ultimately?

GREG BARSTOW: You know, I felt like they were going to challenge -- try to challenge their way out of the penalties is what I was guessing.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: So they didn't seem to really care. It never really came up.

CHRISTINE MAINVILLE: Do you recall the trial running requirements in the project agreement?

GREG BARSTOW: Not so much in the project agreement. I mean, I knew they had certain mileage they wanted in trial running. I know the availability of cars was putting pressure with the opening day, and the requirements for trial running

were being taxed.

CHRISTINE MAINVILLE: Did you have any involvement initially in those requirements --

GREG BARSTOW: No.

CHRISTINE MAINVILLE: -- in devising them? No?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: Do you recall what the original intention was for trial running and what that would look like?

GREG BARSTOW: Well, trial running is what we call "burn-in" in the rail industry, and the intent is to ensure that any failures or some standard designs -- any of that would get burned out. You burn the car in, so you work out the bugs before you have passengers involved.

CHRISTINE MAINVILLE: Do you have any experience with that and how long that should normally go on for?

GREG BARSTOW: You know, it depends project to project, but it's usually -- I would -- I'm saying I -- I think it's usually 1,000 miles, 500 to 1,000 miles.

CHRISTINE MAINVILLE: What would that have represented in this case with the number of

trains you were supposed to be running?

GREG BARSTOW: Well, that's for each train you would -- before they enter service, they would run that number of miles.

CHRISTINE MAINVILLE: Over each train?

GREG BARSTOW: Yeah.

CHRISTINE MAINVILLE: Do you know what was done here and how that compares?

GREG BARSTOW: Well, what they call trial running, I think it's the same. It's when you're running throughout the alignment without passengers. And I don't know what they -- what their number was, but I'm sure that it was challenging because things were behind schedule, and cars needed to be made available.

CHRISTINE MAINVILLE: What was your involvement at that point in time? Were you still working on this project?

GREG BARSTOW: I was definitely phasing out at that point. My involvement would have been probably -- if it was eight hours a week, I'd be surprised.

CHRISTINE MAINVILLE: Okay. Was that just the natural phasing out of your work based on the time lines?

GREG BARSTOW: You know, my role was through the design phase, so when it comes into the operations, it -- it's not really my role anymore. This is Larry Gaul, I think was the guy.

CHRISTINE MAINVILLE: Okay. Were you involved in the independent assessment team?

GREG BARSTOW: Partially. Maybe less than half of the field trips. The assessment was really just assessing the construction side for the most part. It wasn't so much assessment of vehicles. So that's why my role fell away because we wanted to look at the alignment to where the -- just where the delays looked more extreme actually than the vehicles.

CHRISTINE MAINVILLE: To the main line?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And was that as a result of the sinkhole?

GREG BARSTOW: It probably was blamed on the sinkhole.

CHRISTINE MAINVILLE: What was your perspective on that?

GREG BARSTOW: Well, the sinkhole was used as an explanation for a long time.

CHRISTINE MAINVILLE: And did that not

seem reasonable to you?

GREG BARSTOW: You can only go to the well so many times.

CHRISTINE MAINVILLE: What do you think explained the delays to the main line being completed?

GREG BARSTOW: One I saw was limited workforce. You know, you come into a station, and you really don't see much being done. We wondered how in the hell were they going to finish on time.

CHRISTINE MAINVILLE: Were you involved in looking at the geotechnical risk?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: Were you involved in any of the testing and commissioning planning?

GREG BARSTOW: As far as testing, I was not involved with the actual testing, but sometimes -- I believe that I reviewed some of the test reports. And, yeah, I had one long list of issues with the test reports. It's typical -- just like the design, there was -- just about everything we looked at had issues.

CHRISTINE MAINVILLE: So you mean the results of some of the testing?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: What were the issues you would see?

GREG BARSTOW: It's hard to answer these questions because there's so many. I mean, I'd have to look at the document. You know, I mean, it's a long time ago, but it just never ceased to amaze me that there was always an open issue.

