Ottawa Light Rail Commission

Arnaud Lacaze
on Friday, May 20, 2022

neesons

A VERITEXT COMPANY

77 King Street West, Suite 2020
Toronto, Ontario M5K 1A1

neesonsreporting.com | 416.413.7755

1

2

3

4

5

6   OTTAWA LIGHT RAIL COMMISSION

7   ALSTOM TRANSPORT CANADA INC. - ARNAUD LACAZE

8   MAY 20, 2022

9

10

11

12   --------

13   --- Held via Zoom Videoconferencing, with all

14   participants attending remotely, on the 20th day of

15   May, 2022, 2:00 p.m. to 4:40 p.m.

16   --------

17

18

19

20

21

22

23

24

25

1   COUNSEL:

2

3   Anthony Imbesi, Litigation Counsel Member

4   Tara Boghosian, Litigation Counsel Member

5

6   PARTICIPANTS:

7

8   Arnaud Lacaze, Alstom Transport Canada Inc.

9   Michael Valo & Charles Powell, Glaholt Bowles LLP

10

11   ALSO PRESENT:

12

13 Joanne Lawrence, Stenographer/Transcriptionist

14 Benjamin Bilgen, Virtual Technician

15

16

17

18

19

20

21

22

23

24

25

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

2   ANTHONY IMBESI: Okay. Good afternoon,

3   Mr. Lacaze. As I mentioned, my name is Anthony

4   Imbesi. I'm here with my colleague, Ms. Boghosian,

5   from -- counsel for the Commission. So I'll start

6   by reading into the record the parameters of

7   today's interview and then we can begin.

8   So the purpose of today's interview is

9   to obtain your evidence under oath or solemn

10   declaration for use at the Commission's public

11   hearings. This will be a collaborative interview

12   such that my co-counsel, Ms. Boghosian, may

13   intervene to ask certain questions. If time

14   permits, your counsel may also ask follow-up

15   questions at the end of this interview.

16   This interview is being transcribed,

17   and the Commission intends to enter this transcript

18   into evidence at the Commission's public hearings,

19   either at the hearings or by way of a procedural

20   order before the hearings commence.

21   The transcript will be posted to the

22   Commission's public website, along with any

23   corrections made to it, after it is entered into

24   evidence.

25   The transcript, along with any

1   corrections later made to it, will be shared with

2   the Commission's participants and their counsel on

3   a confidential basis before being entered into

4   evidence. You will be given the opportunity to

5   review your transcript and correct any typos or

6   other errors before the transcript is shared with

7   the participants or entered into evidence. Any

8   non-typographical corrections made will be appended

9   to the transcript.

10   Pursuant to Section 33(6) of the Public

11 Inquiries Act (2009): (As read)

12   "A witness at an inquiry shall

13   be deemed to have objected to answer

14   any question asked of him or her

15   upon the ground that his or her

16   answer may tend to incriminate the

17   witness or may tend to establish his

18   or her liability to civil

19   proceedings at the instance of the

20   Crown or of any person, and no

21   answer given by a witness at any

22   inquiry shall be used or be

23   receivable in evidence against him

24   or her in any trial or other

25   proceedings against him or her

1   thereafter taking place, other than

2   a prosecution for perjury in giving

3   such evidence."

4   As required by Section 33(7) of that act, you are

5   hereby advised that you have the right to object to

6   answer any question under Section 5 of the Canada

7   Evidence Act.

8   So with that out of the way, perhaps

9   I'll just get you to begin. If you could describe

10   for us your involvement in Stage 1 of Ottawa's LRT.

11   ARNAUD LACAZE: Okay. So I was working

12   at that time for Alstom. I started -- I was

13   working as the project director here in Montreal,

14   on the metro subway consortium with Bombardier at

15   that time. And in September 2016, I joined Ottawa

16   to take the role of the project director for the

17   LRV in Ottawa. I spent mostly 2 years and a half

18   until October 2018 on this project. So -- and I

19   was in charge of this project at that time.

20   ANTHONY IMBESI: Okay. And I'm sorry,

21   did you say that -- was your role based in Ottawa,

22   or did you split your time between Montreal and

23   Ottawa?

24   ARNAUD LACAZE: I split my time -- my

25   time was split between Ottawa and Montreal. I -- I

1   kept to be based here in Montreal, but I spent, at

2   that time, 4 to -- depends. Approximately 4 days a

3   week in Ottawa.

4   ANTHONY IMBESI: Okay. Thank you. And

5   I -- I don't have a CV or a résumé for you, but

6   perhaps I could get you to take us through your

7   prior experience.

8   Do I understand that you're an

9   engineer?

10   ARNAUD LACAZE: Yes. I did an

11   engineering school in France. It's an aeronautic

12   school. So I received my degree in 1988 in France.

13   I start -- I start in an -- in an engineering

14   company doing 2 years working -- working for

15   Alstom. I started as an engineer for -- for this

16   company, and in 2001, I was hired by Alstom, and I

17   start my career at Alstom. I -- I spent -- I'd

18   work on several project as an engineer manager or

19   technical manager. And then when I came here in

20   Canada in 2007, I start to be a project and

21   program -- program manager in -- in different

22   subjects for -- for Alstom. I spent this time in

23   Alstom, and I left in October 2018.

24   ANTHONY IMBESI: And do I understand

25   now you're with VIA Rail?

1   ARNAUD LACAZE: And now, I am a VP at

2   VIA Rail, yes.

3   ANTHONY IMBESI: Okay. So if you could

4   just take us through, just at a fairly high level,

5   then, after you came to Canada with Alstom, what

6   was the nature of your experience with Alstom? I

7   think you mentioned a few of roles that you held,

8   but could you just explain the roles you had with

9   rolling stock with Alstom in Canada in your last

10   few projects.

11   ARNAUD LACAZE: I start -- I start my

12   career at Belfort. So Belfort is a city in France

13   that specializes in rolling stock. So I start -- I

14   start in 1988 in my career directly with rolling

15   stock. So I worked on several -- several

16   locomotive, several train projects with -- with

17   them during that time, as a system engineer, and

18   after that as a technical manager on this -- on

19   this train.

20   And following that, I wanted to have

21   more expertise in some systems, so I moved to

22   another -- another company -- the same company, but

23   another city. The city is Lyon, in France. And

24   this city is specialized in electronic parts, so I

25   spent -- I spent several years in what we call the

1 command and control of the train, the electronic

2 system and -- and software. So I spent time -- I

3 spent several -- several years in this -- in this

4 area. Same thing in different international,

5 international projects.

6   And finally, when I moved here in

7 Montreal because we -- at that time, Alstom bought

8 a sister company here, the sister company from --

9 from Lyon, so they ask me to move here in Montreal

10 to help with startup to become an Alstom company.

11 So I spent -- I spent 3 years, I guess, or 3 or

12 4 years in this company doing the same thing,

13 electronic and software for -- for systems all

14 around the world.

15   And I wanted to go back to rolling

16 stock at a certain point, after -- after receiving

17 this kind of expertise. And so I start -- I came

18 back here in Montreal with the metro, with the Azur

19 Metro as a project manager and then as a project

20 director for the metro.

21   ANTHONY IMBESI: And in terms of the --

22 you'd mentioned that you had some experience

23 doing -- dealing with the electronics and the

24 software. Is that in respect of the rolling stock,

25 or is that in -- as I understand, Alstom has

1   signalling division as well?

2   ARNAUD LACAZE: It's -- it's mainly

3   rolling stock.

4   ANTHONY IMBESI: Oh, okay.

5   ARNAUD LACAZE: The division -- the

6   division, when I was in Lyon, it was all what we

7   call wayside or CBTC or ATC system, we call it the

8   ERTMS in Europe. And yes, I did some -- I did

9   some projects on the -- on this subject, but mainly

10   always focussed on rolling stock. It was the

11   main -- if you want, the main line or the -- yes,

12   my main motivation has always been rolling stock,

13   so...

14   ANTHONY IMBESI: Okay. And when you've

15   worked on rolling stock in other projects and

16   particularly the last few that you had mentioned,

17   did any of those involve integrating the rolling

18   stock with a -- a communications -- a train control

19   system that wasn't an Alstom proprietary system?

20   ARNAUD LACAZE: Yes, yes. On the -- on

21   the subway here, Ansaldo is -- Ansaldo is the

22   provider of the system.

23   ANTHONY IMBESI: Who, sorry?

24   ARNAUD LACAZE: Ansaldo. So I used

25   to -- but it's somewhat common to -- to not always

1   have the system of the rolling stock company, I

2   would say, integrated. So sometimes, it was full

3   Alstom -- Alstom systems. And sometimes, like

4   here, the subway in Montreal, for example, rolling

5   stock was a mix of Bombardier and Alstom, and this

6   time was a third one, so Ansaldo.

7   ANTHONY IMBESI: Okay. And then during

8   those projects, then, would you have had had

9   involvement in the integration components of --

10   ARNAUD LACAZE: Yes.

11   ANTHONY IMBESI: -- the signalling

12   system? Yes?

13   ARNAUD LACAZE: Yes, because even if

14   it's a -- it's a third company, the rolling

15   stock -- the rolling stock is -- is -- is part of

16   the integration. We were part of the integration

17   because we had direct contracts with -- with this

18   company. I don't know if you're -- it's -- it was

19   a direct link between Alstom and Ansaldo, for

20   example. It was not -- it was not through

21   Bombardier, for example. The -- the STM, so the --

22   the company of Montreal use Ansaldo because the

23   whole system was Ansaldo, but the contract was

24   under the Alstom responsibility. It was -- it was

25   not something -- some -- it was not for a third

1   company framework.

2   ANTHONY IMBESI: Okay. And, sorry, so

3   just so -- just so I understand that, then, was it

4   Alstom that had a contract directly with STM, or

5   was your contract with Ansaldo, and who then had a

6   contract with STM?

7   ARNAUD LACAZE: No. We had a direct

8   contract with -- through the consortium with STM,

9   but the contract with Ansaldo was directly between

10   Alstom and Ansaldo.

11   ANTHONY IMBESI: I see. Okay. And so

12   that --

13   ARNAUD LACAZE: Ansaldo -- Ansaldo had

14   no -- had no contact with STM.

15   ANTHONY IMBESI: Okay. So they were a

16   subcontractor to you on that, to Alstom on that

17   project?

18   ARNAUD LACAZE: Yes, yes. And we used

19   this company because the company was already

20   providing the -- the system to -- to the existing

21   train for STM.

22   ANTHONY IMBESI: And so in your

23   experience on these past projects, is it typical

24   that these are the arrangements, that Alstom is the

25   one who enters into the contract with the train

1   control supplier?

2   ARNAUD LACAZE: Yes, yeah.

3   ANTHONY IMBESI: Have you ever worked

4   on a project other than Ottawa where that wasn't

5   the case?

6   ARNAUD LACAZE: No.

7   ANTHONY IMBESI: Okay. And so turning

8   then to your role with Ottawa's LRT project, you'd

9   mentioned you were a project director from

10   September 2016 to October 2018. Could you just

11   explain for me what your role was as project

12   director. What were your responsibilities, at a

13   high level?

14   ARNAUD LACAZE: High level. I -- I

15   will reuse a typical -- a typical acronym from

16   Alstom is -- the project director is responsible of

17   the QCD: the quality, the cost, and the delays, if

18   any. So we need -- we are here to -- to make

19   working all the team together, to be able -- to be

20   sure at the end to have the -- to have a project

21   with a good level of quality, on time, and under

22   the budget -- and under the budget that we -- that

23   we have at the beginning of the project.

24   So the main role is that, is to -- to

25   be able to always be inside this triangle of --

1 find a good balance between all of them and be able

2 to mitigate all the issues, to make the people

3 working all together, according to our contract.

4   ANTHONY IMBESI: Okay. And so when you

5 were the project director for this project, were

6 you the -- you were the leader of Alstom in respect

7 of this project?

8   ARNAUD LACAZE: Yes. Yeah. Yes.

9   ANTHONY IMBESI: Okay. And who was in

10 the position of project director immediately before

11 you? Was that Nadia Zaari?

12   ARNAUD LACAZE: Yes. It was Nadia,

13 yes.

14   ANTHONY IMBESI: Okay. So I'd like to

15 first start by speaking to you about the Citadis

16 Spirit in particular. The Citadis Spirit, was that

17 the first Citadis Spirit was on the Ottawa LRT

18 Stage 1?

19   ARNAUD LACAZE: It was the first --

20 yes. Citadis Spirit was the first in North

21 America, yes. It's -- this LRV exists in Europe

22 and in other countries, and -- but it was the first

23 time that we deployed, at that time, what we called

24 the Spirit, the Citadis Spirit in North America,

25 yes.

1   ANTHONY IMBESI: So is -- is there a

2   Citadis Spirit model that exists elsewhere outside

3   of North America?

