Ottawa Light Rail Commission

Glen McCurdy
on Wednesday, May 4, 2022

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OTTAWA LIGHT RAIL COMMISSION

GLEN McCURDY

May 4, 2022

--- Held via Zoom Videoconferencing, with all participants attending remotely, on the 4th day of May, 2022, 2:00 p.m. to 5:19 p.m.

COMMISSION COUNSEL:

Christine Mainville, Counsel Member
Carly Peddle, Commission Counsel Member

PARTICIPANTS:

Allison Russell, Esq., Kelly Santini LLP

ALSO PRESENT:

Eveliene Symonds, Stenographer/Transcriptionist
Alicia Sims, Virtual Technician

I N D E X

WITNESS: GLEN McCURDY

INDEX OF EXHIBITS

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

GLEN McCURDY: AFFIRMED.

BY MS. MAINVILLE:

1 Q. Mr. McCurdy, the purpose of today's interview here 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. Peddle, may intervene to ask certain questions. If time permits, your counsel may also ask follow-up questions at the end of the interview.

The interview is being transcribed, and the commission intends to enter the transcript into evidence at the commission's public hearings either at the hearings themselves 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's entered into evidence. The transcript, along with any corrections, 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.

And, finally, pursuant to section 33 sub (6) of the Public Inquiries Act 2009, a witness at an inquiry shall be deemed to have objected to answer any question asked of him upon the ground that his answer may tend to incriminate the witness or may tend to establish his 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 in any trial or other proceedings against him thereafter taking place other than a prosecution for perjury in giving such evidence. And as required by Section 33 sub (7) of the act, you are advised that you have the right to object to answer any question under Section 5 of the Canada Evidence Act. Okay?

A. Okay.

2 Q. So we can proceed. Could you start by explaining your involvement in Stage 1 of what Ottawa's LRT project?

A. Sure. So I was -- I'm -- my

employer is Parsons Corporation, and under the scope of work that Parsons has with the City of Ottawa, I was asked to contribute to the program starting in 2017 as a subject matter expert for train controls, operations, system integration testing and a variety of things as well as system installation monitor, because it was prior to the -- it was during the stage at which the control systems were starting to get connected and deploy -- we were getting deployed to the field and connected.

And so I was brought in to support the Light Rail Systems Operations office -- LRSOI, it was called. It's now called the Rail Construction Program. So effectively the construction side of the City of Ottawa overseeing the construction of the Confederation Line Stage 1 and to provide, you know, on -- on-call and as-needed support, commentary, and oversight to the program in whatever way that the City needed for going forward.

3 Q. Okay. And who were you reporting to?

A. I was receiving tasks from Richard Holder and Eric Dubé at the time.

Q. Who was Eric Dubé?

A. Eric Dubé was the -- he's now a project manager -- City of Ottawa rail construction program, and he was the -- at the time, he was -- his role was group lead for systems and vehicles, I guess is the title now. Now he's a manager of a -- I think that still what he's doing. He remains in that role for the extension program or similar role. I imagine he's already been --

So he works -- he was in the department headed by Richard Holder and by the director of -- and they reported to the director of the rail -- LRSOI program, and his name escapes me at the moment.

Q. And did you say you were also subject matter expert in operations or...

A. Yeah, my -- not -- like, at -- at the time, that wasn't the role, because we -- you know, Tom Fodor and Mike Palmer were brought in to specialize in the operations side of it and the operations maintenance side of it. I was more on the train controls integration testing and oversight and providing advice to the City.

Q. Okay. And when you say "Mike," you mean Mike Palmer?

A. Yeah, Mike Palmer. Yeah, so he was brought in to -- as part of the team on the -- on the operations and maintenance focus.

Q. And --

A. But we're all part of an integrated team. So every -- every -- you know, how the function works and who uses it, they're always kind of working hand in hand on issues.

Q. And was Parsons already involved in the project before you began in 2017?

A. Yes, they were.

Q. Okay. And so what was Parsons' role generally on the project?

MS. RUSSELL: Sorry, counsel, I just -- if I can just interrupt? If the question to Mr. McCurdy can be specific to his time and his knowledge while he was at -- while -- once he joined the project at Parsons, I would appreciate if the question could be more specific in that regard.

MS. MAINVILLE: Sure.

BY MS. MAINVILLE:

Q. Well, I would like to have your understanding of generally Parsons' role on the project, and then you can be specific to what you

directly observed in that regard?

A. Yeah, like, I would defer to my manager Mr. Hulse and his view on it, because he had oversight as to what everybody else's role was doing.

11 Q. Okay.

A. And so my role was in support of it honestly by task order with the City to provide expert advice and commentary and to -- to them on an as-needed basis. So that was -- that was the role of Parsons on there.

And that is understandably very flexible in this type of a program, because the -- you know, a lot of things develop on there, and -- and it's hard to foresee, you know, five years prior to the integrate -- you know, the integration stage, you know, where you need to direct your focus and what you need to do.

So they brought in -- they brought in -- so I was basically on call, and I did multiple roles that was in response to what was going on in the field and as the project moved through stages, right? So we did the install stage, then the -- and then sub system testing and all the way through.

Q. And so you also reported internally within Parsons to your manager, Mr. Hulse?

A. Yes, I did.

Q. How -- do you know how large the Parsons team was approximately during your -- as of the time you were involved?

A. The Parsons team for the City of Ottawa worked -- we had enter -- many people were only halftime, right, and we moved on and off throughout the programs.

So when I started, it was primarily myself, and John was working part time. And then as we moved -- and then as more part of the project came online, like we started testing and the maintenance started and things like that, then other people from Parsons came on to augment the team.

Q. Okay. And were you embedded at the City?

A. I had a desk at the City, and I worked there about three -- three days a week.

Q. Okay.

A. So I worked on the program five days a week, and I was up in the City office about

three -- three days.

Q. Okay.

A. Support of meetings and conversations and in-person -- in-person reports.

Q. Okay. And did you work with STV?

A. No, I wouldn't say I worked with them. I worked near them.

Q. What did you understand -- what did you understand was the difference between the two roles?

A. They had a different focus. Like, they -- they -- they brought in -- it was part of the Capital Transit Partners I think was the term they used, CTP Group, and they had a different contract, different scope of work.

So they were looking -- you know, I understand their work was, you know, largely on the architecture side and on the vehicle -- and on some of the vehicle side. But I really had no -- I had no insight into their scope of work or their responsibilities.

But my work was clear on the train control and the -- and the operations and how the train -- how the train control was being used. But I -- I didn't get into the vehicle side, so that

was for STVs. I had teams on there that worked on vehicle focus areas.

19 Q. Okay.

A. My scope kind of stopped at the train control. They were part of the Capital Transit Partners contract consortium group, CTP Group. But, again, I was only tangentially associated -- working with them.

20 Q. Okay. And what is Parsons' expertise, or what is the company about, if you could just give us that?

A. Okay. Yeah, Parsons is a large company. We -- we have -- in our group, our focus is rail transit. So rail transit operations, project integration.

And so, yeah, so we've been providing on-call technical expertise to rail-associated programs, prior contracts and customers in Washington Metro, TTC Metrolinx, as well as San Francisco Bay area transit, Vancouver transit. And we've also worked for Kawasaki-Hitachi partnered with Alcatel for some programs and provided oversight in others. And also provided oversight integration of train control systems on other programs such as Chicago O'Hare APM and on

down the list. But our focus -- John Hulse's group focusses on rail transit, operations integration, quality, and delivery. And --

21 Q. And sorry, did you --

A. I --

22 Q. Sorry, keep going.

A. Go ahead. But we're flexible to what the customer -- what the customer is asking for.

23 Q. And, sorry, did you say you worked with Thales?

A. I -- Thales, T-H-A-L-E-S?

24 Q. T-H -- yes.

A. Not Telus, Thales. Yeah, so I worked -- in 2010, I joined Parsons. And prior to that, I was a project systems engineer lead at Thales. So I have 10 years' experience with Thales as to the sort of the highest technical level of project responsibility scope. I was lead systems and lead design authority for two programs when I concluded.

25 Q. Okay. And I was just about to ask for your background and experience. So could you tell us a bit more about that?

A. Okay. So, yeah, so my bachelor's

degree in engineering physics, two years sort of -- two years' experience with Queen's University. After that, (audio glitch) with Allied Signal Aerospace -- now Honeywell -- on embedded -- on embedded environmental controllers for commercial aircraft -- Boeing, triple sevens, things like that -- doing software in software systems.

Then from there, I worked -- I joined Alcatel, now Thales, around 2001, yeah, around 2000, yeah, '99. '99/2000, I joined Alcatel and went through multiple roles there both as a contractor/builder, working on commercial proposals and then on the design and then the project deployment. So I rose to the -- I was a lead systems engineer and project systems engineer.

And then I put up -- I worked on two programs, Las Vegas Monorail and Dulles APM. And at the end of the testing phase for those programs, I transitioned. I got the opportunity to join Parsons.

26 Q. And so, sorry, when did you start with Parsons?

A. 2010.

27 Q. 2010. Okay. And when you say you were involved on this project in respect of the

train controls, do I take it it was in respect of Thales's signalling system?

A. Yeah, for the oversight, right? So I was one of the -- one of the items that the City requested some expertise on was providing oversight of the train control system. And so my experience in that dovetailed well.

28 Q. M-hm.

A. Because the City had a lot of experience on, you know, bridge building and power systems and sewage, you know, City municipal structures. But things like networks and train controls is a very industry-specific item.

29 Q. Okay. And when you arrived, was -- what would you say was the state of play at that point in time in respect of the train control system?

A. The program was still being -- under construction would be the word. So 2017, the track was still being bolted onto the -- onto the rail, and the tunnels were still being built. They had effectively just got two vehicles running and some first rough layouts of the -- and they were installing the wayside -- the wayside control systems into place. So the boxes were going on the

walls, the cables -- the wiring -- the wirings were being hooked up.

30 Q. Okay. And so what was your role at that point in time?

A. At that point in time, it was installation monitoring. So as the electrical installers were going through with the boxes, putting them on, I was basically, you know, sort of doing a daily site visit, going into the control rooms, counting the progress for installing the radio units, the signalling equipment on the wayside and onboard and then providing my advice to the rail construction program on the progress, tracking their progress versus the schedule. So what they said they were going to do that week to say what did they actually do and try to provide contact -- try to provide advice to the rail construction program managers --

THE COURT REPORTER: To the -- sorry?

THE WITNESS: -- so they have an oversight as to how things were going, are they on schedule, behind schedule.

THE COURT REPORTER: To the who?

THE WITNESS: To the -- sorry, we call it RCP now, Richard Holder, really, and the -- and

the City of Ottawa construction branch.

THE COURT REPORTER: There was a word that you said, and I wasn't sure what it was, but that's okay, we'll pass.

THE WITNESS: No, yeah, sorry, I keep tripping over the acronyms, the -- because they have the construction group, which is the LRSO -- Light Rail Systems Operations and then OC Transpo, which is the operator side. So they -- they were sort of two groups, but the construction of the program was under the construction group.

BY MS. MAINVILLE:

31 Q. Now, you say you were brought in in part in respect of systems integration.

A. Yeah.

32 Q. But you said your role stopped -- or did not involve the vehicle side. So --

A. Right.

33 Q. -- do I understand that you weren't overseeing the integration between Alstom's trains and the signalling system?

A. Correct. I was not able to scrutinize that as much as I would like.

34 Q. And why is that?

A. I didn't have the information. It

was the -- the vehicle -- yeah, I just didn't have the information, was -- I wasn't invited to it, and the troubleshooting of the vehicle and speed control, it was always an ongoing thing internally between the two companies. And many -- and they didn't really sort of share their progress.

35 Q. So when you say you didn't have the information, did you typically receive your information from the City or directly from the subcontractors?

A. I really had to find everything on my own. The -- we received -- sorry, as well as we received some submissions from the -- through RTG that were delivered through the City as a formal design submission or CDRL -- commercial document -- or CDRL, I forget the term of it -- but they would submit and leave comments on it.

The details of the vehicle controller interface to vehicle was not provided as a submission for comment. It was deemed to be, you know, an internally -- item.

36 Q. And --

A. But I -- but it deemed to be internal to the -- to the -- to the projectco.

37 Q. Okay.

A. I think we eventually got a copy later on, but at that point, it was all done.

38 Q. So it wasn't the case that when you came in, this piece of integration with the vehicle was not part of your scope; it was more that you were not able to perform it?

A. Let me clarify. The -- I was to look at the end report on the progress of the installation, the testing, and the delivery, provide insight as to what are the risks, what are the delays, what are the potential delays to the program in terms of meeting this -- in terms of being able to deliver on time.

The part of that -- and then so what that entails was kind of left you know sort of do what you need to do. And so part of that is looking at the risk of -- of multiple things.

I wasn't going to try to scrutinize the details -- the two pieces of the vehicle talking to each other onboard. I wasn't going to get to that, because that was their responsibility to make it work the best way they could.

So I didn't have the details, but I also didn't want them. I -- they just had to make it meet the -- they had to make it function. And

so I was trying to oversee -- provide the City advice on how well they were progressing to make it all function properly, you know, as it goes, because the nature of this project as well as many projects was that they deliver the hardware to the field sort of in a rough state and then the software to the field in a rough state and then improve the -- improve the software functions with the real equipment on site.

And the vehicle and the train control soft -- like, the computer -- like, the software side of it really started talking to each other directly first time on site in the City, because the City -- because the vehicles are being manufactured there, the test track was there, and so they -- they were -- they were developed.

And the Alstom vehicle, this vehicle, and this train control system were built into -- into -- by two separate factories by two separate companies. And the first time they touched each other was in the city on the test track, and that is typical of programs like this.

39 Q. And you said you were mostly -- well, I don't want to put words in your mouth, but I understood you to say you're tracking potential

delays, whether they were going to be able to deliver on time. Was that more the focus as opposed to whether the systems were being properly integrated or whether there were gaps that could, in fact -- reliability or other performance issues?

A. The question -- the main role was to provide -- and -- and the question to -- sorry. The reports that I provided to -- to the construction office were focussed on delivery to schedule. That was the question they asked. Are they -- are they delivering to schedule?

The next question is what are the risks? Right? So what happened last week? What's can happen next week?

And then what are -- what's -- what's my assessment of any risks to the schedule? Like, if -- so part of that is looking at is it -- are things falling behind? Is there a -- is there a bug that is -- you know, that they're trying to troubleshoot? Is there -- are there any other technical things?