CHRISTINE MAINVILLE: Are you referencing the rolling stock or signalling system in particular or more broadly?

GREG BARSTOW: For me, it's always the rolling stock.

CHRISTINE MAINVILLE: Okay. Did you get any results or oversee any of the integration testing held?

GREG BARSTOW: I don't recall any integration testing. I don't recall.

CHRISTINE MAINVILLE: So the testing you would have been apprised of was more Alstom's testing?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Do you know if the issues you identified were resolved over time?

GREG BARSTOW: I don't know.

CHRISTINE MAINVILLE: Do you know what thought was given to systems integration earlier in the design and planning for the project?

GREG BARSTOW: I'm just thinking. It seemed like the ATC system, you know, would -- the Thales car-borne equipment seemed like an afterthought. You know, I don't think that the -- I don't think that that was handled so well, but yet the platform interface was well done, I thought. Not a lot on that front.

CHRISTINE MAINVILLE: When you say the ATC seemed like an afterthought, was that for OLRTC?

GREG BARSTOW: No. The integration between Thales and Alstom, I think -- I don't think it went very well. It seemed delayed.

CHRISTINE MAINVILLE: What was that -- what's your perspective based on?

GREG BARSTOW: I think you have two strong-headed teams, and you know how that works.

CHRISTINE MAINVILLE: Do you know if that ultimately had implications for the system?

GREG BARSTOW: There was a lot of finger pointing. There was a lot of issues, false warnings. You know, there's protection systems

into, you know -- I don't remember the acronym, but you know, intrusion detection system.

These warnings would indicate that somebody was in the right-of-way. These would go off and shut the car down, shut the whole train down all the time, and it was a long battle to figure out, you know, what's the problem. So this was causing the trains to be stopped in service.

Same thing with the emergency braking system. Thales had a whole host of triggers to trigger the emergency brakes, so the train was constantly being emergency braked, flattening the wheels, shutting the whole -- shutting the whole alignment down because of all these emergency brakes, which it didn't need to be that way.

But that was really sort of outside of my role. The integration, that Thales system, that's what was going on, but, I mean, I can't tell you a whole lot more.

CHRISTINE MAINVILLE: These issues such as the emergency braking issues, that's ultimately an integration problem, correct, between the two systems, the Thales and Alstom systems?

GREG BARSTOW: Yes. Thales -- you know, Thales is responsible to make sure that

emergencies don't happen, so in my opinion, they -- anything under the sun could trigger an emergency brake as a protection mechanism, but it became a situation where emergency brakes were occurring all the time, and that shuts the whole line down.

CHRISTINE MAINVILLE: Shuts the whole line down?

GREG BARSTOW: Yeah. Once the train is stopped, the CBTC system prevents the next car from moving close to that car, so the whole line gets backed up, so that was ugly.

CHRISTINE MAINVILLE: Was this resolved prior to RSA, to your knowledge?

GREG BARSTOW: I doubt it. Maybe. Like I say, I wasn't really involved, but it was a difficult situation.

CHRISTINE MAINVILLE: Did you at any point provide input or were asked to provide input about the amount of integration testing that should be done or the burn-in period that should be done with this particular train?

GREG BARSTOW: Yes, the burn-in, yes. Not the integration so much, but I know my burn-in number was cut. I remember that.

CHRISTINE MAINVILLE: It was cut you

said?

GREG BARSTOW: Cut down, yes.

CHRISTINE MAINVILLE: Do you recall approximately what your burn-in number would have been?

GREG BARSTOW: I would guess that it was 2,000 kilometres, and it became 500, but these are -- these are rough guesses.

CHRISTINE MAINVILLE: And would these have been reported -- this input, would that have been provided to the same people you mentioned earlier, Gary Craig and others, or by then was it someone else?

GREG BARSTOW: Well, these would have been in my spec, so this is before any design would go. And I don't recall how it was cut or who cut it, but I remember them thinking that it was excessive. And when I say "them," I mean -- I don't recall.