4   ARNAUD LACAZE: I would say it's

5   adaptation. It's -- the base exists, but it has

6   been adapted to -- to the reality of the North

7   America -- American market, for -- for sure.

8   ANTHONY IMBESI: So -- but the -- just

9   so I understand, the LRVs that do exist, the

10   Citadis LRVs in Europe, for example, are any of

11   them called the Citadis Spirit, or is the Spirit

12   what the modified version is called in North

13   America?

14   ARNAUD LACAZE: If I remember well --

15   and honestly, I don't remember exactly, but I

16   think -- I think the Spirit is the name of the

17   North America. Because the Spirit -- if I remember

18   well, it's a mix of what we called the -- the

19   tramway in Europe and what we call a tram train.

20   So the tram train is a tramway, able to go at

21   higher speed is a tramway, if you want to be able

22   to do a larger distance, like -- like -- like VIA

23   Rail in Ottawa. So the Citadis, if I remember

24   well, is a mix of these two -- of these two

25   systems.

 1   ANTHONY IMBESI: Okay. And sorry, if

 2 you could just explain that for me again. So

 3 you've got the tram on the one side - which is,

 4 you've just explained, that's the one that's

 5 typically designed to go greater differences?

 6   ARNAUD LACAZE: No, the tram -- what we

 7 call the tram or tramway is the rolling stock

 8 mostly dedicated to be in town, downtown.

 9   ANTHONY IMBESI: I see.

10   ARNAUD LACAZE: We take the example of

11 Paris, for example. In Paris, we have tramway

12 inside, and as soon as the tramway needs to go

13 outside Paris, because it's a larger distances, we

14 did some modification of this tramway. And we

15 don't call them anyway tramway - we call them tram

16 train.

17   ANTHONY IMBESI: Tram train. Okay.

18   ARNAUD LACAZE: It's not a tram; it's

19 not a train. It's a mix. Because -- because you

20 have specific bogies, you are -- to be able to

21 accelerate quickly and to stop also quickly. So

22 it's a -- it's a mix.

23   So the Citadis is a mix of these -- of

24 these two systems, I would say, and that's why it's

25 specifically developed for the -- for the North

1   American markets.

2   ANTHONY IMBESI: Okay. And so are the

3   European Citadis models, are -- are those what you

4   would call tram trains as well?

5   ARNAUD LACAZE: Yes, yes.

6   ANTHONY IMBESI: Okay.

7   ARNAUD LACAZE: From what I remember,

8   honestly, maybe -- maybe the guy from Alstom -- the

9   international guy from Alstom would be better than

10   me. But from what I remember, we are more like a

11   tram train -- tram train.

12   ANTHONY IMBESI: Yeah, no, and I'm just

13   asking just to the best of your knowledge.

14   And so in terms, then, of modifications

15   that were made to the Citadis to bring it to this

16   project and to North America, do you have an

17   understanding as to what the extent of some of

18   those modifications would be?

19   ARNAUD LACAZE: It would be -- when I

20   came, it was already done. The design was

21   mostly -- mostly -- mostly completed at that time.

22   The modification was mainly a link to the -- what

23   we call the winterization, so to adapt the project

24   to the winter condition of -- of Canada.

25   And after that, it was mainly -- due to

1   the Canadian -- Canadian content, it was also

2   some -- some local supplier that we developed to be

3   able to -- to be able to -- to have this -- this

4   Canadian content accessible.

5   ANTHONY IMBESI: And so in terms of

6   what I understand to be a few modifications that

7   may have been made, was there a different bogie

8   design for the Citadis Spirit as compared to the

9   other Citadis models?

10   ARNAUD LACAZE: No. It's -- the bogie

11   is -- the bogie is -- was -- was an existing bogie

12   from -- from Europe. So it was a transfer -- these

13   bogies already exist, and it was made at Le Creusot

14   in France, so we -- we had no modification on -- on

15   this bogie.

16   ANTHONY IMBESI: Okay. So for the

17   bogie, then --

18   ARNAUD LACAZE: We did a transfer -- we

19   did a transfer of production from France to --

20   to -- to here, to Sorel-Tracy in Quebec.

21   ANTHONY IMBESI: Okay. And so would

22   the only difference for the bogie, then, be the

23   suppliers who supplied the components?

24   ARNAUD LACAZE: From what I remember,

25   yes. It was mainly the suppliers that effectively

1   would try to develop the local supplier in -- in

2   Canada but also in North America, to be able after

3   that to reach the American market.

4   ANTHONY IMBESI: Okay. So was the

5   decision to -- were there other supply chains that

6   Alstom created for this project that differed from

7   past projects?

8   ARNAUD LACAZE: Yes. We create --

9   because it's a -- it's a newer product, and it's a

10 new -- it's a new contract, we developed a

11 dedicated supply chain for this project. For some

12 of the parts, we were able to reuse -- because some

13 of the parts are very -- are very dedicated, so

14 we -- we had no choice to reuse what exists in

15 Europe, for example, and for the other one, we

16 developed -- we developed a new supply chain here

17 in North America.

18   ANTHONY IMBESI: Okay. And did I

19 understand you saying as well that Alstom was

20 interested in developing new supply chains in North

21 America --

22   ARNAUD LACAZE: Yes.

23   ANTHONY IMBESI: -- for future

24 projects?

25   ARNAUD LACAZE: Yes, for sure.

```
 1                ANTHONY IMBESI:  Okay.  In terms of the

 2      existing -- and I call it the existing, but the

 3      Citadis model that was present in Europe before

 4      this project, were those 100 percent low floor

 5      vehicles as well?

 6                ARNAUD LACAZE:  100 percent?  I don't

 7      know.  But yes, most -- it's -- it's clearly --

 8      clearly -- the floor is something -- that's why --

 9      since Alstom was -- or is, I don't know, but -- the

10      number one in this kind of tramway because Alstom

11      developed, clearly, these products, and I don't

12      recall Bombardier or Siemens able to have a low

13      floor or a low floor product, anyway, so --

14                ANTHONY IMBESI:  Okay.  So that's a

15      typical --

16                ARNAUD LACAZE:  90 -- maybe 90.  I

17      don't know if it's 100 percent, but most of -- most

18      of the Citadis product or most of the tramway

19      are -- are low floor, yes.

20                ANTHONY IMBESI:  Okay.  So that's an

21      existing feature of Alstom's LRVs.

22                ARNAUD LACAZE:  Yes, yes.  Alstom

23      developed that at the beginning of year 20, 20

24      or -- 2000, and yes, it's clearly a -- it's clearly

25      a specific product for -- from Alstom, yes.
```

1   ANTHONY IMBESI: And you had mentioned

2   some winterization as well when I had asked you

3   about modifications. What would have to have been

4   modified to address winterization?

5   ARNAUD LACAZE: On the train?

6   ANTHONY IMBESI: On the -- on the

7   train, yes.

8   ARNAUD LACAZE: Well, honestly, as I

9   recall, the floors -- under the floor, we put

10   some -- we put a heated -- heated floor. We put

11   some -- a lot of protection on the cables. We

12   put -- we put some system able to -- able to

13   defreeze quickly -- quickly the windows, right,

14   some -- yes, this kind of techniques.

15   ANTHONY IMBESI: Okay. So is it fair,

16   then, that there weren't any sort of fundamental

17   structural changes or anything to the vehicle?

18   ARNAUD LACAZE: Structural, no. Oh,

19   no, no. No, it's clearly -- it's mostly

20   protection, protection around the existing -- the

21   existing system, yes.

22   ANTHONY IMBESI: And so to your

23   knowledge, have Alstom vehicles ever been

24   integrated with a Thales train control system

25   before?

1   ARNAUD LACAZE: Before, yes. Yes. It

2   was not the first time for us to work with Thales,

3   yes.

4   ANTHONY IMBESI: Do you know offhand

5   what projects those would have been?

6   ARNAUD LACAZE: No. No, I don't

7   have -- I don't -- I don't -- I don't want to give

8   you a name where I'm -- where I'm not 100 percent

9   sure. But as I said at the beginning, this is

10   common, to integrate an external system like this -

11   Thales, Ansaldo, you know, another one.

12   ANTHONY IMBESI: Okay. So given what

13   you've told me about that and about Alstom's

14   vehicles typically being low floor, to your

15   knowledge, has a CBTC system been integrated with a

16   low floor LRV in the past?

17   ARNAUD LACAZE: I don't know.

18   ANTHONY IMBESI: I'm sorry, did you say

19   no or you didn't know the answer?

20   ARNAUD LACAZE: I said I don't know.

21   ANTHONY IMBESI: You don't know. Okay.

22   Thank you. That's fine.

23   Would that -- would integrating a CBTC

24   system with a low floor LRV, would that incorporate

25   any challenges or hurdles to be overcome in the

 1 | process?

 2 | ARNAUD LACAZE: It's -- normally,

 3 | it's -- I would say it's a normal technical

 4 | challenge. You have to design the interface; you

 5 | have to design the product; you have to design the

 6 | interface; you have to -- you have to validate the

 7 | interface, and then after that, you have to receive

 8 | the equipment validated by your subsupplier or the

 9 | third party and do the integration, and after that,

10 | validate that everything is working properly. So

11 | you -- it's a normal technical V process, so when

12 | you do step by step, you do the integration, and

13 | then after that, you go -- you do the other side of

14 | the V cycle and you validate.

15 | So normally it's not -- it's a

16 | technical challenge because it's always a technical

17 | challenge, but normally it shouldn't -- shouldn't

18 | be so hard. Is it more difficult than the LRV than

19 | on the other one? Honestly, no. It's -- as soon

20 | as you have the space, you have defined the space

21 | to put -- to put the equipment, you have an

22 | agreement with this company. After that, you have

23 | to do -- to do -- to do the job.

24 | The main challenge, once again, is to

25 | do the rail integration of the system and to

1   clearly -- you have to -- if -- if Alstom was, for

2   example, the -- in direct contact with Thales for

3   this project, clearly we -- clearly, as I

4   mentioned, we would have put someone dedicated with

5   the integration because it's -- it's only a matter

6   of integration. So you have to have someone or a

7   team dedicated to the integration, dedicated to the

8   communication with the supplier, and after that,

9   this team will be able to integrate that into the

10   rolling stock.

11   ANTHONY IMBESI: Okay. Yeah, and I'll

12   certainly take you through some of that integration

13   in a little bit, but first, I'd like to turn to

14   your -- the time when you first started on the

15   project. Could you just explain, to the best of

16   your recollection, what was the state of the

17   project when you arrived.

18   ARNAUD LACAZE: So when I arrived, I

19   arrived in September 2016. So when I arrive at

20   Ottawa, in production, I think Train 7 -- train --

21   yes, Train 7 was in production. Train -- it was

22   the beginning of the production of Train 7. Train

23   2 was at the beginning of the serial test - so, if

24   you want, the production test - and Train 1 was

25   still in Hornell, doing some test and doing some

1   tests with Thales at that time.

2   ANTHONY IMBESI: I'm sorry, in -- which

3   LRV was it in Hornell? Was that LRV 1?

4   ARNAUD LACAZE: LRV 1, yes, was in

5   Hornell doing some serial test and doing some what

6   we call static PICO tests with Thales.

7   ANTHONY IMBESI: Okay. So LRV 27 was

8   in production. LRV --

9   ARNAUD LACAZE: No, no, no. LRV 7.

10   ANTHONY IMBESI: Oh, okay. LRV 7.

11   That makes more sense to me. And you indicated

12   that LRV 2 was at the beginning of serial testing?

13   ARNAUD LACAZE: Yeah.

14   ANTHONY IMBESI: Okay. And so when you

15   arrived and you just explained the status of where

16   things were, did you understand that to have been

17   on schedule? Behind schedule? What was your

18   understanding of how it was as compared to how it

19   was originally planned?

20   ARNAUD LACAZE: Well, I arrived in

21   September, but I did -- during the summer, I did --

22   in July and -- and August, I did some -- some

23   meeting with Nadia and OLRTC. So Nadia was the --

24   the project director before me, so we did some

25   handover, which is something classical at Alstom.

1   So we did some meeting together at Hornell -- or in

2   Ottawa and in Montreal to do some handover.

3   And so I understood at that time that

4   we just had signed a couple of months ago a new --

5   a new baseline with OLRTC in terms of the -- in

6   terms of schedule. But when I came in in

7   September, I realized that effectively we started

8   to have some difficulties with the schedule, and we

9   started to be behind the schedule. So yes, I

10   started with my team first to -- to see where was

11   the difficulties and -- and started to see with

12   OLRTC what was possible then to be done. Because

13   OLRT -- we realized also at that time that OLRTC

14   had some issues to give us access to some of --

15   areas at the MSF, for example, but also to the test

16   track, for -- outside -- outside of the MSF to

17   allow us to do the tests, yes.