So it was mainly on delivery to schedule, delivery to -- but then also open to anything else I -- I found out and wanted to raise as note as a, you know, potential thing to look out

for or ask for more information on or just to track to see if it gets resolved the next week, right? So pretty open -- open definition to free -- free to identify any concerns and raise them.

40 Q. Right.

A. Yeah.

41 Q. But I take it, then, the City's primary focus was own timely completion of the project?

A. Yeah. Timely and complete. So it was on the time; it was also on the -- the suitability, right? So it was you could have it all done, but it's got to be up and done and working. So both on the quality and on the schedule. So is it -- is it in there as per the schedule that the projectco said they were going to do? Like, if they're going to have this much done on this day -- you know, like a week before that day, are they 80 percent there? And then is the -- are the tests being passed? Are they good quality? Are things being done properly and on the way?

42 Q. Okay. So you were keeping an eye or trying to track --

A. Trying to track.

43 Q. -- the quality of the work?

A. Yeah.

44 Q. Okay.

A. So I was keeping an eye on was it getting done and was it done well and complete?

45 Q. Okay. And because you said your reports focussed on delivery to schedule, but I take it, then, they would also address quality issues?

A. Yeah. So any -- delivery means delivery and it's working.

46 Q. Okay.

A. As well as -- but sometimes delivery is just putting a -- putting a box on a wall, so just like this many boxes, this many walls. But then when the whole thing got powered up and put together, you know, is it doing everything we need? Are all the systems they need to talk talking and whatever else is needed?

47 Q. Right. Okay. So who did you understand was overseeing this work on the project company side?

A. Projectco side?

48 Q. The -- and when I say this work, let's start with the -- the integration of the vehicles with the signalling system.

A. Yeah, that responsibility was with OL -- OLRTC, I believe it was.

49 Q. M-hm.

A. OLRT constructors, which was a sub group of the Rideau Transit Group.

50 Q. Was there any person in particular that was overseeing this?

A. There was a couple of them. Mr. Bergeron.

51 Q. M-hm.

A. Frank. His name escapes me at the moment. He picked up -- he picked up the work after that. And Mathieu Branconnier. Yeah. Yeah. Mat -- Mathieu Branconnier --

52 Q. Okay.

A. -- was testing on the vehicle side. Jacques Bergeron was integration for SNC-Lavalin and on -- on the side of the vehicle and the way-side systems.

53 Q. M-hm.

A. And then Frank -- I'll have to look his name up. Yeah, but he was for OLRTC as well.

54 Q. That's fine. So were you -- you were free, I take it, to speak to these individuals

and seek information from them?

A. Yes. And they were my primary sort of interface as to -- as to -- as to call up the -- the interface manager and ask for -- ask for information.

55 Q. Okay. And so do I take it you sought information from them about this interface and integration?

A. Effective -- effectively it was site visits, right? So when I asked them -- when I asked them for a document, they go, Yeah, yeah, we'll get back to it and kind of didn't really. So -- and when I -- and when I did ask them to provide me information as to, okay, how many things did you install, they said, No, we're not in that job of answering your questions so, you know, figure it out yourself. Okay.

So then I went to -- yeah, actually, that point, I put on my hard hat and safety boots and went down to the station where the construction was going ahead. And a lot of the information I was able to -- I gathered was from sort of just sitting in the back of the room while the construction -- while the -- while the construction designers and -- and testing activities were going

on. So I -- I would witness tests and installation work as it was ongoing, but I was on my own to collect information from observations.

And occasionally we'd have a site tour as part of the certification reporting structure and the -- and I would be -- I would be in meetings and privy to all the -- all the projectco weekly reports, monthly reports, and their status reports and then as to go and do an independent check, you know, in the field to see if they're delivering -- see if -- see if what's in the report is what's in the field.

56 Q. Okay. And in that context, would you try to interact with Alstom workers or -- or Thales?

A. Yeah. So I would be -- I would interact with them. I would be in the room and observe them. So I would interact in a non invasive way. I would ask questions, we'd chat, but I just basically let them -- observe them in their -- completing the testing and integration work.

57 Q. Were they more forthcoming with information than the OLRTC people?

A. Yeah, because we -- particularly

in fields, What are you doing now? Oh, we're just doing this. That's fine. It didn't cost them the -- Rideau Transit Group, if they had a document in hand, they would hand it over. Or if they had some notes, they would hand it over. But generally if they had to write something, that was a body of work they -- you know, they were very busy doing other things.

58 Q. Right. They weren't wanting to create more work?

A. Yeah, so I would go collect my own information, write my own report.

59 Q. Okay.

A. But I did it a lot by walking, you know, putting on the hard hat and safety glasses, going into the -- going into the station as constructed, walking the guideway, walking the tunnel, you know, showing up -- showing up during the day what the testing was ongoing and -- and capturing what I could observe.

60 Q. Okay. And I take it you had better luck in other areas than the vehicle integration --

A. Yeah. The --

61 Q. -- in terms of receiving

information.

A. Yeah. And the vehicles was also not part of my primary focus, right? We had -- there was -- there was a team there -- they had a team working on the vehicle side, pretty well populated, but my -- so I didn't -- I didn't feel I needed to -- to sort of be -- you know, that was already well covered, and my focus was on the systems side.

62 Q. Okay. So before we move to the systems side, did you have any concerns or -- or identify any potential issues just based on the -- the information you had about the vehicle integration piece?

A. I provided updates roughly every -- every -- every week or at least every month in -- in written sort of presentation form that was then sent up to Eric and Richard. So weekly -- biweekly construction update as well as comments on submitted documents and feedback on the schedule. So OLRTC would provide a schedule update -- a project schedule on a -- I think, like, a monthly basis, and then I would provide, you know -- and then my -- my reporting to the City was part of a commentary on the project schedule, you

know. They'd say, Oh, yeah, we're done this. Are they done this? They said they're done this, but they're not really. And do it on line-by-line basis, and then the information was provided to construction office and then provided in a report. And they -- and they took that and put it in the report back to -- in a feedback to schedule, I think, was the item from there.

63 Q. So did you make observations about scheduling concerns relating to the vehicle and CBTC integration?

A. Not detailed ones, because the information was kind of limited.

64 Q. Okay.

A. Right? So I didn't have a detailed test procedure of what they were doing on the vehicle interface. I didn't have a detailed test plan. I didn't have the detailed interface as to how it was supposed to work or how it was working or what the problems were or what progress and testing they were doing. Detailed test procedures were really not provided, so it was -- they -- the -- the viewpoint of OLRTC was, you know, this is their job to figure out, "their" being Thales and Alstom. They were going to do the

troubling and deliver it.

And by and large, having done that job 15 years before, okay, yeah, let's the guys with screwdrivers get -- you know, sort of hammer it out.

65 Q. Did you have any sense of whether these procedures existed, or you don't know?

A. I wasn't privy to them. I know from the experience with them that they're -- they're pretty rigid on it. But it's always a troubleshooting area. So the early systems go together, they, you know, get them working, and at the end of it, they do a formal check.

66 Q. Okay.

A. So I know the formal -- I know the formal test exists. Those reports were done, because that was always part of -- when I worked with them, it was part of their own company's quality assurance process. But I was never -- I never saw any of these test procedures or the results of them.

67 Q. Okay.

A. And I issued a couple RFIs in there going, you know, Can you please tell me what the speed profile is on the guideway as it goes

through? And after a year later, they kind of gave me some handwritten note of the -- from the civil designer as to what the speeds they were supposed to follow, but I didn't -- never got an answer as to what speeds they were following.

68 Q. And RFI is a request for information?

A. Yeah.

69 Q. Do they -- is the contractor bound to provide information in respect of those?

A. I don't think -- well, they have to respond to them. They don't need to respond to them fully. And, yeah, part of that was, you know, my own -- my own checks to make sure at least somebody was looking at that part of the interface. So does that exist? Do they know what it is? Does the integrator know what it is? That was part of my scheduling oversight. That wasn't really something that was part of my -- it wasn't going to help with the schedule work.

70 Q. M-hm.

A. Or the -- the delivery schedule report.

71 Q. Okay. And did this speed issue -- did that have to do with journey times and whether

those could be met?

A. I would not -- I wouldn't say it's a speed issue, it's a speed question.

72 Q. Question.

A. And that part is to -- to -- they delivered a simulation report. There's a -- there's an end-to-end journey time -- an end-to-end journey time, so that's a bit of an item. That's an item I'd been intimately tracking throughout the program and continue to do so in that the -- that -- and then performance criteria and their simulation report, their predictive model -- and this is -- this is in the submission I think delivered in 2016, right, indicated they could complete the trip in 21.5 minutes, right? So boom, boom, boom. Go from doing -- departure time to Blair is 21.5. They only had to meet 23 as per the number, so I was, like, oh, that seems really fast.

And what we noticed was that what -- what they predicted in the travel time and what was operating in the field when the vehicles and the -- and everything started working together, they weren't matching. It's, yeah, we're going to go from -- say it's a long run from, like, Hurdman to

Cyrville in, say, 80 seconds, and suddenly it was, like 85, 90, and they weren't showing up. And it's, like, okay. And we know simulations and realities, you have to allow some numbers, but these were kind of always going in the same direction.

And we found that there were areas where, like, what speed they were supposed to go at certain parts of the track, they were changing. So what the preliminary speed along -- like, through the curves like at Hurdman, they're supposed to go through there at a certain speed, and then the trains are going through slower. I was, like, Okay, why's that? And they say, Oh, well, we just set them down. Okay. So you just slowed the train down. Did you -- were you planning on telling the City you were doing that? Was anybody monitoring what the impact of this is? Right? And, again, no real answer on that.

So there was some reason why they did that, probably a good reason related to speed and curve and vehicle safety, but they would do -- they would make these changes unilaterally without informing the City. And I would only find out after getting on the train, riding it, and going

wait a minute, this train is moving slow. And then I ask, What's the speed? And after some time -- again, this is in -- part of our responses in record, that they responded that they slowed -- they slowed several areas of the track to slow the track down.

Which they had freedom to do, right? As long as they ended up meeting the time -- the total PA and met the end-to-end performance, that's part of their design responsibility.

73 Q. Right.

A. But I thought it was -- one of the things I raised on it was during preliminary design, they said it was going to do this. When they got to the field, it did something less.

74 Q. Which raised questions.

A. Still within parameters, but should you -- shouldn't they have, like, you know, said they're doing it or had -- like, ahead of time --

75 Q. M-hm.

A. -- or check that the impact was there? But that didn't seem to -- that -- that piece didn't seem to be there.

76 Q. Did you understand that there --

these journey times they had to meet, that there was an issue relating to braking, accelerating and braking?

A. No. Once the train was accelerating, it accelerated okay. So I couch that. It took a few -- takes a few seconds to get off the mark. That's what it is. And then --

77 Q. Did you -- sorry.

A. Go ahead.

78 Q. No, I'm wondering if you understood they had to adapt the usual -- not sure if I'm --

A. Okay.

79 Q. -- saying this correctly, but the speed profile, perhaps, to avoid coasting and -- and -- and do the rapid acceleration and braking to meet the journey times. Do you have any knowledge as to what I'm referencing?

A. Yeah, I -- I know what you're referencing; I'm not quite sure what the question is you're asking.

80 Q. Was this -- do you have any awareness of Thales having to change their typical standard speed profile to -- to accommodate the -- the requirements under the contract?

A. The -- yeah, so a little bit of context. The train control system on -- is a unit onboard; it provides -- it provides a speed command, right? So it's the driver. It's the driver in your car. If you get into your car and you drop the -- if you drop the gas pedal all the way down, the car is doing the limit of what the car is doing, right? But you don't drive your car like that all the time. You kind of -- so there's a close -- there's a loop -- a feedback there where it will power down until it's going -- until it's going the right speed, and then it backs off, right? And that's the -- the Thales train control side.

There -- there -- the purpose of that -- or the way they design that is to try to get up to the speed as efficiently as you can, stay there until you're told to slow down, and then stop at the station, right? Just simple stuff. Get up there, get back down, and get there in a reasonable -- you know, as quickly as you can. Now, as quickly as you can is kind of where it gets -- it gets tricky, because the -- you can't override -- you have to be -- the -- the part of the troubleshooting is you have to be cognizant of

the way that the vehicle is set up to respond.

So when the train -- what the command says, yeah, go, a whole bunch of stuff has to happen in the vehicle, and the train control can't issue a command that might damage something, overdrive, underdrive, or cause a wheel the slip. So it becomes a bit of a challenging integration and control program.

So, again, I have some experience with that. I've been overseeing that on the program. But they're kind of slave to what the vehicle can do.

81 Q. Right. So did you observe any of that here where there were issues with slips, with the wheels slipping?

A. It took them a long -- it took them a while to troubleshoot it, particularly because the -- in 2017, we only -- they -- Alstom was only able to provide a short -- small number of vehicles that were reliable, right? So when the first vehicle was running and the second vehicles were coming online, they were troubleshooting the vehicle, the vehicles -- and they were changing -- Alstom was revising the software on the traction motors, right, because they were still trying to

get this new vehicle working on this new rail and new system and factory and everything else. So Alstom was still kind of moving -- was still revising the vehicle while the train control is trying to revise the control of the vehicle.

So we saw a lot -- saw some of this through -- and they ended up resolving this eventually, but we did see this through the summer of 2017, 2018. As the vehicles were coming online, the vehicle was also being improved, I guess. They were finding things on the traction motors to -- to -- to change their behaviour for that, and then the speed control had to change in response to it.

82 Q. Are you aware of, later, wheel flats occurring on the trains after they were in service, were in operation?

A. Yes.

83 Q. And do you know whether this issue might have contributed to the wheel flats?

A. No, I don't believe it did, because what I was looking at was -- is the vehicle being commanded to brake, you know, hard -- hard -- get up to speed, stay up to speed, and brake hard enough, right? And that -- so you can get Point A to Point B in the most efficient amount of time --

the least amount of time available, right?

The wheel flats were occurring, because they don't -- when the vehicle's breaking normally, you don't get a wheel flat, right? It's like, the anti-lock braking system in your car. Da, da, da, da, da. And if it locks, it will release it, right? So that's under normal operation, right, when you're driving your car to a stop light.

If you're driving -- driving down the 401 and you pull your handbrake on your car, you get wheel flats, right? And all kinds of bad things damage.