I think most of my feedback would come from Gareth Wood or -- mostly Gareth Wood because Gareth Jones was off the project. So he was my main interface. But, again, this was early on. This could have been IO. I can't say.

CHRISTINE MAINVILLE: So you're saying

your burn-in number was cut at the specification stage? It didn't make it into the specifications?

GREG BARSTOW: It didn't make it into the specification, as far as I recall.

CHRISTINE MAINVILLE: And Gareth Wood, did he have any particular rail experience? Do you know?

GREG BARSTOW: Yes, Gareth Wood had rail experience.

CHRISTINE MAINVILLE: Do you have any sense of why he thought that was excessive, the burn-in number you put forward?

GREG BARSTOW: Again, I cannot lay this on Gareth Wood. I -- my feeling is that, again, it was outside of our responsibility, so it was not something that we needed to worry about. It happened all the time. That wouldn't normally be a Gareth Wood comment. That would be from a higher level.

CHRISTINE MAINVILLE: And out of your scope, does this come back to this issue of not being too prescriptive and this being a P3 and therefore looking at broader performance measures? Is that where the disagreement was?

GREG BARSTOW: Yeah, I think the whole

nature of the P3 caused a lot of the normal concerns to wash away and not take them very seriously. And so normally, we would have, like I said, 700 pages to ensure that the vehicle is done right, and the number of waivers would be -- would have been a fraction of this.

When you force the car builder to do these things, you get a better result, and when you step away and leave it up to them, you get this result. That's my feeling.

CHRISTINE MAINVILLE: Do you understand that -- did you understand that IO's role was reduced over the course of the project?

GREG BARSTOW: I don't know. I only saw them when they were reviewing our spec.

CHRISTINE MAINVILLE: Do you know -- well, were you involved in the journey time requirements?

GREG BARSTOW: Journey time? I haven't heard that phrase.

CHRISTINE MAINVILLE: Okay. The --

GREG BARSTOW: Trip time.

CHRISTINE MAINVILLE: Trip time.

GREG BARSTOW: I mean, roughly I knew the trip-time requirements, the passenger-capacity

requirements, but these were not -- these were prescribed to me. I mean, these weren't developed on my side.

CHRISTINE MAINVILLE: Were they prescribed by the City?

GREG BARSTOW: I don't know where they came from. I know that the PA was very -- it seemed to me that the PA was more focused on trip time and passenger capacity.

These were the main, like, facets of what they needed, how many passengers and what the trip time was, the mean time between vehicles. You know, the "headway" they call it.

CHRISTINE MAINVILLE: Did those specifications cause any concern for you?

GREG BARSTOW: Well, yeah, they needed something like a three-minute headway to maintain the passenger -- to carry the passengers. And, you know, with a longer train, you carry more passengers. You have more time in between trains.

So this headway, because this train was on the lower side of capacity, was three minutes. And this just means that anything can, you know, ripple through the entire alignment.

If you have a one-minute delay, it

cascades, so I was worried definitely that it wouldn't be able to maintain a three-minute headway. And then you see these emergency brakes all the time, which, you know, takes five minutes to correct.

So I saw the whole alignment being bogged down, and a lot of this kind of relates back to that -- yeah, okay, it's a 47-metre train times two, but the original plan was 150-metre platforms, four or five. At one time it was five; maybe it became four of these standard 30-metre vehicles was the thinking early on. So now we have a 96-metre vehicle. You know, it just -- it requires more trains and less headway in between, which is difficult for a system anyway.

Where you have the end of the tracks, the way they were designed, there's no loop. The trains need to get backed up at the terminus because they're trying to swap ends and swap tracks. All that could have happened behind the station, which is a lot easier.

So the whole system just seemed congested. And, I mean, this isn't my role, but it's pretty obvious that it was going to be a challenge.

CHRISTINE MAINVILLE: When you say this wasn't your role, what were the limitations on your role or STV's role in this regard?