18   ANTHONY IMBESI: And so as I understand

19   it, there had been a schedule agreed upon sometime

20   in the few months prior to your arrival, and that

21   was slightly behind by the time that you joined in

22   the end of summer, early fall?

23   ARNAUD LACAZE: Yes. We signed --

24   Alstom signed, at that time, the V5 -- Revision V5

25   of the schedule. I don't recall exactly when. It

1   may have been May or -- I don't know. And in

2   September, yes, I realized with my -- with my team

3   that some of the activity started to be behind,

4   yes.

5   ANTHONY IMBESI: And what activities

6   were those in particular? Was it assembly?

7   Testing?

8   ARNAUD LACAZE: At that time, it was

9   mainly -- mainly the testing. We still didn't have

10   access to the test track, whereas train set number

11   2 was ready to go outside. And also access to MSF:

12   We were able to have full access to the production

13   line, but the -- during the production -- during

14   the production process, you need, at a certain

15   point, to put the LRV in what we call a test area

16   to do some water tests, to be -- to be sure that

17   there is no leakage inside the vehicles, and we

18   also needed to go in a specific area to do some

19   serial tests, so be sure that the train is ready,

20   in terms of manufacturing, to start and to go

21   outside.

22   And when I arrive at that time, Alex

23   L'Homme, the person in charge of the production in

24   the site for -- for us, told me that, yes, we still

25   didn't have access to that. So I started to try to

1   mitigate -- to mitigate some activities with OLRTC

2   to clearly be able to -- first, to continue the

3   production and see what was possible to do.

4   ANTHONY IMBESI: Okay. So I have a

5   question for you about the mitigation in a second,

6   but just so I have it clearly, then, so you had

7   access to the portion of the MSF where you were

8   doing the assembly; correct?

9   ARNAUD LACAZE: Yes.

10   ANTHONY IMBESI: The issue was that you

11 did not have access, full access, a sufficient

12 space in the MSF to do the static testing?

13   ARNAUD LACAZE: To do static testing,

14 weighting, so to put weights in the train, and

15 water test bay, so to do the water -- to do the

16 water test. And this is --

17   ANTHONY IMBESI: And --

18   ARNAUD LACAZE: -- test track, and

19 after that, because train set 2 was dated to do the

20 test to be able to go outside the MSF, to start the

21 dynamic test on the -- on the main line.

22   ANTHONY IMBESI: And I'm sorry, did you

23 say LRV 2 was ready to do the --

24   ARNAUD LACAZE: When I arrived, LRV 2

25 was in the test bay, and it was doing some tests,

1 ready to go -- ready to go outside to start the

2 dynamic test, yes.

3   ANTHONY IMBESI: And then that's where

4 you experienced issues with accessing the test

5 track.

6   ARNAUD LACAZE: Yes. It was -- when I

7 arrive, it was one of the main -- the first main

8 actions that I made with OLRTC, trying to -- to

9 find some way -- to find some mitigation to be able

10 to start the test, first to have access to the

11 entire MSF and quickly have access to the test

12 track to start -- to start the tests, yes.

13   ANTHONY IMBESI: And so at what point,

14 then, did Alstom get access to the portions of the

15 MSF that it required to perform the static testing

16 and the other tests that you had mentioned?

17   ARNAUD LACAZE: So for the static --

18 for the static test, when we had access only to

19 one -- one area instead of four, and we had the --

20 and other functionality was not there. So if I

21 remember well, when we had -- we were not only to

22 have power through the wayside. We had no power

23 from the catenary, which is -- which clearly --

24 clearly -- we can progress with it, but at a

25 certain point, you cannot do all the tests, for

1   sure. And so we were not able to do all the tests,

2   and we had no access to use those parts.

3   So we were able to continue the tests,

4   and this is what I mitigate with OLRTC, saying,

5   Okay, let's continue with the test, but we will not

6   be able to perform 100 percent of the tests. So at

7   a certain point, we'd have to find an agreement:

8   first, to be paid; and secondly, to say, okay, the

9   train is good enough to go outside to start the

10   dynamic tests, but this train will have to come

11   back anyway because we'll have to complete the

12   tests at a certain point. So it was a delay.

13   ANTHONY IMBESI: Okay. So --

14   ARNAUD LACAZE: I asked them to

15   continue to work with -- to -- to allow us to have

16   full access to the -- to the -- what we call the

17   LMB, the test area at MSF, to have full access

18   to -- and "full access" meaning with all the

19   functionalities to allow us to complete all the

20   functional tests.

21   ANTHONY IMBESI: Okay. So your

22   mitigation plan, then, that you had mentioned, that

23   was to perform all the testing that you could on

24   the LRVs that were available. And then was it then

25   assumed that those were going to go out for dynamic

1   testing and then come back to perform the balance

2   of the static testing and the weather testing and

3   everything, the weight testing?

4   ARNAUD LACAZE: Yes, yes. Because I

5   cannot -- this -- this is the part of triangle that

6   I mentioned to you, the Q, the C, and the D. At a

7   certain point, I need to -- I cannot stop the

8   production, and I need to mitigate, but the -- this

9   kind of mitigation clearly will have an impact on

10 the schedule because if you have to -- if we find

11 an agreement, so it's fair, but in the meantime, as

12 we mention, we'll accumulate delays because the --

13 the train will have to be back to complete the

14 test. So we are talking about train set 2, but

15 it's a production line, so number 3, 4, 5 would

16 arrive soon.

17   So at a certain point, okay, mitigate,

18 let's continue, but OLRTC also needed to understand

19 that this train will have to come back at a certain

20 point to complete -- to complete their activities.

21   ANTHONY IMBESI: Okay. And do you

22 recall when you got full or sufficient access to

23 everything in the MSF that was required to perform

24 everything?

25   ARNAUD LACAZE: Full access, I don't

1   recall, and I think I left the project without

2   accepting the full access. So during 2 years and a

3   half, I never had what I call full access. But I

4   was -- I was -- I don't remember exactly when, but

5   I was able, maybe mid 2017, to have access at least

6   to the -- to the LMB with a specific work permit.

7   Because it was not under the Alstom property. It

8   was still under OLRTC property. We put in place a

9   work permit with them, to say, okay, we will -- we

10 will have access -- we want to have access to this

11 area between this time and this time to do the

12 test, and if OLRTC wants to do some work to

13 complete the building, they will have to do that

14 after or before, or if you do it in the same time

15 as us, we will have to stop the test.

16   So we put this -- we put this work

17 permit and the access with them to -- to be -- to

18 be able to access to these -- to these specific

19 areas.

20   ANTHONY IMBESI: Okay. So the full

21 construction wasn't completed, but it was

22 sufficient for your purposes. You just needed a

23 work permit in order to access that portion because

24 it was under OLRTC's control?

25   ARNAUD LACAZE: It was -- yes. And

1 because we needed to complete the -- we need to

2 complete the work. For example, the catenary was

3 not functional at the beginning, so we -- we

4 started all the tests with what we called the

5 wayside, and OLRTC, it was mandatory for them to --

6 to complete the work to be able -- for us to have

7 access to the catenary.

8   ANTHONY IMBESI: And so by May of

9 2017 -- so leaving aside the issue that you needed

10 a work permit in order to access it, was there

11 anything that was still missing that was preventing

12 you from -- from completing any of the work?

13   ARNAUD LACAZE: I don't -- I don't

14 remember if it was in May of 2017, honestly, but it

15 was somewhere in 2017 that we were able to -- to

16 start. I -- I remember that, at a certain time, we

17 had access to -- to the catenary. But following

18 that, we had some issues with the power of the

19 catenary. In fact, the -- the power pack, or what

20 I think they called that is OCS, was not sufficient

21 in terms of power. So each time that we started to

22 test the train, the power was off. So they needed

23 also to redesign the OCS station to be able to --

24 for us to complete the test.

25   So yes, at a certain point, we had

1   access to the LMB, and we were able to start the

2   test. But quickly, we -- we realize and we said to

3   OLRTC, you have an issue with your power because we

4   are not able to complete the tests.

5   ANTHONY IMBESI: And so in talking

6   about the different tests that were undertaken, the

7   early tests that are done, the static tests that we

8   were just talking about, are those referred to as

9   validation tests?

10   ARNAUD LACAZE: I don't remember what

11   we called that. For me, it's what I call factory

12   tests, or production tests. So after -- each

13   vehicle, after the production, after that

14   production, we need to go in this area to do this

15   phase of tests, to be sure that everything is

16   capable, functionality is there.

17   What I call validation -- and I don't

18   know if it's the word used by Alstom, but what I

19   call validation is the qualification of a specific

20   system. Typically, you develop the system in --

21   during the design phase, and you qualify or you

22   validate the system. You validate it or you

23   qualify the system once. And you do -- you choose

24   to do that on one, two, maybe three trains, to

25   qualify, once for all, that the system is working.

1   You don't have to do that every time.

2   ANTHONY IMBESI: And would those be,

3   like, component tests and type tests?

4   ARNAUD LACAZE: Yes, it's type tests,

5   yes, typically.   And for that -- you -- you need --

6   yes, at the beginning, you need to have access to

7   the LMB because we do in the LMB what we call

8   static qualification or static type tests, and

9   quickly after that, you need to go outside on

10   the -- on the track to do type or qualification

11   dynamic test.

12   ANTHONY IMBESI: Okay.   So within the

13   we'll call the validation or qualification phase,

14   there is -- there is the type tests.   That includes

15   both static and dynamic type testing?

16   ARNAUD LACAZE: Yes, yeah.

17   ANTHONY IMBESI: And then from there,

18   do the LRVs, then, each move on to static and

19   dynamic serial testing?

20   ARNAUD LACAZE: Yes.   We have to do --

21   each train after that, we have to do both a static

22   and a dynamic test, but it's a very short test

23   because we consider that the qualification of the

24   type tests have been done on the -- on one or two

25   trains, depending on the project.   But after that,

1 each train will go in the LMB, doing the production

2 test, static test, and a short dynamic run.

3   ANTHONY IMBESI: Okay. And so speaking

4 just then about the validation or qualification

5 testing, both the serial -- excuse me, the static

6 and dynamic components, then, is that all to be

7 completed before serial production begins?

8   ARNAUD LACAZE: In the -- in an ideal

9 world, yes. Yes.

10   ANTHONY IMBESI: In Ottawa, that is

11 what was to happen?

12   ARNAUD LACAZE: No, we did -- because

13 we had some delays -- for me, we had some delays in

14 the -- in the design phase with OLRTC and the City.

15 Alstom accumulates some delays because OLRTC and

16 the City were not able to define exactly -- exactly

17 what they wanted, in terms of design and in terms

18 of functionalities.

19   But at the end, the commercial launch

20 still remained the same. So at a certain point,

21 you are -- your schedule is -- is more and more

22 short, so -- so you need -- you need to take the

23 risk, and you need to do things about it. So

24 that's what we decided in -- after a discussion

25 with OLRTC, of course, is to say, okay, let's start

1   the -- let's do the qualification and the

2   validation test on LRV 1 and 2, but in the

3   meantime, let's start the production.

4   And you -- you understand the risk

5   to -- to do that is we will have retrofit to be

6   done after that, but at least you will have

7   95 percent of the train already here. So it's -- I

8   would say it's common risk. You would see that on

9   every rolling stock project. At a certain point,

10   you need to do things in parallel, and then the

11   main risk is the retrofit after that, for sure.

12   ANTHONY IMBESI: And so -- and doing

13   them in parallel as occurred in Ottawa, is that

14   fairly typical on other projects, or was this a

15   unique instance?

16   ARNAUD LACAZE: No, no, it's typical.

17   It's --

18   ANTHONY IMBESI: It's typical?

19   ARNAUD LACAZE: It's typical because

20   it's -- all the rolling stock project today in the

21   world are very short in terms of -- between the

22   start of the design phase and the commercial

23   launch, that you need to do that. You need to do

24   that.

25   ANTHONY IMBESI: And so speaking about

1 the retrofits, then, so did the majority of

2 retrofits arise because of the need or the decision

3 to conduct the validation qualification testing in

4 parallel with serial production?

5   ARNAUD LACAZE: No. Not from my -- not

6 from my point of view.

7   ANTHONY IMBESI: I'm sorry, your

8 internet just cut out for -- for me. If you could

9 repeat that.

10   ARNAUD LACAZE: It's part of -- part

11 of -- of the retrofit was due to -- to this -- this

12 strategy, of course, but a lot of the retrofit was

13 also due to -- to the design that was not fully --

14 fully frozen. And, again, the interface with

15 Thales, for example, of the interface with the

16 radio change until -- until the last minute.