So that's what was happening when the vehicle would have a fault and it would go into emergency brake mode. So there's a -- a -- a significant fault on the vehicle from the traction power, the brake, or the -- any of the protection circuits. So it would detect if a door was opened -- maybe correctly, maybe incorrectly, but there would be a response. Then the vehicle would go into an emergency braking state and would just slam on -- very rigid hard brakes, and then that would -- that would drag the -- drag the wheels across the rail.

84 Q. And what was your understanding of

what caused these faults?

A. Any number of failures on the vehicle or on the train control detection systems. So we would see -- so when I say the -- like, the -- if the train control halted, it would drop the brakes. If the train control detected the door was open, it would drop the brakes. If the train control checked that the train was going faster than it should, it would drop the brakes. If the train was going to over the track switch and then the track switch would report that it was no longer secured, it would drop the brakes. If they -- but the other one was if the guideway intrusion device system didn't go off. So if they -- if the vehicle was coming, it was going to the station, and a bag would blow through a guideway intrusion device, it would tell all vehicles in the area to immediately drop the hard brakes and -- which -- which on -- which, depending on if the vehicle was moving fast, would cause damage to the wheels.

85 Q. Is it fundamentally an integration issue between the two systems?

A. No. I'm -- not necessarily. It's a -- it's a -- the -- a little bit of context on this. The -- the rail control operation is what

they call a vital control system, right? Vital control systems means it's safety related, and part of that is -- is if -- is the philosophy of if anything is at the system -- system runs and then there's another system over it to see if it's running okay, and that's called the automatic train protection. And then if the train protection system detects anything wrong with what it's watching or with itself, it goes into a severe safe mode, fail safe, right?

So if the train loses position, like, the train -- so if the train positioning system said -- goes along and says I know where I am, I know where I am, I know where I am, whoops, I'm lost, it would -- it would immediately drop the brakes. It would say whoops, I'm lost. I don't know where I am; I cannot safely proceed. I can proceed, I can drive to Kanata, but if you can't safely proceed, you don't know where you are, drop the brakes now. Stop everything. You know, go, you know -- and then go and get a maintainor to come and find out what happened.

So the -- when I talk about wheel damage, if any -- any one small piece goes, you know, buggy or if the detection system itself is

buggy, it will drop severe response.

86 Q. And so is that all --

A. And that's normal.

87 Q. But is that all a Thales system?

A. Yes. Thales and -- well, Thales and -- and there may be other systems onboard the vehicle that would do that. But mostly that's what the Thales system is -- is designed to do.

88 Q. The A --

A. That's the -- that's the safety function.

89 Q. The ATP system is Thales's?

A. Yeah. Yeah.

90 Q. But any understanding of why there's -- and tell me if I'm wrong, but would there more faults on this train. Like, why would there ultimately have been these faults that led to wheel flats?

A. The vehicle could have had a -- there could be -- if there's a failure on the vehicle of -- and, again, I'm kind of going -- I don't know, but if the -- if the -- if there's a failure on the vehicle such that it can't accurately count the rotations of the wheel, that would be a failure of a critical system, and the

onboard would drop the brakes and say, wait, it's not safe to proceed. If a door -- if a door lock was reported to be open, it would do that. If the -- and there's probably other -- other functions where if the brakes -- if the integrity of the brakes are in question -- not if they actually failed but if the sensor watching them is -- you know, then they would report back, you know, critical fault and -- and drop the brakes as well.

So there's an emergency brake circuit that runs typically through the -- through the vehicle, and that if anything breaks, it would go to severe shutdown.

So -- but, yeah, so it's a -- there's software functions, hardware -- hardware checks on the vehicle, hardware checks on the onboard controller, software checks on the onboard controller, and software checks on the wayside that would all -- and that any one of those things can -- will -- will result in an application of the emergency brakes.

91 Q. And you don't know the specifics of what in this case led -- occurred in terms of what the exact faults were? Is that --

A. Well, it was a kind of multitude of things a multitude of times. The things were still being troubleshooted and developed and tested. The onboard controller was still being tested and -- and -- and updated. The guideway intrusion system was still being installed on the wayside. Switches were still -- you know, need to be monitored. A failure of a switch would -- would -- would result in EB depending on where the train was. Fire systems was cause an EB on the train system. The traction system onboard the train. Any one of these things, right?

92 Q. My question is in respect of service operations, so after RSA --

A. M-hm.

93 Q. -- if this issue arose, do you have any knowledge of what, at that point in time, was the occasion in the emergency brake?

A. Not the specifics. The emergency brake is not a fault; it's a result of a detection of a fault.

94 Q. Right.

A. Right? And I'm careful of my words, because the detection might be -- might be the part is wrong.

95 Q. Sure. Sure.
A. Or might be a fault. But any -- any -- any -- part of the safety principle is if any of the critical systems say something could be wrong, stop.
96 Q. Right.
A. Yeah.
97 Q. But I'm saying why were things happening that were going wrong? Why the faults --
A. Many reasons.
98 Q. -- post -- post RSA?
A. Many, many, many reasons.
99 Q. Okay. And fundamentally in terms of root cause and why -- why many of these were occurring after service operations, would you say it was a lack of sufficient troubleshooting ahead of going into operations, insufficient running of the trainings? Do you have a view as to that?
A. Multitude of reasons. The -- the onboard controller at the time of -- of running into revenue service, the Thales onboard controller was running really quite well. The -- the stability of it, it wasn't prone to any erroneous, you know, halting. Like, it wouldn't -- it wouldn't spontaneously go, you know, whoops.

Internal software error. Halt. It was running good. Right?

The -- I don't have insight as to what was going on in vehicle in terms of if it was having internal failures. I know that the internal vehicle would have -- I'm kind of -- maybe I'm speculating a bit on this but would have --

MS. RUSSELL: I don't want any speculation. If you're able to --

THE WITNESS: Yeah.

MS. RUSSELL: If you're able to --

THE WITNESS: I'm not going to comment on the vehicle side.

But there might be faults on the vehicle that would cause that glitch, and that would be something that all the vehicle investigations would have identified later on.

The other items are wayside, so switch machines and guideline intrusion devices.

And any -- of course any actual humans, you know, running on the track, pushing buttons, opening doors, doing things that legitimately need the train to stop. And when they stop, it would -- it would drop -- it would drop emergency brakes, and that would call wheel -- wheel slip, and that

would glitch a bit.

BY MS. MAINVILLE:

100 Q. Okay. Can we talk about overall systems integration.

A. Yeah.

101 Q. So when you arrived, did you -- what -- what did you observe in terms of planning in that regard?

A. In terms of integration?

102 Q. Yes.

A. The -- the Alcatel and Thales teams were working on the -- on the speed, on the -- on the vehicle interface. They mobilise the team on site to, you know, complete the on-site tasks about getting the controller to work with the -- with the -- with the vehicle and -- and troubleshoot that, right? Because the vehicle contains things like sensors, and the train control system would need to know if it's reading the sensors properly. But the sensors are provided by Alstom, right? So that would be a -- how do we tune those?

So they were working well on that. They mobilised a very strong on-site team in support of that. So they -- and I went along for

for some of their -- some of their testing.

The -- and the process for that was pretty formal on both sides where they would do software checks on the vehicle, software checks on the train control, put them out, and then be very, very careful driving it, make sure they're working right and sort of gradually move up. So that was -- that was ongoing on site, because that was where the vehicle -- that's where those few -- those two systems were actually in -- in -- in place and actually had a track to run on. So that was going.

And that at that point is knowingly informal, right? It was try this, do this, because it's engineering level. And then they moved up to the formal -- to the formal level as part of the commissions when the trains were rolling out. So that aspect was -- was, you know, going as -- as expected.

103 Q. Okay. Other aspects?

A. The other aspects were they were working to install, test, and -- and tune the systems in the field while the systems -- while some of the functions were still being made in the back office and while the track was still being

built. So they couldn't -- so while -- while you -- in the schedule, you planned to have, you know, four vehicles fully -- fully reliable running when you're ready to go and all the functions are done, they were working with partial vehicles, partial guideway, and partial functions. And, again, this happens all the time.

The -- I'm working two other programs that are kind of going the same way, and that's -- you know, the question is do you schedule it in? And then if the vehicle is -- is delayed or the track is delayed, then your testing is delayed, and the testing always get pushed to the end.

And then if there's anything that you find during the testing, your -- your amount of time to redesign and fix are sort of squished. So that's kind of a broad sense of it.

Specifically on this job, we had -- if we're running vehicles and rolling out updates to the train control and -- in response to it, we didn't have visibility as to the vehicle faults or into what changes were being done on -- on the systems at a detail level, right?

We -- we kind of found out the day after they change -- they would update the

software. We would find out afterwards from the City, right? So they would roll -- they roll -- they roll a change out, deployed system wide, and we would hear about it sort of over the cubicle wall. We wouldn't even hear about it formally, right, in terms of the City oversight.

So it's entirely within RTG's and OLRTC's responsibility to, you know, do the integration, manage the details, and deliver it at the end as the City providing, you know -- having insight into the, you know, week-to-week progress or the week-to-week, you know, functional changes, we were firewalled from it. So we -- we -- we didn't get notification of design changes in the field even when the vehicles were running and OC Transpo staff were onboard.

104 Q. Did that cause some concern?

A. Well, it -- it -- it -- we really trusted -- even by the structure of it, you had to trust that OLRTC and RTG were doing -- doing everything correctly in terms of due diligence, in terms of safety, in terms of completeness, because we had no way of sort of looking -- we -- we had no way of looking over the shoulder.

105 Q. Did you have any concerns coming

into it about what had been done on the systems integration side -- on the overall systems integration, whether there had been -- whether there was sufficient plans of sufficient planning?

A. Yeah, in terms of the -- like an integration -- like a stage integration plan, we didn't really ever get one. So it was, you know, take the -- it was -- and in terms of a software -- like a software update plan, like, we're going to release these functions; you know, through 2017, 2018, we're going to change the software five times, we're going to add these functions in as we go, right, this kind of stuff, we never saw anything, right? And I don't think one existed.

The project schedule and -- I think the project schedule reports are part of your -- part of your information -- is that OLRT/RTG would deliver a schedule to the City, and that would have integration as one activity right across. So we start here, we end there, one bar graph. I go, Whoa, whoa, whoa. Can you -- there's 10 things in here. You have to do one and then -- you know, do one and then the other one starts, other one starts. Break this down. They're, like, no.

106 Q. Did you get --

A. That --

107 Q. Sorry, repeat?

A. That was just part of the project schedule reports that they provided to the project -- the -- the -- the PMO office, the project management office. Craig Killin was the lead for that with Claudio. No. Yeah. Anyway, that was all under Richard's group. And we provided feedback on that.

But one of my main comments every time I got the schedule was the whole testing integration program is two activities: one, integrate, two, test. And so I'm, like, Are you 20 percent along? And what does 20 percent mean? And, you know, just they weren't able to give any useful answers.

108 Q. And --

A. But I know that behind the scenes, they would have to have much more detailed planning to say, We need these people on site to do this work and so on, but that never got presented -- that never was made available to the City.

109 Q. What was your understanding of the level of understanding of what was required on the systems integration front on the -- on the

contractor's side?

A. My view is that they underestimated the role of an integrator, right? So when you're taking a new train, a new guideway, a new piece of rail, a new station and you're putting it together, somebody needs to watch the details and -- and, you know -- and make sure that every change on one system gets communicated to the other system. If there's an impact, you get the two working together, right? And the -- and I don't think that was well done, right?

So in terms of the -- the vehicle on the train [sic] working together, you know, the role of the integrator is to get these two parties in the room and say, Okay, do you understand what the -- what the -- you know, what level of performance you need? How are you going to get it? Does A understand what B needs to do and what it expects? I mean, is somebody sort of managing this day-to-day? And I don't think -- and that goes for, you know, fire systems, power systems, SCADA system, interface with -- with train controls, how they talk to the user, what displays on the screen, and the -- and of course how the separate systems, you know, will sort of handshake.

And -- and will they -- and things like reliability and things like travel time, every -- every system -- like, you have 100 seconds to get from A to B, that means the vehicle can take this much time, the doors can take this much time, the train control can take this much time. And A plus B plus D with only equal F, right?

Is anybody checking the budget? Like, those kinds of activities just weren't done. And it was -- and so it inputs to -- like, Alcatel will be looking for direction from their -- who was their customer, the light rail constructors, and I don't think they got a lot of information they needed and support on it.

110 Q. Sorry, who is Alcatel?

A. Sorry, Thales.

111 Q. Okay.

A. Yeah. But in terms of the integration, right? So you buy the vehicle, you buy vehicle power, rail. You know, do these parts work together was something that was an afterthought. They -- they bought them, and they left them to the -- to the -- to the -- to the individual subcontractors to get the -- the pieces talking.

112 Q. Did you understand that anyone was actually performing that role as systems integrator?

A. They had one person working on it part time, which I think was underestimating.

113 Q. Who did you understand that to be?

A. That was Jacques -- I think Jacques Bergeron had the title.

114 Q. Okay. And then fair to say he was more focussed on the vehicles?

A. I -- no, I -- I don't think I'm comfortable sort of speculating on what he was focussed on. I only interacted with him a little bit, but he -- yeah.

But in terms of the -- of the interface between the -- the vendors, the different subsystems talking to each other and talking to their customer, they were not -- not -- they were not -- not -- I don't know. They were kind of operating independently, right? So the different subsystems would take the product, put it on the field, and they're kind of left to make it work.

But when I asked questions of how -- like, when I asked questions how do these three systems work together to do something, they all

kind of looked at each other going, you know -- that -- that wasn't their job to answer me, because they were just delivering their piece. But how all three pieces worked together seemed to be an area that was not addressed.

115 Q. And --

A. Very well, I should say.

116 Q. Right. And what implications can that have on performance reliability, ultimately?

MS. RUSSELL: Sorry, counsel, I want to interrupt there for a moment, because I do think that question is asking my client to speculate or give an opinion. So maybe you want to reframe that question, please?

BY MS. MAINVILLE:

117 Q. Right. Do you believe this -- in this project, this may have had an impact on the reliability of the system or the performance ultimately?

A. Yeah, I -- I would say there would be an impact maybe not on reliability but on performance.

118 Q. But how do you distinguish those two things?

A. Reliability is if something fails

and has an impact on the overall system.