GREG BARSTOW: Again, I'm talking about the alignment layout. That's not my role. That would be the construction side. The passenger capacity and trip times which result in that certain headway, these are created by the City. I mean, you know, the City decides what the capacity needs to be, what it will be in the future. So these kind of don't fall under my role.

CHRISTINE MAINVILLE: Would you normally expect the travel time or the trip time to be dependent on weather conditions, inclement weather?

GREG BARSTOW: No.

CHRISTINE MAINVILLE: No?

GREG BARSTOW: No. The CBTC takes the speed and distance between the next train, and it's all automated. The only control the driver has is how long the doors are open.

I mean, the only caveat to that would be is if there was ice -- freezing rain on the rails. I know there's a lot of freezing rain there. This could have some impact.

CHRISTINE MAINVILLE: Okay. Do you recall being asked to opine on an initial proposal for meeting substantial completion by RTG?

GREG BARSTOW: No. This was outside of my time. These activities were going on after I was off the project essentially.

CHRISTINE MAINVILLE: Okay. Maybe we can bring up STV 313.

GREG BARSTOW: I don't know what that means.

CHRISTINE MAINVILLE: Sorry, we'll bring it up for you to look at to see if you recognize it.

GREG BARSTOW: Okay.

CHRISTINE MAINVILLE: Sorry, I guess 2 -- it might be 299. STV 299, it's the same thing. Now, I have a cover email that might give some context to what this is, but do you happen to recognize it?

GREG BARSTOW: Not really. I mean, I -- I'm not sure if this is me or not.

CHRISTINE MAINVILLE: Okay. So let's go back a step to STV 296. You'll see this is an email dated September 5, 2018. And you're not copied on it, but you'll see one of the attachments

says:

"RTG Nov 2nd RSA Proposal - Krieger-Barstow Comments."

GREG BARSTOW: Okay.

CHRISTINE MAINVILLE: And I don't know if you recall when the original May 2018 RSA date was missed. Eventually there was a subsequent target date that was in November 2018 --

GREG BARSTOW: Okay.

CHRISTINE MAINVILLE: -- to meet RSA.

So my understanding of this would be that you provided comments on the new RSA proposal, so the new proposal to meet RSA by November 2018 by RTG. Does that sound at all familiar?

GREG BARSTOW: Not really, but sometimes I may comment on things that I don't know that are going into the RSA. I'm not sure. Maybe you could show me what --

CHRISTINE MAINVILLE: Sure. So let me -- just to see if it refreshes your memory. So this is an email from Tom Prendergast, who's on the STV team; correct?

GREG BARSTOW: Tom was -- yeah, he was in charge of this aspect of the project. He came in later.

CHRISTINE MAINVILLE: Okay. And you see here he'll say:

> "Attached are marked up copies of the document you sent to the Independent Assessment Team for review and comment. In the comments document provided by Krieger and Barstow they have inserted recommended language that the IAT believes should be inserted into the slides as noted."

And I'll take you to a PowerPoint with slides that I believe is being referenced here to see if that rings a bell. But then a bit further down he says:

> "Lastly, attached are two documents summarizing the outstanding critical vehicle issues related to the Alstom fleet along with examples of standard vehicle acceptance criteria/practices used by agencies to ensure the vehicles are ready to be used in revenue service.

The first of these documents

clearly illustrates that there are a number of outstanding vehicle issues that need resolution, some of which need to be completed prior to cars being placed in service.

The second document, while not necessarily being part of the PA, and therefore not enforceable per se, helps to illustrate the risks associated with vehicles having poor or unacceptable reliability issues, and why the need for a sufficient fleet size (minimum service requirement plus unscheduled/scheduled maintenance spares) cannot be compromised without assuming unacceptable risks in delivering service."

So in terms of his description of those two documents, one of them is the one I pulled up earlier. Does that refresh your memory at all as to whether you had any involvement in one of the two documents he describes?

GREG BARSTOW: Well, I could say with respect to these RSA dates and this overall

language, I'm not familiar with this, but when you describe the attached critical items list, then some of them I may.