17   So -- so yes, the risk was taken with

18 OLRTC to -- to get the train, and meaning that we

19 needed to complete some tests. But in the

20 meantime, some interfaces was not yet completely

21 frozen. And typically -- typically, as the Thales

22 interface and the radio interfaces was not -- was

23 not fully frozen -- it was frozen for us, but we

24 realized at the end that it was not fully frozen,

25 and it was also a big part of the retrofit that we

1   did before -- before I left. Yeah.

2   ANTHONY IMBESI: Okay. So the -- the

3   retrofits arose for both reasons, then.

4   ARNAUD LACAZE: Yes. Yes.

5   ANTHONY IMBESI: Okay. And so in

6   talking about the retrofits generally -- and I am

7   going to take you into more detail with respect to

8   the interface with Thales, but speaking more

9   generally, then, when the retrofits were being

10   dealt with, were those being dealt with at the same

11   time as serial production of the LRVs?

12   ARNAUD LACAZE: Yes. The idea is to --

13   is to work with the configuration, so, in fact, you

14   accumulate some return of experience of your train

15   in tests, for example, so you do -- do one or two

16   tests, you accumulate a ton of experience in terms

17   of modification, improvement, or correction. And

18   following that, you do what we call a CCB, a

19   control board with the -- the technical guy, your

20   industrial guy, your team to define, effectively,

21   when and starting at which LRV you will start to

22   implement all this modification.

23   And because you cannot run, run, run

24   without the modification, you design a

25   modification, and this batch of modification are

1 called configuration reviews. And so you define --

2 okay -- with your industrial guy, for example, we

3 will apply the configuration B starting train

4 number 8 in production, for example, meaning that

5 from 1 to 7, you will have a dedicated team, a

6 retrofit team, and this team will apply this

7 modification directly in the field, so on the

8 trains that are already outside the production

9 line. So it's -- we work like this, by batch of

10 modification, or configuration, if you want.

11   ANTHONY IMBESI: Okay. So you -- you

12 implement the change on the new LRVs going forward

13 as they're being produced. And then you have a

14 dedicated team performing retrofits on the ones

15 that have already been produced that are in need of

16 that retrofit.

17   ARNAUD LACAZE: Yes, you -- at that

18 time, once you have the production and you start to

19 use the train, you need to have two teams: the

20 retrofit team, and a production team, of course,

21 and a configuration manager or configuration team

22 able to -- to dispatch the work between these two

23 groups.

24   ANTHONY IMBESI: And so is that

25 something that would have been planned for at the

1 outset of the project, having a dedicated retrofit

2 team available to do that in tandem with

3 production?

4   ARNAUD LACAZE: Yes. It's something --

5 it's -- it's not the plan at the beginning because

6 we want to have something perfect. But the reality

7 is this: You have to build the team at the end,

8 because you start -- you start to do some tests,

9 you start to accumulate -- accumulated some return

10 of experience, and you don't want to disturb the

11 production. You don't want to ask the guy in

12 production to come on the train that is already

13 outside the production to do the work -- to do the

14 job. No.

15   You want -- you your production team

16 and your production line focussed on the production

17 of the train, and that's it. So you don't want

18 them to -- to be disturbed by other things. So you

19 have -- at the time, you have to get this retrofit

20 team, and often the retrofit team becomes the

21 warranty team. It's --

22   ANTHONY IMBESI: Becomes the warranty

23 team?

24   ARNAUD LACAZE: Yes, and generally this

25 team, because they accumulate also their own

1   experience on the train, this team, at a certain

2   point, will become the warranty team when the

3   project will be in -- in that phase, so it's a

4   win/win solution for -- for -- for the project.

5   ANTHONY IMBESI: Okay. So then based

6   off what you're -- what you're saying, then, does

7   the retrofit work draw any resources away from

8   production, or are they handled separately such

9   that they're not effected?

10   ARNAUD LACAZE: No, no, we -- it's a

11   dedicated team. It's a separate team. So --

12   clearly, the main idea is not take people from the

13   production line. So no, it's a dedicated team

14   focussed on -- focussed on the retrofit.

15   ANTHONY IMBESI: So would Alstom

16   needing to perform this retrofit work, does that

17   impact its schedule in any way, then, given that

18   there's a dedicated team handling that?

19   ARNAUD LACAZE: It's -- clear that's

20   for some retrofit activity, yes, you will impact

21   the schedule, and -- and that's why -- that's why

22   it's -- it's a common agreement with OLRTC or with

23   the customer, saying, Okay, we take the risk to

24   start the production; we take the risk to do things

25   in parallel; but be aware that, at a certain point,

1   you will have to do some -- we will have to do some

2   retrofit activities.

3   So according -- and at the beginning of

4   the project, it's -- it might be very difficult to

5   say it will have a huge impact or not on the

6   schedule because you don't know -- we don't know

7   exactly the -- the time and the energy that you

8   will have to spend for the retrofit because you

9   don't know what you don't know. It's the beginning

10   of the tests.

11   But you must alert your customer that

12   effectively, maybe, you will have to face some

13   delay, will have to find some mitigation plan. And

14   the mitigation plan can be, okay, let's start the

15   commercial launch with some functionality that will

16   not be 100 percent functional, for example. You

17   know, if it's not linked to some safety system, you

18   can -- you can have this agreement with your

19   customer.

20   It's -- but this is -- this is where I

21   said at the beginning that you need to have this --

22   this exchange with your customer, and both must

23   understand the risks and must accept the risk.

24   ANTHONY IMBESI: And so is -- is that

25   fairly typical on these projects, to have certain

 1 items to be deferred to be dealt with after revenue

 2 launch?

 3   ARNAUD LACAZE: Yes, yes, yeah. It has

 4 always been the case, yes.

 5   ANTHONY IMBESI: It's always the case,

 6 or typically the case?

 7   ARNAUD LACAZE: Yes, yes. Yes, because

 8 at -- it's normal -- you need to -- you can do all

 9 the tests you want in the -- in the laboratory on

10 your laptop, do simulation. You can do everything

11 you want. The -- the reality is when you are able

12 to -- to use your train in the field. This is

13 where, at the end, you -- you will learn most of

14 the -- you have the most return experience.

15   Because we are not -- in this -- in

16 2020 or now, we are not talking anymore about the

17 train alone in the track. It's -- it's a system

18 now. The train is -- the train is clearly

19 integrated in the -- in the structural element,

20 with communication to the wayside, with information

21 coming from -- from the rail, with -- from -- it's

22 a -- it's a clearly an integrated system. So

23 this -- yes. This is where you learn the most.

24   ANTHONY IMBESI: And did the need to

25 perform retrofits, both because

1 validation/qualification was done in tandem with

2 production and also because of issues that you'd

3 indicated arose in the interface with Thales, did

4 the requirement to do those retrofits impact the

5 testing and commissioning in any way? Did it delay

6 the testing and commissioning? Did it cause that

7 to be compressed? Did it have any implication?

8   ARNAUD LACAZE: Well, yes, it

9 compressed -- it compressed -- I don't -- I don't

10 remember that it compressed the commissioning

11 activities, but it -- it put a lot of pressure on

12 the team because -- because we wanted to keep -- we

13 wanted to keep the -- the deadline. So we

14 increase -- I increase the number of -- of people

15 in my team to be able to work on Saturday, Sunday,

16 and to work in two or three shifts, to be able to

17 maintain a -- to maintain a -- to maintain the --

18 the dates. Because we still need -- if we need --

19 if we need 5 days to do the commissioning, yes, I

20 will try to -- to push the team to do better, but

21 if it's 5 days, it's 5 days, so I will not be able

22 to compress it any more.

23   So the -- the main solution for us, at

24 that time, was to increase the workforce and say,

25 okay, let's -- let's work on Saturday and Sunday to

1   do the -- to do the retrofit, and let's try to work

2   in two or three shifts to complete also the

3   retrofit on some of the trains.

4   ANTHONY IMBESI: Did the -- in your

5   view, did it -- did the necessary amount of testing

6   and commissioning get done despite some of the

7   delays you just mentioned?

8   ARNAUD LACAZE: Sorry, can you repeat.

9   ANTHONY IMBESI: Did you feel that the

10 necessary amount or the required amount of testing

11 and commissioning was still done despite the delays

12 that were experienced?

13   ARNAUD LACAZE: Yes. We -- we -- we

14 tried to -- to do as much as we can, the tests and

15 the commissioning. But at the end, it goes back to

16 the infrastructure. We were not able to -- to

17 start -- to start on time. We were not able to do

18 everything we could -- we wanted at that time. So

19 we tried to mitigate as much as we can, but, again,

20 it's -- and as (indiscernible), it's what I said

21 to -- to OLRTC: You -- in the contract, we are

22 supposed to have -- I don't remember -- 4

23 kilometres of track, for example. We have only 2.

24 And on these 2, we are not able to do the test --

25 do the test all the day. We are able to do the

1 test only 6 -- 6 or 8 hours. So at the end -- at

2 the end, it would push -- it would push the end of

3 the validation.

4   MICHAEL VALO: Mr. Imbesi, I'm sorry to

5 interrupt. I just want to make sure that you and

6 Mr. Lacaze are 100 percent clear on what you're

7 each talking about. You had asked about

8 commissioning and testing, and I just wanted to

9 ensure you were clear about whether you meant

10 commissioning of the overall system or

11 commissioning of the vehicles alone, or maybe both.

12 I just want that to be clear because it wasn't.

13 I'm just not certain, that's all.

14   ANTHONY IMBESI: No, I appreciate that.

15 I'm speaking about the vehicles specifically.

16   MICHAEL VALO: Okay.

17   ANTHONY IMBESI: So in your view,

18 then -- and just to make sure that you are

19 answering what I'm specifically asking, so speaking

20 about the vehicles in particular, you had felt that

21 there was the sufficient amount of testing and

22 commissioning performed in respect of those

23 vehicles?

24   ARNAUD LACAZE: With the extension of

25 time, yes. With -- with the extension of time, if

1   we wanted to keep on schedule, the schedule that we

2   had at the beginning, no. No, because we had -- we

3   had no access to the full -- to the full -- to the

4   full line, for example. We had no access to -- to

5   some parts of -- of the track. We were not able to

6   do -- to do the test all the day. We were able to

7   do the tests on the -- during 6 hours instead of

8   10 hours. We had some issue -- sometime --

9   sometimes -- sometime we are not able to -- to have

10 access to the track during 2 -- 2, 3 weeks.

11   So if you are talking -- maybe it's my

12 English, but if you are talking about the -- the

13 baseline schedule with what OLRTC was able to give

14 us, no, clearly we had no time because we had

15 not -- we requested 10 hours to do a test, and

16 OLRTC gave us, I don't know, 6 hours. So clearly

17 we had no time. If you are talking about the

18 extension of time that we requested, yes, because

19 we said, okay, you give us only 6 hours, which

20 means that we will need 2 more months, I don't

21 know, to do -- to do the tests.

22   ANTHONY IMBESI: Yeah, no, I wasn't

23 talking so much about a -- a comparison between

24 what you were given and what you needed. It was

25 more of a sense of, ultimately, what was done, was

1 that, in your view, sufficient for the testing that

2 at least you experienced? Because I appreciate you

3 were gone before the project got to RSA.

4   ARNAUD LACAZE: Okay. So you mean at

5 the end, yes. Yes, from my point of view, at the

6 end, in terms of rolling stock, in terms of

7 traction and so on, it was -- when I left, I think

8 we had -- we had effectively a good product, able

9 to start -- able to start -- to start commercial

10 launch. And when I left the project in -- in

11 October 2018, I don't recall how many LRVs we had

12 at that time, but it was mostly 20, and a lot of

13 them was used -- already used by -- by OLR -- by

14 the City to do some training.

15   So in terms of functionality of the

16 train, I will say -- I will say yes. In terms of

17 integration to the infrastructure, when I left, no.

18 It was clearly not sufficient.

19   ANTHONY IMBESI: Okay. And I won't ask

20 you about that because I appreciate you won't have

21 knowledge of what happened after you left the

22 project. But I'd like to turn back, then. You

23 were talking about access to the test track. And

24 so you indicated that, at a certain point, you

25 received 4 kilometres of the track as opposed to

1   the entire length?

2   ARNAUD LACAZE: No, we -- we asked them

3   to have 4 kilometres of track to do what we call

4   the qualification - or type tests, if you want,

5   part of them. So we asked -- we asked to have

6   access to 4 kilometres, and we had access only to

7   2. So we were on this 2 kilometres of track doing

8   some tests with LRV -- LRV 2. So it was -- we --

9   we had no possibility to have access to more than

10 that.

11   And after that, we -- later in the

12 project, we wanted to have access to the full line

13 because we need to -- we need to have access to

14 this full line to do what we call the quality ride

15 test. So we need to -- to validate that the

16 behaviour of the train is good everywhere. And so

17 we were not able to do these kinds of tests also

18 because we -- we had no possibility to go inside

19 the tunnel in -- in Ottawa. And so we had no

20 access to the tunnel, and we had no access to the

21 west -- west side of the track.