119 Q. Okay.

A. But there -- maybe. The -- to a degree as well. Like, if a failure -- if you have some -- you know, you can have some failures that are -- you know, will impact the service and others that don't, right? So if you have, like, a back-up system, two pantographs on the train, one system goes and the other goes, so you have redundant systems.

And troubleshooting. If one system fails, you say, oh, that thing needs to be fixed, and you run out and do it. That's how service maintenance runs, right? So system maintenance runs every day, gets beat up badly, things break, and they fix them as they go, right? That's what they call system availability, which is, you know, allowing things to break and then -- but the whole thing keeps running.

And then how those things work together is -- it's always a challenge, though, because the -- it gets into when a failure occurs, how do they identify it and how do they respond to it? That comes out -- if you see some of the later -- later service -- service faults, there's a response

to failure that was -- that was -- it was an item (indiscernible).

So that did -- that did start impacting the reliability of -- there's things like when certain failures would occur, were you ready for them? And that question wasn't -- wasn't well done, I think, on the -- on the job, right?

It was the test -- testing -- testing procedures, the ones we've seen, were focussed on installation, right? Is the box installed properly? That was one level of tests. And the next level of test we saw were did you meet the project agreement? Right? So is the box there and did you meet 23 minutes?

There's a whole lot going on in the middle, right, in terms of failure modes and system -- system safety and safety responses and user interfaces, and we didn't see a lot of that.

And when we did see it, it was kind of reluctant, like the -- the -- the SCM -- the requirement traceability when I looked at -- started getting involved in 2017, we were looking for requirement traceability and testing to requirements, and they weren't able to produce anything.

And then they brought in some afterwards to try to -- try to, you know, connect the -- the safety case and the reliability case after the -- after stuff was already being delivered to the field.

120 Q. Okay. Can you explain that to me a bit more, the --

A. Well, things -- like, part of the integration process is what they called requirements management, right? So, okay, the main system needs to do this, the different parts need to do this, this, and this. The -- and then make sure every sub -- sub vendor, you know, delivers that part, and the whole thing works together.

And you also have a link between the final testing and the -- the -- the -- and what you promise to deliver.

And so this is role of the integrator to say, Everything that I've promised to deliver to the -- you know, the -- for the entire transit system, every piece is doing what it needs to do together in support of that.

And because there's 1,000 moving parts and 1,000 -- and 100 different sub vendors, you have to have a formal -- you know, track it as you

go. And this seemed to be an afterthought when I got involved in 2017, saying, Do you have, you know, traceability of how all these things worked together and how all the requirements are met and that matted out, they weren't able to provide much confidence in that.

121 Q. Was this part of the integration testing? Or is this aside from --

A. Well, it's a part of quality assurance and integration -- what we call integration management. So do all the sub systems -- you know, when there's a failure of one sub system, you know, is it -- are things notified all the way through? When there ends up a hazard, then -- then, you know, anything that can go wrong, have you looked at it from a safety point -- point of view? Do all the, you know, alarms that one system generates get reported to the others? And you can have a system that says, well, alarms are being sent through, but do you have them all? And what do you call all? So these inputs to the designers is always kind of -- and it's always a challenge in every program to do that. That was part of my -- my prior role was to try to -- try to, you know, keep that stuff together.

But it's things like coordinating between the -- the -- the train control, the train power, and the power control and make sure that every sub system knew what it -- every -- every provider knew what they had to do before they got there.

And I saw a lot of them were coming up there with what they had available and were figuring it out on site, and so there's a lot of rework and -- rework and rejigging going on.

122 Q. Lack of planning is what you're saying?

A. Lack of integration, yeah. So the systems were -- things like the -- like the traction power system, right? They said, Okay, we have a pantograph, we have a role. Go and deliver the rail. And they say, How tight does this need to be? I don't know. How quick does the train need to be off the mark? They had no parameters to work from. How fast do the train doors need to open? No parameters, right?

So anything that -- yeah, so they basically delivered what they -- basically delivered something, but did it all work together to deliver the performance was -- nobody was kind

of keeping an eye on that.

123 Q. And who are you -- who are your counterparts here when you're interacting and getting these responses?

A. Well, again, my -- the challenge is that the questions were, you know, Show me the -- show me the integration plan. And then nothing. Show me your validation program plan. And we had maybe six meetings where OLRT brought us in and said, This is our testing plan. They put the schedule up there. But we didn't have anything really sort of in writing to -- to read ahead of time. They did those for a few, and then they stopped, because we would ask all kinds of questions, and they didn't -- you know, they weren't well managed.

And then, yeah, we just saw -- like, again, my -- my -- my observation of the system was anecdotal, right? So I would watch a program going through and then say, you know, How -- you know, how are these things working together and under what -- what's your -- what requirements have you been given by the integrator to perform to? And nobody was able to provide sort of a clear, you know, indication of what they were required to

perform to so in, like, a sub contract or interface document or interface specs. These conversations were ongoing, but we were not allowed -- we were not privy to them.

As I mentioned, there were changes being done to the vehicle and to the train control in 2017, 2018, and we could find out after the fact. And we --

124 Q. Is --

A. Yeah.

125 Q. You can keep going.

A. They were -- they were really under no -- they were under no obligation to disclose or discuss anything with the City as part of the nature of the contract.

126 Q. Is this in the context of RAMP meetings that you're getting this information or making these requests?

MS. RUSSELL: So sorry. I don't mean to interrupt. I didn't catch the word you said before "meetings."

MS. MAINVILLE: RAMP, R-A-M-P.

THE WITNESS: Rail Activation Management Program?

BY MS. MAINVILLE:

127 Q. Yeah.

A. I wasn't involved in those.

128 Q. Okay.

A. I know they were at a higher level, director level. At the engineering level, we'll call it that, Richard was able to get OLRTC's team to do some weekly meetings where they would discuss the validation plan, because we were -- we were to witness the testing. And part of it was to, you know, see the test procedures, get ready for them, watch them, observe them, and witness them.

129 Q. M-hm.

A. And part of that was, you know, being able to see the -- get some visibility into the test procedures and the schedule from a -- sort of an assurance point of view, that's just, like, the end formality, right? So all the troubleshooting and everything should be working ahead of time, and this is the kind of final stamp, which in order to provide, you know, sort of an oversight as to the quality side, that -- that -- it was -- it was still kind of high level.

But, so, yes, we just got -- and just

kind of final accept appearance, right? So it was once everything was in the final state, they would demonstrate it for us, sort of a dog and pony show, and then that would be their -- their evidence that it's ready to go.

So we were -- we -- we brought in for a -- so we had a validation schedule or a test and accepting schedule, and then we test -- test to witness. But even then, the meetings lasted maybe six or seven meetings, and then they got -- just kind of got frustrated with them, and the meetings got cancelled.

130 Q. When you say "they," you mean OLRTC?

A. Yeah. Yeah. All I know is I was -- again, I was the consultant in support of the City. So when they invited me, I went; when they cancelled, I said okay. But, yeah, they were struggling with the -- the -- the validation meetings in the -- meetings, because they put a plan up there, and we would immediately look at what's on the screen and go, Okay, well, we haven't seen the procedure for this. How is this going? That one -- that -- that thing you said is already done we know you haven't done yet. And we'd

challenge them real time.

Overall, the engineering levels were very helpful. The engineering level teams were very helpful when asked direct questions. But when we asked for, you know, anything that would show -- we asked for, like, a detailed test procedure, a detailed test schedule, they were not able to provide one.

131 Q. Okay. And so are you mostly dealing with the engineers at the meetings, or were there project directors and managers?

A. Well, I say engineers. I mean Mathieu Branconnier, the manager of testing, Mr. Bergeron, and from the City's side, there would be many people there from OC Transpo, because they were -- they were -- they were kind of operating the systems throughout the testing phase, and as well as construction office. So, yeah, like, the managers -- the test managers --

132 Q. Okay.

A. -- from OLRTC.

133 Q. So you're not necessarily interacting with the project managers and directors?

A. No, not -- well, the managers -- I

say managers, yes, but not the directors.

134 Q. Okay.

A. So not -- I forget some other names, but, yeah, not the same --

135 Q. Not Eugene Cramer or Matt Slade?

A. Matt Slade, yes.

136 Q. Yes.

A. Certainly, and Eugene was in the room for some of these, yeah.

137 Q. Okay. And then just going back a little bit, when you talked about being reluctant to -- to provide, I think -- correct me if I'm wrong, but to provide some of this, was it a lack of -- this was when you were talking about the failure modes as part of the testing and conditioning. Was it a -- to the best of your knowledge or observations, you know, a lack of time, a lack of understanding of what was required, you know? What -- what informed the --

A. Well, in terms of the --

MS. RUSSELL: Sorry, I just --

BY MS. MAINVILLE:

138 Q. I'm not asking for their perspective. I just want your observations in terms of --

MS. RUSSELL: No, and fair enough, counsel. I just wanted to be clear, because I think I understand what you're getting at, but you talk about -- you said about them being reluctant or someone. I just want to --

THE WITNESS: Yeah, I wouldn't use that word.

MS. RUSSELL: -- confirm who you mean -- who you mean when you talk about reluctant. I didn't understand that necessarily from your question.

BY MS. MAINVILLE:

139 Q. If you could clarify? Because you used the term earlier, "reluctant," and that's what I'm trying to clarify.

A. Okay. Yeah, maybe that's a poor choice of word. Yeah, the -- they -- yeah, they -- again, we didn't have visibility into it, right? We didn't have sort of commercial rights to demand documents outside of what was in the contract. So the -- the -- to that point, though, we also weren't able to scrutinize or provide, you know, commentary or troubleshoot or highlight any issues around integration or failure mode management, right? So if -- you know, if one system raises an

alarm and sends it to the other system, did they action it? When I say alarm, basically fault reporting across all the systems. And was that being, you know, stuck together well?

And that was probably the most evident, because the alarm reporting system was provided by -- by the -- the -- what the -- what the controller saw on the screen was the -- Alcatel, you know, displays and the SCADA displays, but they're getting inputs from a bunch of other sub systems, right? The fire, the stations, the power.

And so they were, you know, always -- this question of should this be a report? Should this be alarm or should this not be, nobody was kind of putting that together. So when a sub system raised a -- they raised -- went beep, the message went through, and what do you do with it? I don't know. And that -- that -- so that was one sort of very visible point of where the integration of the systems was not managed. Because we raised a couple of points, Somebody needs to look at this and they go, Okay, when this system send this line over here, what should we do with it? And that kind of just -- that went no, right? Or they just -- like, it just dragged and dragged and

dragged. Because the different sub system vendors, again, they delivered their thing and they commissioned it, installed it, said, Yeah, we're good, and then, you know, nobody -- nobody told them up front how it should work in terms of corresponding with other systems. And then if they got -- made any changes afterwards, then that's a change, and that might delay things, so...

140 Q. And --

A. But yeah.

141 Q. -- I just want to be clear, every time you say Alcatel, you mean Thales?

A. Thales, sorry.

142 Q. Because they changed names?

A. They changed names. I worked -- I worked for 10 years -- 10 years for -- I worked for nine years for Alcatel and one year for Thales. That's on me. Sorry.

143 Q. That's okay.

A. But to that point, the Thales team was doing everything right given what they were instructed to do from their customer anyway. That's my -- that's my sort of assessment on it.

144 Q. Do you know why SEMP was brought in?

A. The SEMP consultants. I wasn't part of that advice. That occurred just about when I first started with the program.

145 Q. Do you know what they brought to the table?

A. I would be speculating a little bit to answer that.

146 Q. That's fine. What did they bring to the table?

A. Fundamentally, the safety case, I think, because they were asked to clean it up, as the multiple different vendors had, you know, hazards that, you know, existed and potentially operates through multiple systems and there was -- and they needed to get things in order to manage that better. And the -- you know, every -- every vendor doing their own thing leaves a lot of opportunity for stuff to fall in between, So that's why it's important to have them -- have a -- an integrated safety hazard mitigation strategy as well as requirements, you know, through the different systems and through the different companies that are providing those systems. And so somebody needed to put that together.

And I think SEMP had to come in,

because it wasn't done during the -- it wasn't done -- it wasn't well managed during the design phase. They were brought in late, and so they had to generate documentation, you know, on systems that were already in the mail.

147 Q. And what --

MS. RUSSELL: Sorry, I don't want to --

THE WITNESS: I'm kind of speculating a little bit on that.

MS. RUSSELL: Yeah. Please --

THE WITNESS: I know.

MS. RUSSELL: -- I don't want you to speculate or to guess in respect of any of your answers.

THE WITNESS: All right.

MS. RUSSELL: Sorry, counsel, I didn't mean to interrupt. I just have my eye on the time, and I just realise we have been going for about an hour and a half now. I was just wanted to check in to see if Mr. McCurdy might require a break or --

MS. MAINVILLE: We'll take a break regardless. Let's go off the record.

(ADJOURNMENT)

BY MS. MAINVILLE:

148 Q. Testing, can we talk about testing

and conditioning and what the plans were when you come in?

A. Okay. So I'm just pulling up some -- some notes and items here, because there is a Testing Commissioning Working Group.

149 Q. Were you part of -- were you part of that?

A. Yes, I was.

150 Q. Okay. And --

A. There was a series of meetings --

151 Q. Sorry. I just want to clarify. Was that a City working group?

A. Hosted by OLRT constructors. They -- a -- a large audience, including Frank Fitzgerald, Jacques Bergeron, Mathieu Branconnier, John Selke, Jonathan Hulse, and myself, so almost too many people. But it was basically a schedule review of the Testing Commission activities and around 2018, so end of -- end of 2017, early 2018. So I'm just pulling up some notes here. They have testing on there, and it was to -- I imagine these were part of the document trove.

152 Q. These are notes you took at the time?

A. No, these are the official minutes by the OLRT --

153 Q. Okay.

A. -- constructor's group.

154 Q. And do I take it that, being part of the group, you -- you -- you had the -- you had access to the information you needed for testing and conditioning?

A. I had access to the integration that was made available, which was largely this meeting.

155 Q. Okay. So tell me about that.

A. So, yeah. So they delivered verbal reports on the status. So they would deliver an issue -- in the minute -- in the -- in the meeting, they would put up a testing schedule. And then they would check it off, saying, Yeah, this is what -- this is what we've done, this is what's outstanding.

But it would be largely high level, so it would be sort of a checklist of what they have accomplished, what their updates are, and what tests have been completed.