CHRISTINE MAINVILLE: Okay. I'll go back to the other document, but let's file this one for identification purposes, STV 296, so as the first exhibit.

And so maybe we'll go to -- back to 299, STV 299, which is the Critical Ottawa Vehicle Issues. And so do you think it's possible you wrote this or had input into this document?

GREG BARSTOW: I did not write this, but I would have to review it to see if I recognize any of the language, but this is not my document.

CHRISTINE MAINVILLE: Okay. Yeah, please take a couple minutes to review it.

GREG BARSTOW: This looks like Scott.

CHRISTINE MAINVILLE: Scott Krieger?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: I mean, some of the meat and potatoes of this would have come from me probably, any kind of reference listing of issues could be me, but not letter per se.

CHRISTINE MAINVILLE: Okay. If we

could go down to Completion of Tests, the third point there:

"It is unknown at this time if RTG has written any procedures for vehicle integration at this time."

Let me just pause. What would be the procedures for vehicle integration?

GREG BARSTOW: Vehicle integration is basically, yeah, the vehicle and all of its interfaces with main line, stations, integration with the signalling system, you know, the maintenance facility.

CHRISTINE MAINVILLE: There would be written procedures to address these various interfaces?

GREG BARSTOW: Yeah, yeah, the vehicle would be fully tested to make sure it's interfaced with all of its interfaces, you know, to verify that it's fit for service on the alignment.

CHRISTINE MAINVILLE: Do you know if this ultimately was done, that -- whether RTG had written procedures to address these integration -- these integrated components?

GREG BARSTOW: I don't know. I did not see those if there were any.

CHRISTINE MAINVILLE: And then --

GREG BARSTOW: You know, I should say I -- this kind of is an interface between RTG and Alstom, and these are areas of integration with respect to their own team where there seemed to be a lot of falling down.

I don't know. RTG would try to get Alstom to do things, and Alstom wouldn't do them. And this is kind of an interface in itself, and, yes, they had difficulties in those areas.

CHRISTINE MAINVILLE: If we go down to Vehicle Count on Opening Day and the third bullet there, it states:

> "Early life failures of components is always an issue on new vehicle design."

First of all, do you agree with that statement?

GREG BARSTOW: Yes. That's the point for the burn-in.

CHRISTINE MAINVILLE: Yeah. And it says:

> "It appears that RTG has reduced the time for burn-in and trial running with each new schedule

submitted. The risk associated with an unproven vehicle/infrastructure is very high."

GREG BARSTOW: Mm-hm.

CHRISTINE MAINVILLE: You agree with that as well?

GREG BARSTOW: Yeah. Yes.

CHRISTINE MAINVILLE: And so I think as we've discussed, you at this point in time or STV did not see the Citadis Spirit as a proven vehicle; correct?

GREG BARSTOW: We saw the Citadis as proven in the tram environment, is what I was saying. Not proven in the ways of the PA with regard to the duty cycle and the climatic, so not service proven for this project, no.

CHRISTINE MAINVILLE: And so given that this was effectively a new interface with a new infrastructure, it was STV's view that you needed sufficient burn-in or trial running time, that that was particularly critical in these circumstances; is that fair to say?

GREG BARSTOW: Well, it's always important, but the fact that it's a new signalling system and it's being taxed in a way that it's not

been taxed and the weather, all of these complicate things. And, yeah, the more burn-in you have, the more likely you are to wind up with a reliable revenue service.

CHRISTINE MAINVILLE: And I take it this was conveyed to the City?

GREG BARSTOW: Well, this is a letter to Manconi; right?

CHRISTINE MAINVILLE: Yeah, cover email, yes, amongst others.

If you look at the last page, Additional Open Issues, which is a list of open items. Now, this is in, sorry, September 2018. Do you happen to know whether or how these items were resolved?

GREG BARSTOW: No, not at all.

CHRISTINE MAINVILLE: Okay. We'll file this as Exhibit 2 -- or actually, I don't think we need to actually formally file the two documents as exhibits. They'll be identified by document number. My apologies for the confusion.