22   ANTHONY IMBESI: And -- okay. So

23 initially you -- you asked for 4 kilometres. You

24 were given 2. At a certain point, did you get

25 those 4 kilometres?

1   ARNAUD LACAZE: I don't remember. Yes,

2   at a certain point, yes, because we -- at a certain

3   point, we were able to do the test -- to do the

4   test -- to the test between -- until the beginning

5   of the tunnel.

6   So I -- I think when I left, maybe a

7   couple of months before I left in 2018, we were

8   able to -- we were able to have access to these 4

9   kilometres long. So 2 years -- I will say 2 years

10   after the beginning of the tests, we were able to

11   access to these 4 kilometres.

12   ANTHONY IMBESI: And so 2 years after

13   the beginning of the tests, when would the tests

14   have started? I'm trying to get a -- I want to

15   make sure I'm understanding the range of years.

16   ARNAUD LACAZE: The test started on the

17   dynamic track in November of 2016.

18   ANTHONY IMBESI: Okay. So then you're

19   saying by November of 2018, you would have had

20   access in 4 kilometres?

21   ARNAUD LACAZE: In 2018, so it was --

22   it was in 2017, I guess.

23   ANTHONY IMBESI: 2017.

24   ARNAUD LACAZE: Yes, that we -- I don't

25   know exactly when, but at a certain point, yes, we

1   were able to -- yes, to have access to these -- we

2   were able -- step by step, we were able to -- to go

3   in the tunnel, to go in the wayside -- I don't

4   remember exactly the date, but it was not at the

5   beginning for sure. Step by step, they -- they --

6   they start to give us -- to give us access,

7   according to the progress in terms of

8   infrastructure.

9   ANTHONY IMBESI: So what was the

10 implication, then, of not having access to 4

11 kilometres? What were you not able to do given

12 just 2 kilometres?

13   ARNAUD LACAZE: So you don't have the

14 possibility to -- to do a lot of full -- full --

15 how can I say that? -- full traction or full speed

16 because you have this limitation of 2 -- 2

17 kilometres. And after that is the number of LRVs

18 on these -- on the 2 kilometres of track, because

19 you have LRV 2, so Alstom doing some tests; you

20 have Thales doing some dynamic PICO testing on

21 these tracks, and you have the City doing some

22 training.

23   So at the end, you start to accumulate

24 more and more train on this 2 kilometre of track,

25 and if you had also the work that they also needed

1 to do on this track to install -- to install or to

2 correct some -- some issues, yes, at the end, it's

3 starting to be very -- very crowded, let's say.

4   ANTHONY IMBESI: Okay. So it was

5 congested and then the -- your inability to get to

6 the max speed that was required.

7   ARNAUD LACAZE: Yes.

8   ANTHONY IMBESI: Were there any other

9 issues -- and I know you'd mentioned -- I

10 believe -- were there power issues with respect to

11 the track? Were there issues -- so even with the 2

12 kilometres that you were given, were there factors

13 that prevented you from performing your testing on

14 those kilometres at any point in time?

15   ARNAUD LACAZE: Yes. But the first one

16 is -- is the gauge of the track. So the -- the

17 first time that we go -- went outside, we -- we

18 realized that the gauge was not -- was not correct,

19 so we -- we stop -- we stop -- we stop that, and we

20 asked OLRTC to put the correct gauge of -- gauge of

21 the -- of the track.

22   Finally, they request us to use a train

23 to push -- because we've installed a system that --

24 that the train will push the track and the track

25 would be as -- the correct length or the correct

1   gauge with -- with the train, so they asked us to

2   do that. We -- we -- with some expert, experience,

3   we think about that, and then okay, finally we

4   accept to do that, to use the train number 2 to --

5   to push -- to push the track to the correct gauge.

6   So we did that on the 2 kilometres, and we asked --

7   we asked OLRTC first to correct this -- this issue

8   on the other -- on the -- on the full line, for

9   everywhere.

10   And so it was our discussion with them,

11 and then finally, a couple of months after that,

12 they came back to us accepting the fact that

13 effectively they will have to change their -- the

14 system because they were -- they were not able to

15 maintain the gauge. After -- after the winter

16 season or with it, the track was -- was moving

17 too -- too fast, and it was due to some clips -- I

18 don't know the technical issues, but they had to

19 change the way to maintain the track on the -- on

20 the ground.

21   So that meant that it was -- honestly,

22 it was very difficult for -- for them to admit

23 that, but, finally, they admitted that they needed

24 to change -- to change that, yes.

25   ANTHONY IMBESI: So just for the

1   record, then, gauge is the distance between the two

2   rails?

3   ARNAUD LACAZE: Yes, the gauge is the

4   distance between -- yes, between the two rails.

5   ANTHONY IMBESI: And so was the gauge

6   just inconsistent throughout the entire track, or

7   was it -- was it too narrow in all locations?

8   ARNAUD LACAZE: It was inconsistent.

9   Sometimes -- you -- it's a very precise -- precise

10   measurement. If I remember well, you need to be

11   plus 1 and minus 3 millimetres. You have to

12   respect this -- this range. And we asked OLRT to

13   give us exactly the -- the gauge on all the track,

14   to be sure that we had something consistent because

15   we realized it was not consistent. Sometimes it

16   was too narrow, sometimes it was too tight. It was

17   very unpredictable. So we -- we had this issue at

18   first with -- with the -- with the track, yes.

19   ANTHONY IMBESI: And does that prevent

20   you from being able to utilize the track?

21   ARNAUD LACAZE: We refused at the

22   beginning, yeah. We told them we don't -- we don't

23   want to go outside if the range is not correct.

24   ANTHONY IMBESI: But why would that be?

25   What's the implication of having the gauge off in

1   the way that it was?

2   ARNAUD LACAZE: Well, you can damage --

3   you can damage the wheels.

4   ANTHONY IMBESI: And so in terms of

5   OLRTC, were you the main person of contact between

6   Alstom and OLRTC during your time on the project?

7   ARNAUD LACAZE: Yes. Yes. As the

8   project director, yes.

9   ANTHONY IMBESI: So what would have

10   been the nature of your contact with OLRTC? What

11   is it that you were handling?

12   ARNAUD LACAZE: What do you mean by

13   "the nature"?

14   ANTHONY IMBESI: Well, were you dealing

15   with all circumstances? Like, were you dealing

16   with commercial issues, technical issues,

17   scheduling issues?

18   ARNAUD LACAZE: Yes, yes, I mean, I

19   deal -- I don't remember exactly at that time what

20   I was doing with them, but yes, I had daily contact

21   with them in terms of -- in terms of schedule,

22   commercial issues, of course technical, but I'm

23   not -- even if I am an engineer, I'm -- I'm no more

24   a technical guy, so it was mainly my team that was

25   dealing with them. I was mainly here to be aware

1   of the technical situation, support my team or

2   to -- on the explanation, and find a mitigation

3   plan or find some solution with -- with OLRTC.

4   But my main target is to keep the

5   relationship with OLRTC or with the customer, if

6   you want, and yes, dealing with all these aspects,

7   schedule, commercial, technical, with the help, of

8   course, of -- of the team behind me.

9   ANTHONY IMBESI: Who were -- who were

10   your counterparts at OLRTC? Who was it that you

11   were dealing with?

12   ARNAUD LACAZE: It was a man at the

13   beginning. I don't remember his name. And after

14   that, it was Sharon -- Sharon Oakley. Yes, Sharon

15   Oakley. The first man, I don't remember his name.

16   ANTHONY IMBESI: Okay. And you touched

17   on --

18   ARNAUD LACAZE: It was a contract --

19   for the contract and project aspect. For the

20   technical, it was Mr. Bergeron.

21   ANTHONY IMBESI: Jacques Bergeron?

22   ARNAUD LACAZE: Jacques Bergeron, yes.

23   Yes, for the technical aspect. Because he was a

24   technical guy but also a project manager, so I was

25   dealing with him for most -- for general -- general

1   topics in terms of technical. But it was mainly --

2   it was mainly -- the main counterpart was Sharon.

3   ANTHONY IMBESI: Was Dr. Oakley?

4   ARNAUD LACAZE: Dr. Oakley, yes.

5   ANTHONY IMBESI: Okay. And so turning

6   then to Jacques Bergeron, was he the individual

7   that was responsible for systems integration on

8   OLRTC's end?

9   ARNAUD LACAZE: He was -- yes, he

10   was -- he was responsible of -- he was responsible

11   of the integration, and he helped by -- he was

12   helped by a Mr. Fitzgerald. Mr. Fitzgerald, who

13   was -- Mr. Fitzgerald for Thales. Mr. Bergeron

14   was, I would say, the lead, and after that, he had

15   some specific -- specific person dedicated for some

16   specific system.

17   ANTHONY IMBESI: So Mr. Fitzgerald, is

18   that Frank Fitzgerald?

19   ARNAUD LACAZE: Frank Fitzgerald, yes.

20   Yeah.

21   ANTHONY IMBESI: Okay. And so -- and I

22   know that we've spoken a little bit earlier today

23   about integration, but could you just describe for

24   me OLRTC's approach to systems integration. How

25   did it approach that facet of the project?

1   ARNAUD LACAZE: I cannot say. It

2   was -- honestly, I -- I cannot say it was an

3   integration.

4   ANTHONY IMBESI: What do you mean by

5   that?

6   ARNAUD LACAZE: I mean -- I mean, it

7   was a lot of -- it was clearly a lack of

8   integration. It was -- based -- based on my

9   experience in the past and also present experience,

10   it was not -- it was clearly a lack of integration

11   or -- or management.

12   When you -- when you do an integration,

13   you -- you take all the responsibility, and you --

14   you make sure that both parties will communicate

15   together. Anything that's -- if it's not the case,

16   you will bring this guy in the room and say, okay,

17   now we'll fix the issue. You don't try to -- you

18   don't try to -- to work with -- with one of -- one

19   of the parties and leave the other party in the

20   dark and come back a couple of months or one year

21   after that, saying, okay, by the way, you -- you

22   missed -- you missed some -- some things, so -- no.

23   It's not like this.

24   When you do an integration, you --

25   really, the guy or -- here to link everybody all

1   together. And it's -- honestly, it's key. And I'm

2   talking about my past experience, but I'm also

3   talking about my current experience doing this

4   integration. You need to do these things.

5   (Indiscernible). It's not -- I'm talking --

6   honestly, I'm talking very free here. I'm not

7   working anymore with Alstom. I'm at -- honestly,

8   OLRTC missed this -- this integration, missed this

9   link of -- this link between -- between both

10   companies.

11   ANTHONY IMBESI: And so is that a

12   failure on OLRTC's part to -- to manage that

13   process? Is -- is it an issue of collaboration?

14   Like, what specifically would you have expected to

15   see happen that didn't happen?

16   ARNAUD LACAZE: Yes. For -- for me,

17   it's the main -- the main subject of this project.

18   The -- as -- how can I say that? As a -- as a

19   customer, you need -- because at the end, you will

20   use this product, so as a customer, you need to --

21   to make everything happen. You need to make the

22   link between your supplier. You cannot -- you

23   cannot say, okay, I will let the supplier do what

24   they want. No, the supplier has their own

25   contract, their own objective. The integrator or

1   the customer, you are here to -- to make the link

2   and be sure that you will receive something at the

3   end that you will be able to use.

4   So you have to do this effort. You

5   have to do the -- to do the -- to do these things

6   happen. And to do that, you have to communicate,

7   and you have to understand what your Supplier A is

8   saying, what your Supplier B is saying, and try to

9   find -- and trying to match and try to -- to be

10   able to mitigate everything.

11   And yes, it's -- it was clearly a --

12   clearly a -- a lack of collaboration on the -- on

13   this project, yes.

14   ANTHONY IMBESI: Did you feel that

15   those at OLRTC had the necessary experience to

16   perform the job?

17   ARNAUD LACAZE: Well, honestly, I don't

18   know. I will not judge their past experience or

19   their -- if they -- if they have put at this place,

20   I will say that it was a choice of their

21   management, so -- the only thing I can say, it's --

22   that the collaboration was not here. I will not

23   judge on their -- no, I will not judge on their

24   capacity or not to do -- to the job. I'm not here

25   to do that.

1   Just a contestation, at the end, the

2   collaboration was clearly not here, between us,

3   between OLRTC, and between the other third party.

4   ANTHONY IMBESI: The other -- are you

5   speaking primarily about Thales?

6   ARNAUD LACAZE: Yes, yes, yes, Thales

7   was the main -- the main contributor, yes.