So they would say -- like, for example, one note here, it said CBTC -- which is the train

control -- Zone 3, Maturity 0, test completed. Right? So I was, like, Okay, so what is Zone 3, Maturity 0? And then they go well, Oh, well, you have to go -- and so we'd get sort of a rough schedule saying, Okay, well, it's these tests. I go, Okay, can you give me the content of those tests? And they go, you know, No, no, this is kind of -- this is kind of all it is. Right? So it's kind of like a title. Just scheduling and updates, but the details of what was tested and what it was tested against and the past criteria were --

156 Q. So can I --

A. -- was -- was not challenge -- was -- was included in the meetings.

157 Q. So can I clarify? Are you witnessing any of the testing, or you're just receiving these updates about it?

A. Okay. You raise a very good point. No, I'm not witnessing these tests.

158 Q. Okay.

A. Right? So they -- when I -- when I sort of, you know, go out there and watch, they're doing testing. And I say, Can you share me -- and I -- can you show me your results? And it's kind of, like, No, no, no, we are just

recording them on the hard drive. We're going to take them away and write up the report. Which is fine; that's normal.

But then the reports, they weren't sent to the City. They were sent to -- they basically stayed within their companies and still never -- never seen the reports from any -- from -- from a lot of these testings.

159 Q. Didn't they need to be approved if not by the City then by the independent certifier?

A. No. The -- the detailed level of the functions -- any -- the functional tests and the maturity level test, right, so is the -- is the -- is the software functioning in the field? Is the train tracking? Is the signal getting through? Those type of things, those were never -- well, hang on. Both kind of yes or no. The -- the -- the functional tests, we have not -- we have not seen the procedure. The detail -- the lower level functional test, we have not seen the procedures, and we have not seen the final report.

160 Q. Do you know --

A. The -- and -- and --

161 Q. If you could just pause sometimes, because your answers are very long, and I -- I do

need to ask some --

A. Okay.

162 Q. -- clarifying questions.

A. Sure.

163 Q. Do you know of anyone at the City who received this?

A. No. They haven't -- if they haven't -- they were supposed to come to me when they come in.

164 Q. Okay.

A. And they were supposed to be delivered as part of the package for substantial completion.

165 Q. Right. So you're basically -- you were designated as the person in charge of the testing and commissioning for the City?

A. No, I was -- I was not in charge -- I was not in charge of testing and commissioning for the City.

166 Q. So why would it come to you if anybody --

A. Well, I was oversight for the train control system. You raise a good point. When you say who was in charge of testing for the City, nobody really had that role. We were -- we

were witnessing -- the rail -- the rail construction office was the witness formal acceptance tests, right? And so that is the highest level checklist, right? So, like, the end-to-end, yeah. That -- so there was a list of the higher level tests.

But anything sort of below that, like, are these two systems working right or if a failure occurs, does the alarm go through, those are -- we were blind to those.

167 Q. So am I right to say, then, that you/the City --

A. M-hm.

168 Q. -- received everything that was required under the agreement in terms of -- required to be produced to the City in terms of the formal acceptance test, you just didn't see the sort of more granular testing results?

A. We were -- any ability to assess the -- the -- the functionality of the -- and the -- and the -- okay. Two -- two points. We didn't -- we -- we -- in -- in many areas, we didn't know what the systems were going to do until we saw them, right? So for the -- the -- like, the train doors, the -- the alarm messaging and things

like that, you go, you say what messages is played at what station at what time? If you want to find out, you have to go to -- you have to wait until they install it and then go to the station and try it. But we couldn't get a list of what it was supposed to do before it went to the field and was installed.

So the City's ability to say, yes, this works, no, this doesn't, or you've totally missed the requirements on this, we were not able to effectively evaluate if the design sort of worked for the users, the operators, the passengers, because those aspects were only -- we had a very high level design review material five years ago -- like, 2015, 2016 -- what was actually delivered in the field, sometimes the -- something slightly different. There was no mechanism for updating the new function to the City.

If the vendor's provided that to OLRTC, it didn't get through, because they would only submit through what they were required to. Everything else, you know, they just didn't, because they weren't required to.

169 Q. And --

A. And this was an issue for me in

the -- trying to, you know, see -- try to see if the -- the -- the images on the screens, the service reliability in case one thing goes wrong, can you go around it? The messages on the wayside, the response to the guideway intrusion, were they going to work in the field? We didn't have the details as to what the systems were doing, were supposed to do, or what they were doing until we went out there and -- and looked at it after it was installed.

So this is why -- and then at that point, we would say, Wait a minute, there -- there's a deficiency here, and they go, Well, it's too late, right? We're going -- if you want, we're -- you know, it's already installed. And so it was very frustrating in that area, and that's why we continue to have a list of deficiencies and concerns that would -- that would -- so after substantial completion, there was a list of outstanding, you know, items raised by the City saying you haven't done these, we haven't seen the test reports, these functions aren't there, you're -- you know, you have the documents for it -- for that.

And, yeah, and then they -- they --

the -- any -- ideally, an integrator, risk management, oversight in the City would identify these concerns early on when they could be resolved, and that was our goal in doing that. I think to a certain degree, it was within the constructor's goal to do that as well. But a lot of things got -- you know, we just didn't have visibility on them until after it was already built.

170 Q. Okay. And so as I understand it, these were in relation to things the City had to sign off on?

A. No. We didn't sign off on anything.

171 Q. But -- but you couldn't -- in terms -- and that goes to your point about having a list of outstanding items at substantial completion; right?

A. Well, sorry, can you clarify that question?

172 Q. So I guess I'm trying to distinguish between what, on paper -- not -- you know, the City should have been able to sign off on versus --

A. Okay.

173 Q. -- what you were actually able to. I'm just trying to understand.

A. Okay.

174 Q. Like, the City was supposed to sign off on these, were they not?

A. The -- the -- the contract only had the high level acceptance procedures, right? It was at the City -- because we -- we did receive the top level test procedures and commented on them, but the City didn't have approval over them. So if we had a -- a concern, saying, you know, This isn't good enough or you missed a spot, they kept going and were under the rights to do so. Right? They were submitted for -- for comment but not approval. So we could have a comment, but they were not required to do anything with our comments.

175 Q. So is it your understanding that --

A. Provided they were fully compliant to the project agreement, which was very high level.

176 Q. Okay. And was it your understanding that they were -- what was deficient and the list of deficiencies and concerns that you -- you referenced at substantial completion,

these were not things that could prevent the substantial completion? Like, were they just comments as opposed to --

A. Well, there -- there -- there were many of them. Many of them are the -- the tests weren't completed, right? The testing weren't completed successfully, we don't know what it does, we don't know if it does to the right requirement. It just wasn't done.

177 Q. And --

A. And the -- the question of, you know, is that something that they want to -- you know, substantial completion under the contract allows for things to be carried past it.

178 Q. Right.

A. Some things subject to mutual agreement.

179 Q. Right. Again, that's what I was getting at. These were things the City ultimately agreed to defer, but think didn't have to. I'm trying to --

A. That's -- that's something I can't make a statement on. I provided my -- I provided my list of concerns as part of the substantial completion assessment in 2019, and they were taken.

And the City and the constructors then -- then -- then took those -- took those items along with the rest of the teams, right, the architecture team, the vehicle teams, and they took those forward as part of the substantial completion, submitted it to independent assessor, and it was out of my hands at that point.

180 Q. And you submitted your input to Richard Holder?

A. Yeah.

181 Q. Okay.

A. Yeah, Richard, Eric, and that -- that team to then put into an ultimate response to the substantial completion request and -- and manage that.

182 Q. And did -- what discussions did you have with Richard Holder about this or -- or Eric?

A. Well, part of the substantial completion -- let me pull up a few notes on -- on it; and, again, this should all be documents that are already part of it -- is they submitted a set of -- trying to find the deals here. Yeah, so they submitted a set of documentation with their claim that they are substantially complete. Yeah. So

April -- 26th of April, 2019, substantial completion notice.

183 Q. You mean by "they," RTG?

A. Yeah, Rideau. Yeah. So that was sent to -- so they submitted that and we -- we responded -- or I -- I provided inputs into their response.

With that, they -- they -- formal -- formal notice that they feel they completed all contents of the contract, and then here is their evidence to do so. And then we were asked to open the evidence and identify it if everything was there or not.

184 Q. Okay. So you had input into whether substantial completion was met and the various items there?

A. Yeah. So I -- I identified a number of -- of items of concern, provided them to our -- Richard and Eric's teams to -- to -- and compile.

185 Q. And --

A. And --

186 Q. -- just so I'm clear, because Rideau Transit Group applied twice for substantial completion, and I don't have the dates in front of

me, are you referring to the first time or the second?

A. First time.

187 Q. And, in fact, at that time, substantial completion was not achieved?

A. Correct.

188 Q. Okay. If we move to the second date, did you provide the same input at that time?

A. No, I did not. I was -- I was not requested to.

189 Q. Okay. And when -- I don't think we -- I asked you, when did your involvement on the Ottawa LRT project end?

A. The project concluded when they went into revenue. So I continued to provide supervision on the program through to September, October 2019, but I also continued -- I continued on, and they -- an ongoing basis, you know, offsite providing -- to assist Richard with the resolution of the outstanding deficiencies as they pertained to the train control.

And also I've been working to support the system for scheduling, so for train schedules, and also provide oversight on post revenue design changes and updates.

190 Q. Okay. And -- and until when? Are you still involved at all?

A. I'm still -- I'm still involved with it, yeah.

191 Q. Okay. Got it.

A. I think we've concluded that -- yeah, so I'm still involved once a month to support Richard in -- in trying to conclude technical deficiencies from the Stage 1. It's minor -- you probably -- you're aware of the -- what they -- what they refer to as the deficiencies list.

192 Q. The minor deficiencies list?

A. Yeah.

193 Q. Are some of those deficiencies you would not consider to be minor?

A. I'm -- the minor/major is more of a commercial definition that I don't wish to comment on. I do see them as deficiencies, but I'm just focusing my attention on the train control aspects, usability, some functions that were deferred.

194 Q. It is a pretty extensive list; correct?

A. M-hm. Yeah.

195 Q. And --

A. I'm only tracking a small set of them.

196 Q. Right. Okay. And is that the case for your earlier input on substantial completion? Is that focussed on train control or was that more --

A. Yeah, I was focussed on the train control.

197 Q. Okay.

A. There -- there was a -- there was a large team there working on tunnel vent, power, vehicles, and so I was provided the train control on --

198 Q. So even your involvement on testing and commissioning was focused not on overall testing and commissioning but on train control?

A. Yeah, on the train controls and, by extension, things that the controls touched, right? So headway, throughput, travel times.

199 Q. Okay. Are there any -- well, first of all, you were -- you say you were not asked for substantial completion for input. Do you know if anyone else --

A. On the second one.

200 Q. Yes. Sorry. Do you know if anybody else was?

A. I don't know.

201 Q. Okay. And you --

A. They -- they could have taken my input from the first and done, but I also -- I also didn't receive an updated package. They gave a package of their test -- of their test -- of their evidence of completion, test report, I guess, validation evidence, and I've not seen an updated validation evidence. So whatever I saw in April was the last test valid -- was the last test report that I've seen.

202 Q. April 2019?

A. Yes.

203 Q. So did you not provide later input into the minor deficiencies list?

A. Yes, I did.

204 Q. So what was that based on? Like, what --

A. We're -- well, one of them was a lot of the tests were still not -- I have no evidence that the tests were done, and I have no evidence what these tests are. And so, yeah. And so they're saying everything's, you know -- all the

testing is completed, and the City doesn't know what the test -- what the -- you know, we only know the top level test procedures, but we don't know the detail -- we don't know the sub system test --

205 Q. What --

A. -- what they were, were they done, or were they done successfully?

206 Q. What would you consider the most significant tests that you're not sure were -- were performed or that you have no evidence of -- of being performed or of the results?

A. Well, the most significant one is the -- is the -- the current performance of, like, the speed control and the current performance of the failure management. We are left to -- we are -- we are trusting that the integrators and the sub vendors have done everything diligently in terms of -- of safety and fault management. And, you know, having worked with them, I don't have any doubt to that, because they're very, very careful.

But in terms of the -- you know, the -- the -- the fault reporting and the speed control resolution and the travel times and, you know, those items, they were still kind of being modified, and we never saw evidence of a final

conclusion.

So from my -- I'm looking at it more not did the test fail but did they have clear pass criteria, right? And what did the system do when you do this, this, and this? And we kind of don't know.

And I'm looking at obscure scenarios, right? We know normal scenarios: You know, leave, go to the next station. That's fine. We watch -- we witness it every day. But it's the -- the -- what we don't do -- what we don't use it for every day. We don't know what it does until we try it -- we try it out. So we ask operators in the field to, you know, send a command and see what it does, because we don't know what -- you know, under what -- there's conditions of the details that we don't have visibility into from the design -- from the test -- from any test report.

So we should see the -- the vendor, the -- the integrator should, you know, check the system out, put it into a -- a test result and get the test result to the quality checks. And somewhere in that pipe, we as the City, we're -- we're -- still have not seen the test -- like, the full set of test results, so we can't scrutinize

them.

207 Q. And what discussions did you have with Richard Holder or Eric Dubé about that or others in the City?

A. They know.

208 Q. What was the response?

A. I just provided my observations. It's not -- it's not for me. They don't owe me a response.

209 Q. No, but did they respond? Did they say they would follow up? Did they say they were not concerned? Did they -- like, was there a response?

A. They wouldn't respond to me. I -- I didn't ask them to. I said, look -- in my -- in my summary submissions there, I said, Look, we haven't seen the final test results for -- for the detailed stuff. We have test results for the completion. That was submitted as part of the process for substantial -- claim of substantial completion and the notice of readiness for revenue service under the P3 contract.

And I wasn't -- I wasn't part of the decision to, you know, evaluate those when they came through.

210 Q. Are there any items on the minor deficiencies list that could have impacted performance reliability or safety of the vehicle?

A. Not safety. They were very -- they were very cautious on the -- ensuring that safety hazards were -- were resolved --

211 Q. M-hm.

A. -- on there, and that -- that continues to be an ongoing thing. I think in terms of reliability and fault management, I've raised a couple items of concern where the vehicle would have to default back to manual condition, and then the operators would take it from there. But we had those workarounds operating in place.