So I just want to take you to the PowerPoint that's referenced in the cover email. It's STV 297. Do you recall commenting on this PowerPoint? Sorry, can you go to the first slide?

Yes.

GREG BARSTOW: I don't believe so. Again, my role was limited at this time.

CHRISTINE MAINVILLE: Yes, but if it was titled "Krieger-Barstow Comments," is it possible you did and you simply don't recall?

GREG BARSTOW: Well, I can't tell anything from the first page.

CHRISTINE MAINVILLE: No. Let's just see if you recognize or if it refreshes your memory, Slide 10. So this talks about vehicle testing, and the comment is:

> "Traditionally, months of extensive testing in real operating condition would be carried out to identify latent design issues. Alstom claimed they would like to see 3000-5000 km. This will not be possible. As such, latent design issues may be identified after start of service, which could affect the ability to run the vehicles."

Do you have any recollection of this input?

GREG BARSTOW: No, I really don't. I

would imagine this is Scott. This looks like Scott. You know, we may have talked about it. You remember those burn-in numbers I was talking about?

CHRISTINE MAINVILLE: Yes.

GREG BARSTOW: So that number there is already the reduced number, 500 to 1,000. So maybe we talked about it, but I see the document.

CHRISTINE MAINVILLE: Okay. And you're referencing the second paragraph:

"Additionally, each vehicle would have been required to operate failure free (burn in) for 500-1000 km to identify infant mortality issues."

So you would --

GREG BARSTOW: That would mean if the -- if there was a failure, you start back at zero.

CHRISTINE MAINVILLE: Sorry, repeat that.

GREG BARSTOW: If you have a failure in that time, you reset the clock, and you start at kilometre 1.

CHRISTINE MAINVILLE: Right.

GREG BARSTOW: The point is this could

be much longer.

CHRISTINE MAINVILLE: Okay.

"These issues, combined with a decrease in the starting day fleet count (e.g. no spare vehicles) will make it very difficult to maintain the required level of service."

That's the final comment on this page. So you agree with these statements?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: And I take it you weren't there ultimately to know how much was done?

GREG BARSTOW: No, I really wasn't. I don't know what they finally agreed to. I know they were low on cars for a long time. I know they wanted to try to use some Stage 2 cars to increase their car count. That's about all I know in this stage.

CHRISTINE MAINVILLE: And I just want to see if you agree with this statement at Slide 12. You're indicating:

"They" -- I think in reference to OLRTC -- "are proposing to run trial running with some single cars, which is not acceptable on multiple

technical customer and PA fronts."

So I take it running single cars during trial running was not -- did not meet the PA requirement; is that your recollection?

GREG BARSTOW: I don't recall what the trial running requirements were, but it's not surprising that this would be stated.

CHRISTINE MAINVILLE: Because during trial running, you would want to recreate what service will be, which was supposed to be double cars; correct?

GREG BARSTOW: Yeah, and there's aspects of double car running that need to be taxed and trialed, you know, all the connections between the cars. You know, your acceleration, your braking, your door openings, and all of this interface needs to be tested on all cars.

CHRISTINE MAINVILLE: And similarly, if we go to Slide 13, that would be the case for pretrial running as well? You'll see bullet 3 -- or point 3 says:

> "Undertaking pre-trial running with single car vehicles is a major deviation from the PA and does not yield true operating environment

issues."

GREG BARSTOW: Same thing, yes.

CHRISTINE MAINVILLE: And why would you also want to replicate the double-car environment for pretrial running?

GREG BARSTOW: Well, I don't know how they break down the trial running requirements. Of course, the more time that you can run it, as you said, as a willing service, the more likely you are to find the problems.

CHRISTINE MAINVILLE: What was pretrial running intended for? Do you recall?

GREG BARSTOW: I don't -- you know, I mean, trial running, I believe, was a PA requirement, and pretrial running -- I'm guessing. I would imagine that it was -- I don't know. I don't know the basis for pretrial running. My guess is that that would not be part of the PA.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: Maybe it is. I'm not sure.