8   ANTHONY IMBESI: Okay. And so in

9   terms, then, of dealing with integration, what was

10   Alstom's understanding, then, of what OLRTC's

11   integration responsibilities were?

12   ARNAUD LACAZE: You -- you -- as an --

13   because on this -- in this project, Alstom had no

14   direct contract with -- with Thales. So you -- we

15   cannot go -- we cannot go to Thales, saying, okay,

16   you need to do that, that, or that, because we

17   don't know their contract. We don't know at the

18   end what they signed in terms of contract and in

19   terms of requirement.

20   So once again, this role of integration

21   must be done by OLRTC because OLRTC has a contract

22   with Alstom and has a contract with -- with Thales.

23   So we are here to make this integration clearly for

24   good. So they are here to facilitate the

25   discussion and the collaboration between those two

1   companies, and they are here to take the decision

2   and say -- because -- okay -- they know what

3   exactly is the contract between the two, so they

4   are here to say -- to take the decision and to

5   freeze, at the end, the interfaces, saying, okay,

6   Alstom, you will receive this kind of equipment

7   from -- from -- from Thales; here is all the

8   interfaces, so build your train according that.

9   They have to do this kind of job.

10   They have to also -- so they have to

11 follow us in terms of preparation of the train, to

12 receive -- to receive this equipment, and they have

13 to follow Thales to respect this integration --

14 these interfaces and to respect the scope of -- of

15 the work. They have to do -- they have to do these

16 kinds of things. And when we have an issue, the

17 integrator is here to -- first to mitigate and, at

18 the end, to take a decision.

19   ANTHONY IMBESI: So to make decisions

20 to deal with issues that arise during the

21 integration process?

22   ARNAUD LACAZE: Exactly, yes. Yeah.

23   ANTHONY IMBESI: And then --

24   ARNAUD LACAZE: And an issue can be a

25 variation order or a technical issue from us, from

1   Alstom, but also from Thales. It's a -- in both --

2   it's in both directions. We need to -- we need to

3   understand and to find a -- and to help to find a

4   solution for both -- for -- for Alstom and for --

5   for Thales.

6   ANTHONY IMBESI: How would you describe

7   the working relationship between Alstom and Thales?

8   ARNAUD LACAZE: It was -- at the

9   beginning, it was -- it was collaborative, I would

10 say, because we -- even if it was delayed -- when

11 I -- when I arrive on the project, we were able

12 to -- to start -- we were able to start the static

13 PICO test. It was in September or October 2016.

14   After that, it was clearly a

15 contract -- a contractual relationship because they

16 understand and we understand that we had no

17 direct -- direct contract or -- together, so it was

18 a -- it was a -- purely a contractual -- a

19 contractual relationship. At my level, I will say

20 that. By -- I would say not by chance, but this

21 is -- this is something natural: The guy on the --

22 onsite, the technical guy, because we were every

23 day working together, we were able, at the end, to

24 find some solution. We were able to try to -- to

25 mitigate as -- as much as we can some technical

1   issues.

2   ANTHONY IMBESI: Do you feel there was

3   sufficient information sharing between Thales and

4   Alstom?

5   ARNAUD LACAZE: No, no. Clearly, no.

6   No, no. We discovered -- we tried to freeze an

7   interface baseline early in the project, and we

8   discover -- we discover -- I think it was in May,

9   with LRV 5, it was in April or May 2017 that,

10   finally, the -- the configuration that -- that was

11   frozen in 1 year before was not good anymore.

12   After that, when we start to do some

13   static PICO test or dynamic PICO tests, we realized

14   that we -- we needed to do a lot of modification

15   inside the system. So clearly it was not -- it was

16   not transparent.

17   And again, I'm not blaming -- I'm not

18   blaming Thales because they have some technical

19   issue. It's normal. It's normal to have technical

20   issues. I'm -- I'm -- I'm just pointing here the

21   fact that the collaboration and the transparency

22   was not here.

23   ANTHONY IMBESI: So if it's -- if it's

24   normal to have some technical issues, then what is

25   it that gives rise to your comment that there

1   wasn't enough transparency?

2   ARNAUD LACAZE: Because it was too

3   late. It was too late. We -- we should have been

4   aware of the functionality of the system earlier in

5   the project and not discover when you do the test

6   and when you try to integrate that, finally, the

7   system is not what we have -- what we had in the

8   specification.

9   It's -- it's not a -- it's -- for

10   Thales, it was not a new product. It was something

11   that already exists. So you can -- as I say, it is

12   normal you have -- it's a technical project.

13   It's -- we are in the industry. It's normal to

14   have issues, but a lot of things should have been

15   raised a lot of months before. So -- after that,

16   it's too late. You -- first, you create

17   frustration in the team, and you create retrofit

18   activities, and this is what we had at the end of

19   this -- of this project, a lot of retrofit linked

20   to -- linked to -- to Thales.

21   ANTHONY IMBESI: Did the -- does the

22   fact that Thales and Alstom are competitors in the

23   train control system market, did that impact the

24   relationship in any way?

25   ARNAUD LACAZE: No. No, because

1   it's -- honestly, no, because we are rolling stock,

2   and we are not -- we are not the -- a system team,

3   so no.

4   And, again, it's -- it's not something

5   new for Alstom to work with -- with third parties,

6   and so we -- we used to -- to -- they used to work

7   with -- with Bombardier. At that time, it was a

8   competitor, but we used to have some contract with

9   Bombardier, same thing for -- for Thales and for

10   others.

11   ANTHONY IMBESI: So in terms of it --

12   it sounds like -- as if you're saying that the

13   design kept evolving to a certain extent from what

14   you're being provided by Thales. Is that fair?

15   ARNAUD LACAZE: Yes. Yeah.

16   ANTHONY IMBESI: And so -- so how did

17   that play out in practice, then? How did Alstom

18   respond to the evolving design that it was

19   receiving?

20   ARNAUD LACAZE: First -- first, we --

21   we alert OLRTC first that in terms of -- from a

22   technical point of view, it was clearly not aligned

23   with the specification that we agreed, and so we --

24   we wanted to have some explanation it's -- from

25   OLRTC about this change and, similarly, a

1   confirmation. And if -- because maybe it was an

2   error from Thales. I don't know. But as soon as

3   OLRTC confirmed that, effectively, what we tested

4   affected the new functionality of the new system of

5   Thales, we request -- we request a variation order,

6   and we -- we requested an extension of time also

7   because, at that time, we knew that it would have a

8   huge impact for -- for the schedule, and we are

9   talking about more than 300 points of connection.

10 It's -- it's a huge, complex system, the ATC

11 system, and the interface is -- yeah, definitely,

12 we knew that we had to -- to change a lot of things

13 in our train.

14   ANTHONY IMBESI: And so are those the

15 retrofit issues that you alluded to earlier in

16 terms of the integration with Thales's system?

17   ARNAUD LACAZE: Yes.

18   ANTHONY IMBESI: And so you had

19 mentioned that the evolving design wasn't in line

20 with the specification that you'd agreed upon with

21 OLRTC, and are you speaking about the contractual

22 requirement between Alstom and OLRTC to have a

23 finalized CBTC design early on in the project, or

24 what are you referring to?

25   ARNAUD LACAZE: Yes, I'm referring to

1   that.   It's -- as I mentioned, it's -- it's key,

2   during the design phase, to freeze -- to freeze

3   your interfaces, because you will build your train

4   according to these interfaces. I don't know if --

5   if a system required -- required to have three

6   inputs, you will -- you will build your train with

7   maybe four inputs because you still need to have a

8   spare, but you will build your train with four wire

9   to -- four, three wire to connect with this system.

10   If you come back 1 or 2 years later,

11   saying, oh, by the way, it's not three, it's five,

12   now, yes, you -- you have a big issue because you

13   need to -- to rethink your -- your electrical

14   system and rethink your production to add a wire.

15   It's just an example, but it's --

16   that's why you need -- you need to freeze all the

17   interface earlier in the -- in the design phase.

18   And I mentioned this number of three or four

19   because as a rolling stock manufacturer, you know

20   that, during the tests, or you know that during the

21   project you will have to do some changes, so you --

22   you put a small amount of provision, but when you

23   come back with a system that is completely

24   different, it's -- it's -- your -- your system is

25   no more able to support that, so you have to

1   rethink everything.

2   ANTHONY IMBESI: And so during your

3   time at the project, would you have reviewed the

4   Alstom subcontract with OLRTC?

5   ARNAUD LACAZE: The -- the what?

6   The...

7   ANTHONY IMBESI: When you were involved

8   in the project, would you have reviewed Alstom's

9   subcontract with OLRTC?

10   ARNAUD LACAZE: With -- my contract

11   with OLRTC?

12   ANTHONY IMBESI: Yes.

13   ARNAUD LACAZE: Yes, of course.

14   ANTHONY IMBESI: You were familiar with

15   the contract at the time?

16   ARNAUD LACAZE: Yeah, yes. It's --

17   it's part of the handover that I -- I met with --

18   with Nadia at that time. We do a handover in terms

19   of the -- the technical aspects, situation of the

20   project versus the contract to clearly understand

21   where we are in the contract. We -- in conformity

22   to the contract, do we have some pending waiver?

23   Do we have some risk, difficulties? Do we have

24   some variation order? It's -- it's part of the

25   package that I am -- that every project manager or

1 director need to -- need to do with these

2 predecessors, so...

3   ANTHONY IMBESI: So in terms of the

4 specific contractual requirement that I had

5 mentioned, then, it is my understanding that the

6 contract required Thales to deliver a finalized

7 CBTC specification by April of 2013. Do you recall

8 that?

9   ARNAUD LACAZE: Oh, I don't recall the

10 date, honestly, but I recall because it was -- it

11 was part of the subcontract that we were supposed

12 to receive a full -- a full system, validated and

13 integrated. When I said "integrated," it's in one

14 piece. After that, what was supposed to be done in

15 2014, honestly, I don't remember, but I remember

16 that we were supposed to receive this, clearly,

17 yes, because -- because this -- because it was part

18 of the dilemma that we -- that we had at that time.

19   ANTHONY IMBESI: And so is it practical

20 in these types of projects to have a finalized CBTC

21 specification within the first 2 or 3 months of the

22 project?

23   ARNAUD LACAZE: In terms of interface,

24 yes. Yes. It's -- but it's like -- it's like with

25 all of our systems. When I receive a compressor --

1   like, for -- from a supplier, for example --

2   ANTHONY IMBESI: A what, I'm sorry?

3   ARNAUD LACAZE: I will take an example

4   from another system, a compressor or -- yes. So

5   let's take the example of a compressor. From this

6   supplier, I'm receiving an equipment fully

7   integrated, a compressor, and with this supplier,

8   and earlier in the project, at the beginning of the

9   project, they will tell me, okay, I will do my job

10   inside this box, but I need to communicate with

11   your train, I don't know, two inputs and two

12   outputs, so prepare your train to connect to my

13   system two output and two -- two input, and that's

14   it.

15   So this is a deal that we -- we have

16   with all the supplier. Of course, as a -- because

17   as an integrator, we'll -- we'll check with them

18   what we do inside this box to be sure that, in

19   terms of functionality, it's in conformity with

20   what we want. But in terms of interface and in

21   terms of production, it's only that. You -- you

22   give me a box, I will plug your box in my train,

23   and after that, relay the software and relay the

24   validation, be sure that the communication is okay.

25   And this is clearly what we were

1   expecting from Thales. Of course, Thales is a

2   little bit more complicated because it's a safety

3   system. But we said, okay, give us a box; give us,

4   effectively, what you need in terms of

5   connectivity; we'll prepare the train. When your

6   box will arrive, we'll put the box in the train,

7   connect everything, and we'll start the validation.

8   ANTHONY IMBESI: And so what I -- I'm

9   sorry. I didn't mean to cut you off there.

10   ARNAUD LACAZE: Yes, that's why I said,

11 yes, you need, absolutely, at the beginning of the

12 project, to define these interfaces.

13   ANTHONY IMBESI: And so I guess what

14 I'm trying to understand, then, is does Thales need

15 anything from Alstom in terms of design

16 characteristics of the train in order for it to be

17 able to prepare a finalized CBTC specification?

18   ARNAUD LACAZE: That's why -- that's

19 why we did the -- that's why it's mandatory to

20 do -- to do this meeting, this technical meeting

21 with them at the beginning. It's an exchange with

22 Thales: I need to install -- I don't know, two

23 sensors in your -- in your bogie or under the

24 underframe. The -- the -- the company present to

25 us their interfaces, the functionality of their

1 system, and we deal with that to design the

2 interface and say, okay, let's prepare the train

3 to -- you know, to -- with a number of space, a

4 number of sensors, a number of cables, wiring and

5 so on.

6   ANTHONY IMBESI: Okay. And so that's

7 an interaction that would typically happen at the

8 very start of a -- a project?