But as an ongoing level, we want to get those systems, you know, not relying on manual override so much.

212 Q. Okay.

A. So they're -- they're safe -- safe to run with currently, but we'd like to see them resolved before we close out the final program.

213 Q. And did you convey to the City -- well, let me first ask you this.

A. Okay.

214 Q. What input did you have about

this -- this fault management issue being on the minor deficiencies list?

A. Yeah, just to provide regular -- regular update. I think after revenue, we -- we met with the OLRT constructors on a monthly basis to -- to review them to -- to sort of try to explain why we raised those comments and where the issues were so they understood them and then asked for action for our -- prior to -- prior to resolving. And we still have those meetings down once a month.

215 Q. What I mean is did you have concerns about that item not being resolved prior to revenue service availability?

A. The items that are currently on there are -- are mainly related to scheduling. So they -- the trains are running. They're not running as well -- as sufficiently as they should turned contract, but they are running. And so we continue to try to get action to improve those -- improve the accuracy of the scheduling.

216 Q. So you mean the -- the journey times being met and such things, the performance?

A. Yeah.

217 Q. Okay.

A. Yeah.

218 Q. What about vehicle availability?

A. That's not an area that I provide input on.

219 Q. Okay.

A. Right? So when you look at the vehicle -- vehicle faults or vehicle going into a shutdown mode, that's not -- there's a team working on that, and I'm not part of that. I'm -- my focus is on the control and operations.

220 Q. Okay. And did you -- did you convey concerns about any items on the minor deficiencies list being on the list and not being resolved prior to revenue service availability from a -- particularly from a reliability standpoint, right, that could impact the performance of the trains or the reliability of the train?

A. None would rely -- none would impact the reliability. None would cause a failure or -- or change the response to a failure on there. It's more in terms of travel time, headway, throughput, and functionality.

There was one -- there was one item that we -- that was held open for six months that was impacting the reliability, but it was

addressed.

221 Q. What was that?

A. Around the switches.

222 Q. Right.

A. Yeah.

223 Q. So you mean it was addressed after -- six months after revenue service?

A. After revenue service, yeah.

224 Q. Okay. And what was that --

A. As a -- as a post revenue update.

225 Q. Okay. And what was that issue?

A. It was around the reliability of the switch machines or -- or not -- sorry, not the machines. Reliability of the switches to report locked status, right? So when a -- when a switch -- when a -- a little bit of background is a track switch has to have two rails that are in -- in contact with each other, right? So that's when the train goes around and takes a corner. But they have to be locked, and there's another circuit on them to ensure that they're -- that they're -- that they're -- you know, that they're all the way over and that they're immobilised, right? So if they're a little bit open like that, you don't want your train driving into them, because that will cause a

derail. So there's a circuits on there that -- so a switch can be in place but reported to be maybe not fully verified. And that's what they call -- and that goes into this thing called the switch disturbed state.

And so through the switch machines, you know, maybe not making connection or maybe having some on-site problem, they would show as -- as not fully secured, locked. And then the response to the system is to say don't drive a train over this, because we're not 100 percent sure that it's safe to do so, right? And 100 percent actually means like a double check.

So if there's any -- so the circuitry verifies that the switch is all the way over and that it's locked. And if it's anything less than that, it won't allow the train to go over.

And with this guideway, if -- with two tracks running parallel for 12 kilometres, if one -- if you have a switch problem, then -- sorry, every -- every train runs over every piece of track and every switch. So when one switch goes down, it causes a lot of haywire in the system. And that -- and that can be from a -- a -- a reduction in service, right -- they have to switch tracks and

switch back -- or complete suspension of service, right? You just -- you can't get -- you can't get through either tracks.

226 Q. And did that occur following service?

A. I think we saw a lot of -- I think we saw several events in 2019 --

227 Q. M-hm.

A. -- through the first eight months of service. But I wasn't tracking the reliability reports on those. That was all within RTM and RTG. I was sort of -- I taking a back -- I was off the program substantially at that point.

228 Q. Are these reliability reports from Alstom, do you know?

A. This would be the switch machines.

229 Q. Okay.

A. So they would be from our -- they would be Rideau Transit Maintenance, RTM --

230 Q. Okay.

A. -- would be managing those in terms of work reports and then the remedial effort to -- to -- to improve reliability of the switches.

231 Q. And was that an item that you expressed concern about being on the minor

deficiencies list?

A. Yeah, for 2019, they were, and two components of it. One is the -- the mechanical reliability of the switch and then the system response to the failure. So they both need to be improved. So that's also tied in -- and, again, the switch is a complicated -- the switch is a complicated machine, right, because it's -- it can be affected by electrical concerns, it can be affected by lack of oil, it can be affected by ice or a -- or a heater not being fully tuned and -- and optimised, right? And they with work reliably all day, and then you walk away, and they fail in the middle of the night.

So it was a bug that the -- has been plaguing the system a lot through the commissioning and testing phase. So even a year before opening, we knew the switches were -- were having reliability problems. And so, yeah, that's reported in many of our -- of our reports.

232 Q. And do you know what the response was to that or why it wasn't resolved?

A. The engineering team was working on it, and it was a combination of factors. I wasn't privy to the final conclusion for it, but it

required an upgrade in maintenance procedures, upgrade to the track switch heaters, and the -- and the software change on zone controller.

233 Q. On the --

A. But they were -- all -- all those substantial changes were done after revenue service.

234 Q. Okay. Okay. But you don't know --

A. I wasn't privy to the details on those. That would be under the -- the RTM and the OC Transpo groups were managing that afterwards.

235 Q. Okay.

A. So it was reflected in Michael Morgan's deficiency letter and the remedial plan.

236 Q. Okay.

A. But I wasn't involved in those directly -- or indirectly. I was -- I was -- so --

237 Q. Were you aware of the terms sheet that was signed to go into revenue service?

A. I was aware that there was one, but I've not -- I'm not privy to it.

238 Q. So you were not asking for input to it?

A. No, not directly. I provided my inputs to Richard, he provided it to Michael, and Michael did the terms sheet. So I was asked for my -- my -- my items and -- and supported OC Transpo and the City in its decision-making, but it wasn't -- I -- I wasn't privy to the final result.

239 Q. What do you mean by -- like your items? On what were you asking for?

A. Well, part of the -- just the -- just the regular status reports. You know, what items are outstanding that are affecting the system? I provided my evidence to Richard, and he provided it up to the appropriate people within the City.

240 Q. Okay. And --

A. But I -- I wasn't -- I wasn't involved in it after that.

241 Q. Okay. And then in terms of items outstanding, did you have concerns about any of them -- about going into revenue service availability with -- with the items you identified as being outstanding?

A. The things I identified, they -- there was a -- there -- it's -- there were manual, like, workarounds, right? So if switches aren't

reliable, you get somebody out there, you know, manually addressing it, right? And it's -- it's -- and the risk is -- it was identified and, you know, the -- and the -- the appropriate contractors recognised it. And from what I saw, they were doing what they -- they were taking reasonable action to try and mitigate it.

But, yeah, no, I didn't have any concerns about the -- you know, the impact to the system --

242 Q. And --

A. -- at that point. It was always -- you know there were always -- you know, like, with any one of these system going -- going open, we knew that -- we knew that issue was there, and we knew it would impact, but we didn't know -- there's no way to know to what degree and to -- and -- and how it -- and how -- or to what degree it would be mitigated in service.

243 Q. Which issue are you referencing right now?

A. Again the switches, probably the biggest one, yeah. So they have a problem with the -- so the switches are reporting out -- out of status. Can you get -- can you get somebody out

there to get it back in status, you know? Probably. By and large, the failures weren't -- like, the thing didn't actually break, right? It just got wobbly.

244 Q. Right. Is it fair to say it was clear to everybody that there would be enhanced pressure on maintenance following --

MS. RUSSELL: So --

THE WITNESS: I kind of can't talk to that.

MS. RUSSELL: Yeah, sorry. I just wanted to make a point that Mr. McCurdy can't speak to what was clear to other people.

MS. MAINVILLE: Yeah.

BY MS. MAINVILLE:

245 Q. Was it clear to you that there would be significant pressure on the maintenance teams after revenue service?

A. I can't really answer that one way or the other in terms of what the maintenance -- what the design is. There were -- you know, I identified the concerns, and they were communicated through the City to Rideau Transit Group and Rideau Transit Maintenance, and, you know, they were the competent -- they were the competent group and

responsible to manage them. Their ability to do or not to so, they -- they -- that was part of, you know, going on. We did see improvements, you know, trending well through. Like when we first identified the failures of the -- of the -- of the -- of the switches in the vehicles in 2018 going forward, we did see a steady improvement in them. They -- they were really quite frequently failing when they first went out for, again, a multitude of reasons. They were new, a lot of things moving around still, still very much an active construction site, things were still being tested. So that was expected.

And then as we -- as they used them and we ran the trains over them and we got more milage on the system, we did see an improvement of reliability all the way through 2019.

246 Q. Were you ever --

A. Trending -- so things were overall trending in the right direction.

247 Q. Were you asked to provide an opinion as to the readiness of the system or -- or the train control system for operations?

A. Yeah, so I identified the -- the -- the items in the -- in the -- they were

captured in the deficiency list and the response to the substantial completion package, right? So what -- what were things in there that were still missing? What were things we saw from the field? What were things we saw from, you know lessons learned from, you know, recent site failures?

And they were -- so they ultimately were captured and managed part of the outstanding terms sheet to a degree -- I haven't seen it -- and the -- and the minor deficiency list.

248 Q. Did you provide an actual opinion as to whether -- in considering those outstanding items, whether the -- you thought the system was ready for -- to go into service?

A. I don't provide comment as to whether it was -- whether the whole system was ready, but were there items of functional reliability deficiency related to the train control? I identified a number -- those through the substantial completion responses and to the -- to the -- to the deficiency -- to the minor deficiency list.

249 Q. And what -- what were those aside from the switches?

A. Primarily the switches and

primarily the -- sort of the outstanding risk of not having a final test.

250 Q. Okay.

A. Procedures or evidence or results. So we don't know what it -- we -- so aside from what we saw it do, we don't know if it -- what -- we don't -- we don't --

251 Q. M-hm.

A. -- have the pages to -- if it's doing what it's supposed to do and if it's doing everything that it -- if there's any outstanding test, you know, failures on that.

252 Q. So based on what you were able to observe, are you able to say whether the integration testing was sufficient?

A. The integration testing was kind of done by experience. So they put the state of the power, the vehicle, the train control together, and they ran it, right? And if the whole thing runs, you're integrated. Right? So instead of -- it was done by demonstration of integrating it and running it. So that's how, you know, you know if your -- if your speed control is running the train right is you actually do it and then watch it.

253 Q. But what's your view on the

sufficiency or adequacy on that?

A. Overall, it's -- no. Well, you've asked a question about, you know, how -- how was the integration testing done. The answer is you integrate it and then run it. And then if the overall -- and the -- and the end result is successful, then your integration is successful.

And so that's always been -- that's always been the procedure on these systems for -- you know, in -- in my experience. The final -- you know, the final proof is in the field.

254 Q. Did you get a result for -- like, was there -- did it pass the integration test? Did you get that information?

A. We got test results from a number -- we got -- we got a substantial set of test results. The -- on the overall -- on the overall system. So, like, the end-to-end travel time results, we got a result for that.

But there were also functions in there for, like, alarm disposition, schedule delay recovery -- like if there's a delay, did that recover -- that test was never really done. The -- as a follow -- as the form of commissioning tests, that was never done. Were the trains departing in

the right amount of time that we expected them too? Nobody really checked that.

So OC -- so you know, working with OC Transpo, we basically started running a test on the system as well to demonstrate what it did.

255 Q. Did --

A. Or -- or -- or if those tests were done, we don't know about them, because they weren't -- we didn't get the detailed procedures nor the detailed test report.

256 Q. Okay. Did Thales express concerns about the sufficiency of the integration testing?

MS. RUSSELL: Well --

THE WITNESS: No.

MS. RUSSELL: -- only --

THE WITNESS: I'm not privy.

BY MS. MAINVILLE:

257 Q. To you.

MS. MAINVILLE: I asked if anyone from Thales expressed concerns to him.

THE WITNESS: No. And this was -- this was their tests, right?

BY MS. MAINVILLE:

258 Q. Right. But do you know in terms of the time that they were given to run these

tests, did that seem sufficient to you, or was it very compressed?

A. Oh, they had time. The -- the concern -- was there was certainly a pressure on delivery to schedule, 'cause you remember, do you live -- you -- you -- do you --

259 Q. In Ottawa?

A. Do you -- do you live in Ottawa?

260 Q. I know Ottawa, yes.

A. You know Ottawa? Were you in Ottawa in 2018, 2017 walking around? Okay. Anyway, there were signs on Queen Street saying O Train 2018, right? 12 foot high all the way down the street, O Train 2018. So 2018 came and went. The -- there -- and there was certainly a pressure -- a schedule pressure, right? And it was, okay, we got it -- what -- and everything -- the -- the delivery and schedule, and you can see this in schedule update, is they didn't put the end schedule -- they didn't rebaseline the -- the testing program to say, you know, the vehicles are coming in here, the track's coming in here, your testing window is now, you know, end of 2018, beginning of 2019. The schedule said, you know -- again, you can find -- I sort of -- I don't have it

in front of me, but the schedules were always very optimistic. You know, it was, yeah, everything -- 30 days, we'll be ready to go. Plan -- plan to launch end of 2018. We're going to make the end date. So they would move six months, six months, six months, six months. And so there was a pressure to, you know, finish in six months, and then it would move.

261 Q. M-hm.

A. And -- but, again, some -- and -- but at the end of it, it's -- they were looking for a reliable vehicle, a reliable switch, a reliable switch, and then they could test the train control, because the train control ties everything together. And so the track, the train, the switches, and the power need to work first; then you can check out your train control and run it to -- to demonstrate reliability.

And so by delay in having vehicles go out and then break in the middle of the test, you lose -- you lose -- you lose the day, right? Having a -- a switch machine fail, you go out, you try to run a test where you got five trains out on a run, one of the trains fail and the switch machine fails, then you those week. And so they

were -- and you lose any benefit from that test.

And yeah. And, again, this happen -- again, I've commissioned five different systems this way, and this is really quite -- this is not abnormal, but it was -- you know, it was -- it was a challenge in the way -- you know, they tried to manage the unknown, right? Because, like, you have a -- the -- go out, the vehicle has a problem, you bring it back, you fix it, you put it back out, and then you try to fix it again.