CHRISTINE MAINVILLE: Was Mr. Krieger on the project longer than you were in terms of being more fully involved?

GREG BARSTOW: Krieger was involved up

until -- I don't know when the start date was, but he was on for maybe six months, and then me for eight years, and then him for, I don't know, three, four years.

CHRISTINE MAINVILLE: Sorry, did he stay on after you started phasing out?

GREG BARSTOW: Yeah. This time frame here you're looking at is when he was active and I was not.

CHRISTINE MAINVILLE: Okay. Okay. Great. So we'll leave some of these questions to him. We can bring this down.

GREG BARSTOW: And Larry Gaul was the operations guy, I believe, so if you can get him, he can probably help with the end-term stuff.

And there was a Ron Pilkington. The name might be off. Ron P. was involved at that time too.

CHRISTINE MAINVILLE: What would you say are the risks associated with vehicles having poor reliability?

GREG BARSTOW: Well, the main -- the main thing is availability. You know, you don't have the shop space to correct these cars. You don't have the number of cars out in service.

That's one aspect.

The other one is failures on the main line that cascade throughout your service and delay everything. Spare parts can be problems on some contracts. I'm not familiar with these design, build, maintain contracts. They're becoming more common, but I'm not so familiar with passing the maintenance on to the car builder. It's becoming more common. I don't know how well that works. But the main thing is availability of cars.

CHRISTINE MAINVILLE: It will impact the passenger experience?

GREG BARSTOW: Yes. It will be a longer wait time. There could be stops on the line. You could have to get out and take shuttle buses. You know, it can be, yeah, problematic.

CHRISTINE MAINVILLE: How concerned did you understand the City to be about these reliability or performance issues?

GREG BARSTOW: I have a hard time knowing what they felt. You know that I did not espouse the incentivization program, but, you know, I guess in a way they felt that that was the best way to prioritize these things, but to me, it didn't work well.

CHRISTINE MAINVILLE: Because ultimately, it's fair to say they generally sided with IO on the approach to take to the requirements when there was a disagreement with -- between STV and IO?

GREG BARSTOW: If you're going back to the original spec where IO was involved, I can't recall the City, RIO being -- actively pushing IO. It felt like IO came down and they are -- well, you know, acted like the ultimate customer in a way, and they came in and they dictated what they wanted to see, and we did it. And I don't know that RIO was or the City -- I don't know how much they were buying into it. It really seemed like IO was running the show.

So I wouldn't suggest that the City was pro or con. It just seemed like IO had some power. But, yeah, we had reliability information. We had maintainability. We had all these requirements in the original spec that went away because we don't care.

CHRISTINE MAINVILLE: Would you have had an original spec on the AVKR average that would need to be met during trial running?

GREG BARSTOW: I don't know what AVKR

is.

CHRISTINE MAINVILLE: The -- your indulgence.

GREG BARSTOW: It must be a Canadian term. Average kilometres.

CHRISTINE MAINVILLE: It's the average kilometres run basically -- aggregate vehicle kilometre availability ratios.

GREG BARSTOW: I'm not familiar with that or anything related to it.

CHRISTINE MAINVILLE: Okay.

GREG BARSTOW: I mean, we have mean time between failure, MTBR numbers that we've prescribed to our system.

CHRISTINE MAINVILLE: It's also characterized as availability performance. And I think you reference what should be meant in terms of vehicle availability which would be achieved before going into service, would you not?

GREG BARSTOW: I believe that would come from staff or Larry Gaul or both.

CHRISTINE MAINVILLE: Let me ask you this: Would you expect -- before going into service, would you expect the trains -- the vehicle availability to be at least as good as what will be

required during revenue -- during service operations to not incur any penalties?

GREG BARSTOW: Oh, yeah, I mean, your availability numbers that you prescribe, you need at least that many in the beginning because you're more likely to have issues. So going into service with a reduced car count is doubly damaging. Number one, you haven't done the trial running, and number two, you -- so you're going to expect more failures.