9   ARNAUD LACAZE: Yes. But understand

10 that we need this information to start the

11 production. If we need to -- if we need put two

12 wire, or if we need to dedicate a specific place or

13 area in the train for -- for one system, we need to

14 understand that at the beginning, very early on in

15 the project.

16   ANTHONY IMBESI: So we've gone a bit

17 more than halfway here, so perhaps we'll take a

18 break. If we could go off the record.

19   -- RECESS AT 3:36 --

20   -- UPON RESUMING AT 3:50 --

21   ANTHONY IMBESI: So, Mr. Lacaze, just

22 following a bit more on where we left off, talking

23 about integration - and specifically I'm speaking

24 about integration with Alstom and Thales - were

25 there regular meetings that were held, hosted by

1   OLRTC involving OLRTC, Alstom, and Thales?

2   ARNAUD LACAZE: Was there a regular

3   meeting? From what I understood, a regular meeting

4   was -- until June or July 2016. After that, when I

5   was here, we -- we did the static PICO test with

6   them in September or October 2016 at Hornell, and

7   following that, we had no regular meeting with

8   OLRTC. I don't recall specific -- specific

9   meeting -- or technical meeting, I mean.

10   We had some -- some meetings because --

11 with OLRTC and Thales, but in terms of organization

12 of the tests. But in terms of technical meetings,

13 no, we had no new technical meeting with them, and

14 requests to redo technical meetings when we

15 realized in -- with LRV 5 in May 2017 that we had

16 some issues. The system was not -- was not the

17 system -- the system that we received and we tested

18 on LRV 5 was not aligned with the specification, so

19 we requested OLRT to -- to redo -- to redo some --

20 some technical meeting to redefine an interface --

21 a new interface specification, if you will.

22   ANTHONY IMBESI: Okay. So the

23 technical meetings that were held at a certain

24 point in the project, those stopped around June,

25 July of 2017, before you became involved in the

1 project?

2   ARNAUD LACAZE: Yes because, in fact,

3 for us - and for Thales, I guess - the interfaces

4 was -- were frozen, so we worked and we completed

5 all the trains based on this interface. We did --

6 we did the static PICO test in -- as I mentioned,

7 in September or October, and after that, we redo --

8 so when we redo a static PICO test in -- I think in

9 May, the following year, on LRV 5. So we didn't

10 have the -- we didn't have, at that time, a

11 dedicated technical meeting with them because we

12 were -- we were working with the interface frozen a

13 couple of months ago.

14   ANTHONY IMBESI: Okay. So the -- the

15 interface had been frozen. Was it that there was

16 no need for those meetings, or was there another

17 reason that they were no longer held?

18   ARNAUD LACAZE: Interfaces was -- was

19 frozen before, so -- right -- I don't -- I don't

20 know if we -- we had some needs, no. We were

21 working on this -- we were working on this subject,

22 on the interface, so -- you know, it's -- we had no

23 specific reason to do -- to do a technical meeting.

24   ANTHONY IMBESI: Okay.

25   ARNAUD LACAZE: The interface was

1 frozen, you did the test; of course, you -- you saw

2 some issues, but you knew that Thales will advise a

3 subject, so we had no -- no specific point until --

4 until the next phase, at that time, which was the

5 test on LRV 5, of -- of the system.

6   ANTHONY IMBESI: And so could you just

7 explain to me, then -- so I think you had said that

8 was in May of 2017 with respect to LRV 5. What was

9 the testing that you were doing, and what was the

10 issue that you had encountered?

11   ARNAUD LACAZE: In fact, if I remember

12 well, that contract, Thales needed to train Alstom

13 to do static PICO test, so if you want a static

14 test on two vehicles, so we -- they did that on LRV

15 1, and the next, in terms of sequence, was Train 5.

16 So what we did, in fact, at -- at Ottawa, we start

17 in May of 2017, we did what was in the contract,

18 saying, okay, we have a train ready. The train is

19 prepared with -- according the interface that we --

20 that we design, and so we start to integrated

21 your -- your equipment, we put your equipment

22 inside our train, so let's start. Let's restart

23 the static PICO test. We'll redo it with you, and

24 it will be, like, a training for us, to do -- to do

25 the -- to do this test, because we were supposed to

 1   do this test with -- on each of the vehicles, to

 2   validate that the connect -- the connection between

 3   the two systems agreed. The idea isn't to validate

 4   the system of Thales. The idea is to validate the

 5   interface, that you put a signal in -- I don't

 6   know. The system is on; then you switch off and

 7   the system is off, for example.

 8   ANTHONY IMBESI: And was that the VOBC

 9   rack in particular?

10   ARNAUD LACAZE: It was a VOBC rack,

11   yes. The idea is to put in the VOBC and to

12   validate and -- the couple of interface that we

13   define -- we define all together.

14   ANTHONY IMBESI: Okay.

15   ARNAUD LACAZE: The idea is to -- it's

16   like this for all the systems. The idea is to

17   validate that the interface integration between the

18   rolling stock and System XYZ - so Thales here - is

19   correct.

20   ANTHONY IMBESI: Okay.

21   ARNAUD LACAZE: Because we don't

22   validate the functionality of the system. We

23   validate only the interface.

24   ANTHONY IMBESI: Okay. So Thales was

25   going to do the same two and, at the same time,

1 train Alstom and how to do it, and was Alstom then

2 responsible for doing --

3   ARNAUD LACAZE: Yes.

4   ANTHONY IMBESI: -- the static PICO

5 test for the balance of the fleet?

6   ARNAUD LACAZE: Yes, yes. But this is

7 something very classic: The rolling stock

8 integrator is responsible to install the equipment

9 and to relate that the interface is good.

10   ANTHONY IMBESI: That's typical in

11 rolling stock, to do it that way, for the rolling

12 stock to do it?

13   ARNAUD LACAZE: That's typical, yes.

14 You verify that you have a good connectivity

15 between your train and the system.

16   ANTHONY IMBESI: And so what was the

17 issue, then, that was discovered with LRV 5 in May

18 2017?

19   ARNAUD LACAZE: At first, we -- we

20 realized that we didn't -- we didn't receive a full

21 rack. We received several components that we

22 needed to install, and the -- the deal for us, as

23 I -- I took the example of the compressor, for

24 example. We receive a full system, and the idea

25 was Thales was to receive a full system and not to

1   receive one equipment, another one, and do -- and

2   request Alstom to -- to make the integration and to

3   do the connection between the system. The VOBC is

4   a system, so we don't know the connectivity, and we

5   don't know the link between two electronic box, for

6   example.

7   So it was a surprise to do that, so

8   same thing: I sent a letter to OLRTC saying that

9   it was not the deal, and we don't -- we are not

10 Thales, so we don't know the connectivity between

11 the systems, so it was the first -- the first

12 contestation.

13   The second one, we realized that,

14 finally, we need -- we needed more connectivity, so

15 we needed more wire to -- to -- to interface with

16 us because we were -- we didn't receive a full

17 rack. We received several electronic box, so we

18 needed to increase the number of interfaces, the

19 number of connectivity. And most of all, we

20 realized that we need to do some tests inside --

21 inside the electronic box, which, clearly, is not

22 possible.

23   ANTHONY IMBESI: I'm sorry, inside

24 what?

25   ARNAUD LACAZE: Inside the system. We

1   need to open the system and to start to validate

2   inside the electronic, so it clearly was a no-go

3   for us. You're not supposed to open or to do

4   modification or to do some tests inside -- inside a

5   sub -- the third -- the third supplier system. We

6   need -- we need to provide to the integrator -- so

7   to the rolling stock integrator, we need to provide

8   a fully validated, fully functional system. The

9   static PICO tests were not here to validate the

10 system or to tune their system. The static PICO

11 test was here to be sure that the system is able to

12 communicate with the train. That's it. And it --

13 it was also a big issue, and we said to OLRTC that

14 we will not do the test if it's -- if it's like

15 this.

16   ANTHONY IMBESI: Okay. So -- so Alstom

17 expected to have a fully assembled VOBC rack that

18 was sufficiently tested and -- and tuned so that it

19 could be essentially plugged into the rolling stock

20 for the static PICO testing to be performed. Is

21 that fair?

22   ARNAUD LACAZE: Yes. As we do for --

23 with all -- all vehicles.

24   ANTHONY IMBESI: And so how was that

25 issue dealt with? How was it resolved?

1   ARNAUD LACAZE: It took a couple of --

2   honestly, it took a couple of months. First, in

3   terms of -- in terms of integration, purely

4   integration, we -- we redefined with OLRTC an ICD,

5   an interface specification, which led to the huge

6   amount of retrofit that we -- that we had in 2018,

7   because we needed to -- to add more wire, to change

8   the cabling, to change the routing, the routing of

9   some cables. So it was -- at first, it was the

10   main -- the main physical subject, I would say,

11   because it was no more a single rack. It was

12   several racks. So at least to the main -- to this

13   main huge retrofit.

14   And concerning the tests, we refused to

15   do the tests. We accept to do some tests, but --

16   some tests linked to the new interface, in fact,

17   because they changed the interface, but we refused

18   to do -- to do -- to do all the tests inside their

19   equipment. And so we said to OLRTC, we will not go

20   in that way. It's -- it's a safety system. We

21   don't know the system. And finally, the deal

22   with -- to -- we deal with Thales to do it, and I

23   know that Thales sent a variation order to OLRTC to

24   do that.

25   So, finally, Thales did these static

1   PICO tests, but you will understand that, at the

2   beginning, the static PICO test was supposed to

3   have maybe taken, I don't know, half a day, because

4   it was just a matter of maybe two or three

5   connections. At the end, I don't know -- I don't

6   know, today, what is it. But at the end, we spent

7   more than 1 week per train to do the static PICO

8   because we were not talking anymore about one full

9   integrated validated system. We were talking about

10   several systems to -- to communicate, all of them,

11   all between them -- between them.

12   So it changed also the time needed per

13   train to do -- to do -- to do the tests. That's

14   why I request, again, variation order and an

15   extension of time to OLRTC to explain that, first,

16   we need to change the configuration of the train,

17   but we also need more time to do the tests, so

18   which will delay the acceptance of the -- of the

19   train.

20   ANTHONY IMBESI: And I'm sorry, did you

21   say that it -- it increased the time required to do

22   the -- the test per train from half a day per train

23   to 1 week per train?

24   ARNAUD LACAZE: Yes. From what I

25   remember -- and maybe -- I might be -- you know,

1   you can check that with Yang or -- I don't know,

2   the technical guy for Siemens -- or from Alstom,

3   sorry, but from what I remember, yes, it was half a

4   day, maybe 1 day at the beginning, and at the end,

5   I remember to have spent -- to have spent 5 days on

6   this subject, yes. Because we are talking about I

7   think 11, possibly, test procedures to be done.

8   ANTHONY IMBESI: And so you were -- and

9   you had indicated, then, that that impacted the

10   acceptance of the trains.

11   ARNAUD LACAZE: Yes. Yes.

12   ANTHONY IMBESI: And that was the

13   acceptance of the trains by OLRTC?

14   ARNAUD LACAZE: Yes.

15   ANTHONY IMBESI: And so --

16   ARNAUD LACAZE: And that's -- with that

17   additional time, you have -- you need to add that

18   to your schedule.

19   ANTHONY IMBESI: And so was that the

20   reason that Milestone 9 of Alstom's deliverables

21   was revised to account for a provisional acceptance

22   of the vehicles, or was that for another reason?

23   ARNAUD LACAZE: No, it was for another

24   reason.

25   ANTHONY IMBESI: Okay. Could you

 1   explain to me what the reasoning for that was,

 2   then.

 3   ARNAUD LACAZE: Yes. Milestone 9,

 4   yeah, it was a provisional acceptance, but we

 5   realized also, with OLRTC, that Thales needed this

 6   train to do the dynamic PICO test. So it was

 7   something -- something -- okay -- we -- we didn't

 8   know that, but at least it's a contract between --

 9   between OLRTC and Thales. But they realized, at a

10   certain point, that we needed the train to do

11   the -- to do the dynamic PICO, so to do some tests

12   after the delivery of the train by Alstom.

13   But in the contract, the contract was

14   clear: It was qualification from -- qualification

15   tests, some milestone - I don't remember the name -

16   and at the end, an acceptance of the train, which

17   means that even if the train is ready, I cannot

18   give this train to OLRTC to do what they want

19   because this train is still under the

20   responsibility of Alstom.

21   So OLRTC came back to us saying that we

22   need this train to do -- to do some tests with

23   Thales, and I told them that you can't. To do

24   that, you -- you need to accept the train, and to

25   accept the train, you need the 32 trains to be

1 accepted, so you will not do anything before --

2 before -- I don't know, May 2018, at the end of the

3 contract.