And there was a period where they were doing -- doing a lot of that, but things were slipping in terms of schedule.

But the -- so the -- the integration testing was, I think, under some pressure because of late reliable performance of the track and the -- and the -- and the vehicles to support the testing program.

262 Q. And did that last till the end of the integration testing period or -- or -- or even beyond?

A. They were able to complete the tests, but it delayed -- you know, that was part -- that was part of the -- the -- the delay. And then certainly there was a, you know, desire for RTG to

enter service.

263 Q. Right. And --

A. And so --

264 Q. And the City, I take it?

A. -- they got pushed, right? So they got a -- you're -- you're sort of start of testing gets sort of delayed by the sub systems, and your end date is under pressure as well.

265 Q. Fair to say the City was also --

A. I -- I don't -- I'm not going to comment on that.

266 Q. Well, you just commented on RTG, so I'm just wondering on what basis are you able to say that versus --

A. Because I saw the schedules that RTG was sending.

267 Q. Okay. And you're not --

A. Yeah.

268 Q. -- able to say whether you witnessed whatever you want to call it -- pressure, incentivised, you know, or -- or sense of urgency to be part of the City --

A. Yeah.

269 Q. -- to get to revenue service?

A. Yeah, their -- their -- their

desire was to gain the substantial completion milestone at the first opportunity. And I could see this by the -- by the letter they sent in April.

270 Q. "They" being?

A. Rideau Transit Group.

271 Q. Okay. No, but I'm asking about the City. You're not able to say -- you didn't witness anything about whether the City was eager to get to revenue service?

A. No, nothing outside of what the mayor put in his press releases and things.

272 Q. The signs on Queen Street, were those City signs?

A. Yeah, the City -- City of Ottawa OC Transpo communications stakeholder management. They were very excited to -- to -- to show the -- you know, in -- in 20 -- in 2013, they put up signs saying revenue 2018.

273 Q. Right. Did -- in terms of full integration testing --

A. M-hm.

274 Q. -- I understand in terms of the trains running the full line, that was --

A. Right.

275 Q. -- only able to be done later in -- well, fairly --

A. I'd have to --

276 Q. -- (indiscernible)?

A. -- check the schedules and that, but, yeah, they didn't get the full end-to-end running until 2018.

277 Q. Was it into 2019?

A. I'm thinking summer -- summer -- or -- or late -- late 2018, I think they got the track in, track and power, and then -- and then the vehicles started coming online.

278 Q. Was there from your perspective enough time to -- to run the trains across the whole line?

MS. RUSSELL: Sorry, counsel. Mr. McCurdy may understand the question, but I don't really understand your question. What do you mean, enough time to run the train across the whole line?

BY MS. MAINVILLE:

279 Q. Well, let me ask you first. What -- what would be from your perspective the -- the amount of time that you would want to see the trains running on a new system like this in terms

of dry running and -- and -- and going around the full line prior to entering into service?

A. It's hard to say if the -- we know -- I worked on a program -- let's see. I -- it's very -- it's really quite hard to say. You do want to be able to have enough mileage or hours running on the vehicles to shake out any -- any hidden failures.

280 Q. M-hm.

A. Right? What that number is, it would be the subject of a sort of more detailed reliability analysis. And I think the schedule -- so I -- I'm not going to comment on that, but the -- I think the schedule accounted for adequate time to prove out the vehicles for -- before revenue. The schedule -- the original schedule.

What it didn't factor in was sort of any -- any unreliability issues on the vehicle that -- that may be -- may be outstanding, expecting -- but the vehicles have to perform up to that reliability standard early. And then it's just a matter of proving out the -- the -- the reliability demonstration, right? So it's a matter of -- and so once -- once they're operating well, then there's a certain amount of time to prove it.

281 Q. Right.
A. They were a bit late in getting to that level of performing.
282 Q. M-hm.
A. And so between the level of performing and the level of proving, you can kind of see where things are going there.
283 Q. Was the --
A. And so the schedule had enough time for it --
284 Q. Okay.
A. -- if they were reliable at the start.
285 Q. Okay. So, in fact, was there -- was there sufficient time to shake out all those -- the bugs on this before revenue service on this project?
A. They -- you're kind of asking me to look a bit in hindsight a bit on that. At the time -- at the time, I don't think anybody can make a confident call one way or the other.
286 Q. Okay.
A. Because we knew there were -- we knew there were some bugs, but how big they were going to be in the future would have been a call at

the time looking forward.

287 Q. Were you involved in trial running?

A. Loosely. So I wasn't involved in the -- I was on site during the trial running, and I was -- when -- I was requested to be very hands off during that period and let them -- let them run.

288 Q. Were --

A. So not to be in any control rooms, not to be in any rooms, not to do anything more than just ride the train sort of as a passenger, right, unless -- unless I may inadvertently ruin things.

289 Q. Who made that request of you?

A. Well, that would be -- that would be Eric Dubé. I said, Yeah, can I go in? As I mentioned before, I would go on the site and observe in the control room. But during the test procedure, they asked nobody in the room that didn't need to be there. And so I, you know, politely said I'll take another step back and just watch outside.

And that was also -- that was the way -- that was the process of the trial running

was, you know, you run it like you're running passengers, and when you're running passengers, you don't have people doing site visits.

290 Q. What were your observations of issues that the trains were encountering during the trial running?

A. Limited. As I said, I wasn't in the rooms, and I wasn't privy to the reports at the end in terms of the, you know, reliability failures.

291 Q. Okay.

A. I was still providing, you know, feedback on the -- on the -- on the train control testing, and I was available to be on -- on call to provide support, and I think I visited a few sites just to check on the status of some other elements unrelated to the operations like telephones.

292 Q. Were you consulted about any issues during the trial run?

A. No.

293 Q. So you weren't provided with performance data reliability reports?

A. No, those were -- those were part of the reliability demo team, and I was not privy to any of those documents. I still have not seen

any of the reports -- of the results of that except that trial running test.

294 Q. Okay. Do you know whether there was automatic train control testing or train ATO testing or...

A. The whole system was running in automatic mode with this -- with all -- with all the -- all the automatic scheduling and operation functions.

295 Q. Would you expect Alstom have been involved in that testing?

A. Alstom?

296 Q. Yeah.

A. Sorry. Can you clarify the question?

297 Q. Well, aside from -- I take it -- of course Alstom would provide the trains --

A. Yeah.

298 Q. -- for testing. But aside from that, would you -- would they be -- would you have expected them to be involved in the -- in the actual testing?

A. They -- they're -- they -- they would have done -- I'm kind of speculating here.

MS. RUSSELL: Okay. If it --

THE WITNESS: It involved --

MS. RUSSELL: I don't want --

BY MS. MAINVILLE:

299 Q. But the question doesn't ask for speculation.

A. Okay.

300 Q. Well, let me ask you first, did you --

A. Okay.

301 Q. -- was Alstom involved, to your knowledge, on -- in this testing beyond providing the trains?

A. Okay. The testing being trial running?

302 Q. No, no. The -- is it ATC or ATO testing?

A. Well, the -- the -- the train control is sometimes called CBTC. That's -- that's the term they use. It's all same thing. It's the train control. That is the -- like, the -- the train control operates every -- like, sort of kind of operates everything, so every -- every -- every piece like the vehicle, the tracks, switches, the power system, they feed into the train control, and the train control then gives commands. So they all

have to be working before the train control can operate effectively.

303 Q. M-hm.

A. Because if, you know, some parts breaks, the whole thing stops.

The -- and Alstom was providing the vehicle, and so they're responsible for delivery and -- and the safe -- the consistent reliable operation of that.

The overall tying of the trial running, OTC was providing the operators onboard and at central, and they provide the trains. And then the trial running demo was, you know, let it go or -- or let it --run the daily service plan as you would with passengers onboard.

304 Q. I don't think that was my question.

A. Okay.

305 Q. Was Alstom involved in the CBTC testing beyond providing the trains?

A. I don't know how to answer that. I -- I -- in -- provide -- Alstom? They would do their tests. They would not be doing the train control test, because that would be a different company.

306 Q. Okay. So --

A. And then -- yeah.

307 Q. So you wouldn't necessarily expect them to be more involved with Thales on that testing?

A. No, not beyond their own work, which is -- not beyond their own scope, which is the -- which is the vehicle operation and -- and delivery of that.

308 Q. What knowledge do you have of the -- any winter dynamic testing?

A. Yeah, 'cause I was there in January 2019. That was a hoot. Well, I know it was ongoing, but again, we weren't really invite to witness the test, which was unfortunate.

But the winter dynamic testing, I don't think much was done. We checked the reports -- we'll check the information on it, but they did have a winter operations demonstration requirement. And I don't have a test; I wasn't involved in the oversight of those tests. I think OC Transpo had people on site for that.

But, yeah, largely their -- their winter management plan was to clear the snow off the track before driving the train down, right? As

opposed to driving the train through the snow.

309 Q. Would you have expected to see more for Ottawa's climate?

A. I don't think I can quite comment on that. I expected to see more or less in winter operations? If the track is clear, the train is a train, right? It's -- it's okay. It became a snow -- it became a snow management question. But, yeah, there was -- you know, but this -- yeah, the -- the performance of the train to operate under a certain amount of snow was certainly part of the project agreement.

And it would be interesting to scrutinise that test result, because the vehicle, as we saw, would -- when it encountered a bit of snow would have problems continuing operation. So it was incumbent to clear the snow before the train went through, and I think that's reflected in the maintenance procedures.

310 Q. Do you know when a decision was made to reduce the number of trains running during peak periods from 15 to 13?

A. I know roughly.

311 Q. When --

A. Because -- yeah, let me -- let me

double check this. Mr. Charter was involved in that.

312 Q. Mr. sorry?

A. Charter. Troy. Troy. I'm sure you've -- he's going to be a key --

313 Q. M-hm.

A. Yeah, he was in the meeting for that -- for those discussions. I was sort of brought in afterwards to try to look at the scheduling, because I was -- I was doing the sub work for the scheduling and delivering the service plan, and so I was requested to modify the service plan for a 15-train peak operation to a 13-train operation and resolve how that work with launches and recoveries.

314 Q. So do you -- do you recall whether that was before trial running? Like, whenabouts roughly?

A. That's a good question. It was before revenue. Was it before trial? Good question.

315 Q. Okay. What reason -- maybe let's start here. What reason were you given, if any, for the change?

A. Well, again, I wasn't really --

they didn't really owe my any reasons.

316 Q. It's not about that, but did you receive --

A. Yeah.

317 Q. Did you --

A. I don't want to speculate to somebody's else's decisions.

318 Q. I'm not asking you to speculate; I'm asking what reason you were given.

A. That it was decided to open with the 13 trains and hold back the last two. They just weren't -- the vehicles weren't ready and they weren't ready and running reliably. So they -- the -- the contract and project agreement said that we needed a certain count. We needed 15 -- 32 fully revenue-ready trains to get completion. And so how do you get -- so in order to carry passengers with less than 32 trains, they needed to modify that.

319 Q. And was that Troy Charter who conveyed that to you?

A. Yeah, Troy -- Troy through Richard, right? For the scheduling stuff, I was kind of working for Troy's group on the operations side. So I was asked to provide a -- a -- a

revised daily -- daily schedule plan that would operate with 13 trains.

320 Q. Okay. But in terms of -- you said Troy through Charter -- I'm sorry. I'll try that again.

A. Troy -- yeah, Troy Charter and Richard.

321 Q. Yes.

A. Right? Because they were the two --

322 Q. Yes.

A. -- you know, operations and construction side -- asked me to deliver a schedule, because I -- I was delivering the schedules at that point, for -- to command the train control system to run with 15 trains during the morning service or -- and to deliver them a version that was modified that would only operate with -- that would operate with only 13 -- that would deliver service for the day having only 13 trains available plus spare.

323 Q. Right. In terms of the -- the -- the two trains not running reliably, was that conveyed by Mr. Charter or Mr. Holder or both?

A. I didn't ask further.

324 Q. No, but who conveyed that?
A. I'd say Troy. Troy Charter.
325 Q. Aside from this reduction and the number of trains, were you consulted about the possibility of any progressive start or soft start to an opening?
A. No. The -- the idea of a commercial opening --
326 Q. Yes.
A. -- was something that Mr. Manconi was not excited about, right? He was working towards a full opening on -- on time, on schedule, and challenging the Rideau Transit Group to deliver that.
327 Q. How --
A. See, that was in -- part of -- that was part of a couple of his service communications events. He says, We're going -- we're going -- we're -- we're -- we want to have everything. But that was early. That was, like, 2018.
328 Q. What's the service communications event?
A. Maybe it was just a meeting I was in with him, and he was talking to somebody else.

But it seemed like, no, they were not -- they were not in -- you know, he made a promise to -- he was keen on delivering to the City full service, right? And if there was going to be an adjustment to that, you know, that hadn't -- that hadn't been -- yeah.

So I -- I'm -- yeah, let me just think about this for a second. Yeah, so, no, there was no discussion about opening partial service or halfway service or what could we do getting out the door. We weren't trying to negotiate internally as to, you know, how can we carry -- how can we -- how can we roll something earlier? That was not -- that was not conversation within the City. It was not contemplated.

329 Q. It was a non starter?

A. That was a non starter, right? We -- our objective with the -- with the City oversight group was to oversee and verify full delivery of the system from Rideau Transit Group as per the contract.

330 Q. What do you know about the decision not to have the yard be automated ultimately?

A. I wasn't involved in that, but I understand it. There was a -- it was a limitation

that the -- the vehicle factory was still there, right? And so the maintenance building and the factory and the yard were the same facility.

331 Q. M-hm.

A. And in order to get the vehicle -- get the yard up to automatic operation, you needed to test it. In order to test it, you need to get all the trains and all the maintenance work out of it for a little while. And this continues to be one of the barriers today. Oh, and you had to get the construction team to stop tearing it apart, because they expanded the yard halfway through the program as well.

So in order to get the yard in automatic operation, they needed to get the -- the vehicle -- they needed to get the factory, the maintenance, and some of the storage trains out of it so that the -- the -- the top -- the -- these -- these -- like, the -- the wiring checkouts -- like, the cable-by-cable checks could be done.

And you also needed a -- a substantial period of time to prove out reliability on it, and it was hard to do that when it was still being used.