The fact that they were going into service with a reduced number of cars, I mean, it showed -- it was clear to the City that the system wasn't up to par.

And you've got to remember that sinkhole happened, like, seven years before this is going on. So I can just see them blaming the sinkhole.

CHRISTINE MAINVILLE: Well, 2016, was it not?

GREG BARSTOW: Oh, I don't know. Was it?

CHRISTINE MAINVILLE: And this was in 2019 ultimately that they went into service.

GREG BARSTOW: Oh, I thought it was

earlier.

CHRISTINE MAINVILLE: Did you believe they needed the full complement of vehicles that had been planned for to go into service to make sure vehicle availability was -- that they could meet vehicle availability?

GREG BARSTOW: I think they felt they obviously -- yeah, of course they had to. Whether or not they were ever going to get there was a different question.

CHRISTINE MAINVILLE: So you foresaw challenges if they didn't have the full complement of vehicles available?

GREG BARSTOW: Yes.

CHRISTINE MAINVILLE: Okay. We're at 5. Is there anything I haven't asked you about that you think is important for us to know?

GREG BARSTOW: Well, I don't know if this P3 approach has been effective on other railcar procurements. I wonder about that. I would suggest that the City try a different approach next time or the design build maintain aspects of it. There's just conflicting interests there.

CHRISTINE MAINVILLE: Even if the same

entities ultimately are responsible for each of those aspects?

GREG BARSTOW: Yes, yes. I think it becomes a conflict of interest, and there's nobody there watching the henhouse, so to speak.

CHRISTINE MAINVILLE: Carly, did you have follow-up questions?

CARLY PEDDLE: No, I didn't. Thank you.

CHRISTINE MAINVILLE: Michael, anything you wanted to --

MICHAEL O'BRIEN: I have a couple of brief ones if the reporter will indulge.

Mr. Barstow, you were speaking a few minutes ago about the specifications and mentioned reliability information, maintainability information. You said a few other words, and then you said "because we don't care." What do you mean by "we don't care"?

GREG BARSTOW: Oh, okay, sorry about that. I was quoting the IO representative who kept saying, "Do we care? Do we care?" every time we went through a line item in the spec.

"Do we care?" alluding to the fact that penalties, it's not our problem. We don't need

this information because the penalties will ultimately take care of these problems, so we don't need to specify. That's what I meant by "do we care; I don't care."

MICHAEL O'BRIEN: Thank you. Aside from the documents that you reviewed that were put to you today in the examination, can you confirm that your testimony today was based on your recollection?

GREG BARSTOW: It's my recollection, yes. I don't have any documentation in front of me.

MICHAEL O'BRIEN: When did you stop working on the project in a primary capacity?

GREG BARSTOW: I would be estimating that it was 2017, 2018.

MICHAEL O'BRIEN: Those are all my questions. Thank you, Ms. Mainville. Thank you, Mr. Barstow.

GREG BARSTOW: Thank you.

CHRISTINE MAINVILLE: Thank you. We can go off record.

-- Adjourned at 5:03 p.m.

REPORTER'S CERTIFICATE

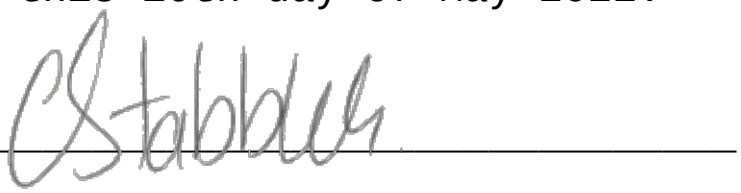
I, CARISSA STABBLER, Registered Professional Reporter, certify;

That the foregoing proceedings were held remotely via Zoom videoconference at the time therein set forth, at which time the witness was put under oath by me;

That the testimony of the witness and all objections made at the time of the examination were recorded stenographically by me and were thereafter transcribed;

That the foregoing is a true and correct transcript of my shorthand notes so taken.

Dated this 10th day of May 2022.



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