332 Q. Do you know whether this would

have impacted the later -- the derailments in the yard? Like, the fact that -- could it have contributed, the fact that it was not automated?

A. The -- well, as I talked about the protection system and the protection system about the -- the switches when they're -- when they're firmly placed and locked, the train control system's job is to make -- is to give permission for a train to cross a switch among -- one of -- one of its jobs.

So when the switch is in place, the train has permission to go across it. While the train is going across, that switch can't move, right?

333 Q. M-hm.

A. So that's -- that's -- that's the protection function that it provides. So when the passengers are driving around Hurdman, they go by a switch, there's a large system that makes sure that that whole track has solid integrity and the road is clear.

That system in the yard is turned off, so it's -- you can move a switch and a train anywhere.

334 Q. Did you have any interactions with

Roger Woodhead from the engineering joint venue, the RTG engineering joint venture? Or he -- he was with SNC?

A. No, I don't know that name.

335 Q. Okay.

MS. RUSSELL: Oh, counsel, sorry, I just wanted to pop in for a minute. I'm just looking at the time and wanted to get a sense of where you're at.

MS. MAINVILLE: I have five more minutes, given that we took the time for the spelling instead earlier, I would ask.

MS. RUSSELL: Yeah, no, I'm not saying that -- asking you to stop. I'm asking you what's your sense of how much more timing you have.

MS. MAINVILLE: I would say five more minutes.

MS. RUSSELL: Okay. Thank you.

BY MS. MAINVILLE:

336 Q. Can you tell me, you've worked at Thales and you're -- you're an expert in the CBTC system as I understand it. So can you tell me how -- whether this was a new design for Thales on this -- on this train?

A. No, it's a very established

platform. The -- the system -- yeah. So it's a very established platform. So the product that Alcatel delivered is probably -- well, it's -- it's a thing -- they do a thing called baseline. So take a product that's been delivered in revenue on a prior project and then will customize it to the particular site.

337 Q. M-hm.

A. Right? So they have a common -- what they call a common product, but effectively the product evolves through different field deliveries.

So they took the same train control product -- like, the -- the fundamental part of it is what they delivered in Shanghai, Singapore, Edmonton, England, right? Those guys. The -- and they have some mileage on them, right? So that's how they know the interlocking works, how the switch machine works, and basically they have a -- a -- 70 -- 70 percent of it is sort of off the shelf or pre -- pre established. And a similar thing with hardware, the switch machines. The switch machines are using a product that's been delivered for 20 years.

Of course, every time you build

something, you kind of -- you know, you may not have the same factory where you built the last one, so you kind of have a little bit of a different factory. You may have different screws, right, to use a very -- so there's little manufacturing variances going forward. And then they customize it to the new guideway, the new customer, then the new -- and the new train. So it's -- the product baseline is very -- is -- is -- is -- is mature, it's been used in another program, it's established, but then they bring it over here, and they start modifying it to the new system.

338 Q. And did this project require more customization than the usual project -- the typical project?

A. I wouldn't -- I don't know. You can't -- more or less, I -- I wouldn't say anything -- I wouldn't say no. Actually, this is -- compared to some of their other programs, it required a minimum amount of customisation, because as a customer, we were -- we were very happy to accept things off -- sort of, like, functionally to the -- you know, the functional off-the-shelf design, we were very happy to accept. And that's good, because I've worked with customers who had

great ideas about, you know, building new ways of doing things and very specific ways, and those always end up causing more problems.

339 Q. Do you know if this --

A. We're trying to find it.

340 Q. Sorry, do you know if this was the first time that it interfaced with Alstom on a -- on a -- on an LRT?

A. It's the first time it's interfaced with this vehicle.

341 Q. Did --

A. Yeah.

342 Q. Do you know of challenges that that occasioned on this project?

A. I couldn't say challenges, but the interface design is always a challenge on these things. It's always a big -- because the vehicle -- it's not just a truck, right? It's a whole computer network with power systems and doors and announcements and -- and -- and, you know, it's like it's -- it's -- effectively, you're trying to ride -- the -- they're -- I kind of -- I kind of liken them to little airplanes, right, in terms of level of complexity. There's multiple onboard controllers, and so the complexity of the interface

is always there.

The -- so -- but, yeah, it's part of every project to do that. It was schedule pressure, because they first integrated to the vehicle on site pretty late in the game. And they -- they were doing -- so -- so both the vehicle and the train control system were kind of changing as -- as you went through. But they eventually -- but they did stabilize around 2018, right? So they both kind of stabilized.

There was a lot of iterations. Again, very normal, because you got two -- you got two complicated systems with two companies who are -- are -- who are working together on it.

But in terms of the customisation, no, I think the customization is very good, because we didn't include any -- the City didn't put any complications on the train control design. And by complications, I mean a different signalling system.

In Singapore, there was two signalling system on top of each other, and they had to handshake and hand over. Complications.

And we -- and we had a green -- we had a blank -- a -- a green field, a brown -- a

green -- a green -- a green system, and they could do very -- and they could -- and they had full control over it.

So, yeah, in terms of the -- the product, it was very -- very -- it was kind of a simple -- the key safety functions were very simple to, because we -- the City didn't put any complications on them.

343 Q. In terms of the later breakdowns and derailments that the system encountered, aside from what you've already mentioned in terms of the switches and whatnot, are there others that you -- well, are you able to speak to -- let me rephrase.

Some of the issues you witnessed --

A. Okay.

344 Q. -- during the testing phase and commissions phase, do you see any of those as having contributed to or potentially contributed to some of these issues that the trains later encountered; for instance, door issues, issues with the overhead catenary system, or anything like that?

A. There's nothing in the train control that was going to do that. The -- but in terms of the -- in terms of the testing and

integration program, right, when we ran the -- when we ran the -- the field trial and the demonstration programs, when there was a failure -- well, first of all, things like the -- things like the doors, right, we ran the doors complete -- we -- we ran the -- the testing that was done was minimal. And this is across the system. The tests were done in terms of we need to see the doors open and close. The doors open, the doors close, test passed. Done. Good. You know, go, go, go, go, go, right?

Nobody stuck a foot in the door, right? And -- and nobody opened the door and kicked it. So -- and so those kind of, you know -- if we didn't have the door must withstand an impact of, you know, one elbow's worth, you know, one time out of 10, we didn't put that in spec, 'cause it's a performance-based spec. The whole thing needs to work.

So things like the failures and environmental concerns and the -- the -- the robustness of the environment -- so how much snow, how much water, how much passenger shaking, how much vibration, how much load on the -- on the -- on the -- how much, you know, current load does the power system in the vehicle need to work together,

the City didn't have -- it wasn't the City's job to put those in the project agreement, and all of those sort of interface risks -- so interface with passengers, interface with driver, interface with the -- the -- the vehicle and the power system, how those worked together was entirely out of the City's hands.

And that's part of downloading the risk under the P3 model, right? Is -- is -- is Rideau Transit constructors groups and the maintenance -- had to make sure those all worked, and they had free hand in either, you know, getting this system or that system or this procedure or that work around, you know, to do it. If your power is overloading, you could use less power or you can build a bigger capacitor. That's one example; that's not the example here. But they had -- that was -- down -- so the City didn't get involved in --

345 Q. Yeah, but that wasn't my --

A. -- (indiscernible) those functions were, because --

346 Q. Yeah.

A. -- that was the integrator's job.

347 Q. Okay. That wasn't my question,

though.

A. Okay.

348 Q. Did --

A. Well...

349 Q. I -- would -- let me ask a follow-up question.

A. Okay.

350 Q. Is there -- is there -- are these types of things like would an -- what happens if an elbow is -- you know, goes through, are these things that you often see or are standard or as part of the testing?

A. Kind of not so much, really. Like, that particular one, no, that would have been --

351 Q. No.

A. -- done by -- that particular one, that one sticks in my mind, because that would have gotten -- that would have gotten found by every -- like -- like, no -- we never -- there's no -- no project I worked on has checked that, right? We just kind of assumed that the doors were robust, right? We never did a -- we never put a robustness requirement on them, right? So that's something I'm going to take forward as a lesson.

The -- but that kind of -- the things you don't think about that sneak up -- because we didn't put them in the project agreement, we didn't put them in the contract that the City needed to see demonstrated, the test -- the top level test just demonstrated to the contract. So anything that we didn't put in the contract may or may not have been tested, may or may not have been checked, may or may not have been diligent. We as -- as City oversight, we were very limited on what we could identify.

352 Q. Okay. But again, like, so my question is not about City oversight or what's the City's responsibility versus --

A. Okay.

353 Q. -- (indiscernible). I'm just trying to understand, like, would a contractor -- and if you can't answer, you can't answer. But based on your experience, like, is that something the contractor would typically test or -- or not? Or is it a lesson learned, as you're -- as you're saying?

A. Well, these would be lessons -- these would be lessons learned, but it comes down to, you know -- like, they -- like, the items

that -- the items that sort of cause these failures, how could we have prevented it or caught it or -- or who should prevent it or how it be prevented is -- is -- is definitely going to be some lessons learned going forward.

Our -- our tests -- to say the tests weren't complete or -- or -- or could we have -- and so the question kind of goes to, you know, had we held off and had we continued to test more, would we have caught these things? And nobody knows. But some point -- so -- so that -- that's one of the challenges going back.

354 Q. Okay.

A. But in terms of, you know, testing the interface to snow or testing the interface to passenger abuse and boarding, yeah, they weren't -- they weren't part of the test program. And so when we did hit the field and we did hit those conditions, it didn't -- it didn't -- it -- it -- those were the -- those were some of the areas that it had challenges.

355 Q. Okay. I guess I'm still unclear as to whether you would normally expect these to be part of the program or not, not necessarily -- and -- and looking forward, though, you would --

you -- you think you would want --

A. Yeah, it's --

356 Q. -- it. If you're devising that program, would you have thought of it at the -- you know, was it something that was standard or not?

A. Not so much.

357 Q. Okay.

A. Not so much. Like, every -- I put -- I put three systems in the vehicles. We never -- we -- we've never kicked the doors through testing, right?

358 Q. Okay.

A. Because you might break it, right? And you don't want to do it. And how much do you kick it? We don't know. So that one -- that one would have gotten by everybody.

359 Q. Okay.

A. But, similarly, it's -- you know, yeah, no, we don't know why that one -- that one got through. But we -- but things like that in terms of, you know, the diligent -- we didn't think to ask the question either, right? But, you know, should the City have asked the question? And, you know, no, we didn't, and nobody else did. And so, yeah, that got -- that got through. But that kind

of would have gotten through everybody, I think.

360 Q. Yeah.

A. Yeah, in terms of the -- sorry. Did that answer your question?

361 Q. I think, yes.

A. Okay.

362 Q. I just want to give you an opportunity to -- are there other -- because you said a lot of lessons learned. You know, what -- what are other lessoned learned that you think might be relevant to our mandate in terms of looking ahead and making recommendations for a future project?

A. Yeah, that's a good one. Yeah, I'd say more -- there -- there should remain some level of -- of oversight enforceability on it in terms of, you know, as the -- the integrator and the quality work is given to the -- the projectco. You know, we should -- we should at least -- the City should at least retain the ability to, you know, get detailed documents along the way to be able to monitor and be able to flag any -- and -- and -- and be able to address any -- any issues earlier on.

363 Q. And I just have one --

A. Yeah.

364 Q. I just have one -- what I think is a quick question, but...

A. Okay.

365 Q. In terms of journey time requirements, just going back to that issue of --

A. Okay.

366 Q. -- journey time --

A. Yeah.

367 Q. -- should -- should there be different requirements or expectations based on inclement weather for --

A. Good point.

368 Q. -- a (indiscernible) system like this?

A. Yeah, we didn't account for -- yeah, and again, we -- we didn't account for alternate modes of operation, right? So the -- the -- the requirement is written for a dry rail situation, right? So under -- so that number works for dry rail. Should we have a wet rail number?

369 Q. Right.

A. I don't know. We don't. The -- but, yeah, we do have some wet rail conditions. What -- what should the number be for that, and how

would you determine that up front, right? That would be the question. So, yeah, it's -- it's going to take a bit. There -- there is -- the trains do travel slower under wet weather. We -- the project agreement didn't account for that.

It assumed that the -- a part of that also is the wheel rail -- the wheel rail adhesion is the projectco's job, right? So if it works, if it starts getting slippery under wet weather, you know, that's just -- it's -- it's their -- that's part of -- like, the City didn't inspect that number either. So we can say -- yeah.

370 Q. So it -- is it something that's not typically provided for and it wasn't in this case, or it's not common in the industry to your knowledge?

MS. RUSSELL: Well, sorry --

THE WITNESS: It's not common in terms of the performance requirement for the system, no. I've never -- I've never seen it. We've always had the -- the -- the journey time -- conditions for the journey time are established in the dry rail. So if you change the condition, does that end time change?

BY MS. MAINVILLE:

371 Q. M-hm.

A. It's a defined condition. How much should it change is something that we couldn't really evaluate. I wouldn't even try to evaluate it in a contract going forward, because it's subject to, you know, a whole bunch of other design decisions down the road.

MS. MAINVILLE: Right. Okay. I apologise for going over. Some answers were longer than anticipated. But can I just check if my co-counsel has any critical questions to ask, and --

MS. PEDDLE: No, I don't. Thank you.

MS. MAINVILLE: Thanks. Allison, is there anything you wanted to follow up on?

MS. RUSSELL: There may be. I wanted an opportunity to go through my notes. What I'm -- given the time and just because of what my expectation was for today's examination, I'm going to ask that if there's any follow-up questions that I might have, if I could -- if I could communicate that to you, and we can deal with it by that -- that way.

I didn't have follow-up questions in

the last examination. I don't know that I will in this one. I just -- I'm just really cognizant of the timing here.

MS. MAINVILLE: Okay. Okay. So you mean you'll convey them, and then we can address them as --

MS. RUSSELL: Yeah, if we -- if necessary.

MS. MAINVILLE: -- needed? Yeah, okay. Okay. We can go off record.

-- Upon concluding at 5:19 p.m.

REPORTER'S CERTIFICATE

I, Eveliene Symonds, BA, CSR(A), Certified Shorthand Reporter, certify;

That the foregoing proceedings were taken before me at the time and place 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.

I further certify that this questioning was conducted in accordance with the Protocol for Remote Questioning, Revised 05/05/2020.

Dated this 4th day of May, 2022.

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