4   And so that's why we -- we arrived

5 to -- at this middle point, saying, Okay, let's

6 accept this -- let's do a provisional acceptance

7 train-per-train. So you will receive -- you will

8 receive a provisional acceptance from OLRTC,

9 Alstom. The train will be now under the

10 responsibility of -- of OLRTC. You will start the

11 warranty, and you will be able to use the train to

12 do some activities linked to OLRTC - so training,

13 so dynamic PICO from Thales, and so on. So it was

14 a mechanism put in place to allow OLRTC to do their

15 activities.

16   ANTHONY IMBESI: So -- and -- okay. So

17 to make sure I understand that, then, so this

18 dynamic testing that -- that Thales needed to do,

19 that was not accounted for under Alstom's

20 subcontract. There was nothing that provided for

21 that --

22   ARNAUD LACAZE: No.

23   ANTHONY IMBESI: -- to your knowledge?

24   ARNAUD LACAZE: That is not something

25 that -- even after -- even after we deliver the

1   train, they do their dynamic PICO, and -- and

2   that's it. So it's -- it's something under the

3   scope of work of Alstom.

4   ANTHONY IMBESI: Okay. And in order to

5   have the vehicles accepted by OLRTC, they had to

6   all be accepted at the same time initially.

7   ARNAUD LACAZE: Initially, yes.

8   ANTHONY IMBESI: Okay.

9   ARNAUD LACAZE: If I remember,

10   Milestone 9 was something like this, final

11   acceptance or acceptance of the 32 trains.

12   ANTHONY IMBESI: So at the time,

13   then -- so after you had agreed to this modified

14   milestone, for the trains that did receive

15   provisional acceptance, were those, for all intents

16   and purposes, completed by Alstom, or was there

17   anything remaining for Alstom to do on those trains

18   once it got them back =from OLRTC?

19   ARNAUD LACAZE: No, no, it was -- it

20   was -- that's why it's also a provisional

21   acceptance because, if you remember -- if you

22   remember, at the beginning of our discussion, we

23   said that some aspect of the light maintenance bay,

24   some item of -- the MSF was not completed, so we

25   continued the production, but some of the train

1   will have come back inside -- inside Alstom

2   jurisdiction to be completed, so it -- it was well

3   known by OLRTC that it's a provisional acceptance.

4   The train is under the control of

5   OLRTC, but these trains still need to come back to

6   Alstom at a certain point to do the retrofit

7   activity or to complete what we were not able to do

8   that because this provisional acceptance was made

9   early in the -- in the -- in the project, early for

10 me, when -- when I arrived. And so I think the

11 first one to be provisionally accepted was train

12 set 5, and so we are talking maybe -- I don't know,

13 maybe June, July 2017.

14   So yes, they knew that this train will

15 have to go back at a certain point to Alstom to be

16 completed: first in terms of a test and in terms of

17 retrofit.

18   ANTHONY IMBESI: So what testing, then,

19 would Alstom then need to do for those

20 provisionally accepted vehicles?

21   ARNAUD LACAZE: Well, for some of them,

22 it was the testing, for example.

23   ANTHONY IMBESI: Oh, it was the testing

24 that you weren't able to do because of a lack of

25 the availability of the MSF?

1   ARNAUD LACAZE: Yes, exactly. Yeah.

2   Some water test, some open point -- because we were

3   not able to complete the -- the LMB test, this kind

4   of -- this kind of subject.

5   ANTHONY IMBESI: And so in doing it in

6   terms of the provisional acceptance and the trains

7   having to come back to Alstom to finish the testing

8   and the retrofitting, did that impact Alstom's

9   schedule in any way?

10   ARNAUD LACAZE: Yes. Yes, because we

11 realized soon that we would have some conflict

12 because Thales needs the train to do the dynamic

13 PICO; the City needs the train to do their test, I

14 guess; and we need to get this train back to

15 complete the -- to complete the train.

16   So -- like I say, at certain points,

17 you -- you accumulate some -- some delays, and you

18 have to -- you have to give priority to one of --

19 one of the -- of the player. So...

20   ANTHONY IMBESI: And so before you

21 had -- before Alstom and OLRTC had agreed to this

22 provisional acceptance framework, how was it

23 supposed to work for the City of Ottawa training

24 the operators? Were they to do their training

25 after OLRTC had done final acceptance of the

1   vehicles, or was that ever contemplated to be done

2   prior to that period of time?

3   ARNAUD LACAZE: Honestly, it was not

4   something communicated to Alstom at that time. So

5   what we understood based on the contract is,

6   effectively, you deliver the 32 trains, and

7   everybody will start what we have to do. So you do

8   the -- at 9 milestone -- I don't remember -- yes, I

9   think it's Milestone 9, so we do that. And after

10   that, the City needs to train the guys. Thales

11   need to do their tests and maybe -- maybe something

12   else, I don't know, but it was the original -- the

13   original contract was based on this.

14   ANTHONY IMBESI: The original contract

15   was Alstom finishes it, where it delivers all the

16   trains and everyone else does what they need to do

17   in respect of testing and training?

18   ARNAUD LACAZE: Exactly.

19   ANTHONY IMBESI: Okay. Did that have

20   any impact on the vehicles, doing it that way? You

21   know, did it lead to more extensive retrofit work

22   after they came back to Alstom?

23   ARNAUD LACAZE: Yes, because -- yes,

24   because we had some issues in terms of -- the train

25   provisionally accepted was no more under the

1   management of Alstom. And so we realize quickly

2   that doing the dynamic PICO test, Siemens also did

3   some changes, again, in the interface. They did

4   some changes in the static PICO test.

5   If you remember, the static PICO test

6   is under the responsibility of Alstom. So if you

7   change the static PICO test, what does it mean for

8   Alstom? Because we did the static PICO test at a

9   certain point, so Thales did some modification like

10 this.

11   And we -- so we had a lot of issues in

12 terms of configuration. We delivered -- we

13 delivered the train at a certain configuration -

14 Configuration X, for example - and when we received

15 back the train, we -- we realized that sometimes

16 the configuration had changed from Thales, because

17 it was the main system used by -- used for the

18 train, and it was -- it was also a subject of

19 discussion with OLRT because we realized that we

20 start to change equipment inside the train with --

21 we start to change some cabling inside their

22 system, so the configuration changed a lot.

23   ANTHONY IMBESI: And so just during the

24 evidence that you've just given, I just want to

25 clarify for the record, you had mentioned Siemens

1   at one point, but was that a reference to Thales?

2   ARNAUD LACAZE: Excuse me, yes. Excuse

3   me, yes. So Thales, sorry.

4   ANTHONY IMBESI: Okay. No, that's

5   certainly fine.

6   And so in making those certain changes

7   that you just had indicated that Thales made, did

8   that require Alstom to redo any of the testing that

9   it had already done previously?

10   ARNAUD LACAZE: Yeah. Yes, yes, for

11   sure, yes. Yeah. We did, again, some static PICO

12   test because the configuration changed, so -- and

13   we did again some of the tests, to be sure that the

14   system was still working properly.

15   ANTHONY IMBESI: So that would have had

16   a further impact, then, on Alstom's schedule?

17   ARNAUD LACAZE: Yes. Again, impact on

18   the -- on schedule. And, again, we sent letters to

19   OLRTC to inform them officially that, first, for

20   us, it was not possible to change the configuration

21   like this, because it's a provisional acceptance.

22   At a certain point, we'll have to do a final

23   acceptance. And to do a final acceptance, we need

24   to have a clear understanding of the configuration

25   of -- of the train, in -- configuration and also

1   the serial number of each equipment and the

2   revision of each equipment.

3   So we sent them a letter for that,

4   and -- to stop, in fact, to do this change of if

5   you do some change, inform -- inform us, inform

6   Alstom. And the second point was the

7   (indiscernible), again, yes, because we needed --

8   we needed more time to redo some of the tests.

9   ANTHONY IMBESI: And so turning back,

10   then, to something that I believe you touched on

11   earlier, was Alstom's work delayed in any way by

12   decisionmaking on the part of the City?

13   ARNAUD LACAZE: Before I came, it was

14   linked -- mostly linked to the design. And when I

15   was -- when I was here, it was mostly linked to the

16   radio and, again, the interface. The interface was

17   not frozen on the radio, so we -- we start --

18   again, because we needed to -- to start the

19   production, so we start with the radio that they

20   were thinking, at that time, to use. And finally

21   they changed their mind, they changed the radio,

22   and they changed the interfaces of the radio.

23   And so it's -- it's created, again,

24   some retrofits because we needed to change the

25   interface again, the cabling and so on. And we ask

1   for that also variation order to OLRTC.

2   ANTHONY IMBESI: And did the fact that

3   Alstom, in this case, didn't have a direct

4   contractual relationship with the owner as you had

5   you would have, for example, in the Montreal

6   project that you were talking about, did that have

7   an impact on the City's deliverables of these

8   design decisions that it had to make?

9   ARNAUD LACAZE: Well, for me, yes.

10 Yes.   Clearly.   Because when you have direct

11 contact, you know the priority, so you will push

12 your -- you will push your supplier, because you

13 know that it's a huge impact.   Going through OLRTC,

14 I don't know, as a contractor for OLRTC with the

15 City, but I'm pretty sure that we had a lot of

16 other issues with the City.

17   And maybe -- and I say "maybe," but

18 maybe the radio was not a priority for them, and

19 they prefer at that time -- and this is normal.

20 I'm not saying that it's not normal.   But in terms

21 of priority for them, it was maybe more important

22 to focus on other aspects than focus on the radio,

23 because for them, their contract delivers a radio,

24 it's maybe something smaller.   But for us, it was

25 not -- again, it was an interface, so it was not so

1   small. That's why sometimes it's obvious better

2   for us to deal directly with the subsupplier,

3   especially when you have direct impacts like this.

4   ANTHONY IMBESI: Because that allows

5   you to focus the issues on things that you require

6   as opposed to having to deal with OLRTC as the

7   integrator trying to manage those requests?

8   ARNAUD LACAZE: In fact, they should

9   have someone focussing on this -- on this subject,

10   on this integration.

11   ANTHONY IMBESI: Oh, OLRTC should have

12   someone focussed on this question?

13   ARNAUD LACAZE: Yes. Focussed on this

14   question, yes. On these interfaces clearly with

15   us, yeah.

16   ANTHONY IMBESI: And as we talked about

17   before, you didn't feel that that was there or that

18   was sufficient?

19   ARNAUD LACAZE: No, for -- without a

20   person with enough experience, no, it was not

21   sufficient. It was not sufficient because we -- we

22   were facing to this issue in the end with -- again,

23   it was a huge -- a huge retrofit on this -- on this

24   subject.

25   ANTHONY IMBESI: So in terms, then,

1   of -- of Alstom's scheduling, I know that you had

2   spoken about the Version 5, V5 schedule that was in

3   place just prior to your arrival at the project;

4   correct?

5   ARNAUD LACAZE: Yeah.

6   ANTHONY IMBESI: And so following your

7   involvement, were you dealing with OLRTC in respect

8   of -- of scheduling issues?

9   ARNAUD LACAZE: Oh, yes, yes.

10   ANTHONY IMBESI: And --

11   ARNAUD LACAZE: Yes, it was -- it was

12   one of -- yes, it's part of the activity of the

13   project director to -- to inform -- to inform the

14   customer of delays or potential delays, of issues,

15   how we can mitigate them, and when -- if it's not

16   possible, to -- to clearly tell them, okay, we have

17   an issue; here is a re -- is a reschedule, so let's

18   work together with -- to solve it.

19   ANTHONY IMBESI: And so during your

20   time on the project, were there schedule disputes?

21   Were there circumstances where, for example,

22   refusals to the extensions where the position of

23   OLRTC or other issues that led to disputes with

24   respect to scheduling?

25   ARNAUD LACAZE: Every month.

1   ANTHONY IMBESI: I'm sorry?

2   ARNAUD LACAZE: Every month.   Every

3   month, they -- they never recognize -- they never

4   recognized at all that -- the fact that we were

5   facing some issues.   And, again, some issues linked

6   to Alstom.   And I will be honest, we -- we were

7   facing some issues, but we were also facing some

8   issues with other subsupplier.   So if -- if you do

9   inventory of all these issues, every month, we -- I

10   advised them that we had some issues that we

11   needed -- we needed to have access to the track,

12   for example; we needed to have a -- to have access

13   to some parts of the LMB, that we needed some

14   information, and yes, they always refused to

15   discuss about any impact or any delays.   So...

16   ANTHONY IMBESI: And so in terms of the

17   delay, so you had just mentioned that there were

18   some issues with some of your sub-subsuppliers.   I

19   take it that there were delays in obtaining parts

20   and materials and things of that nature?

21   ARNAUD LACAZE: Yes, yeah.

22   ANTHONY IMBESI: So those -- those

23   would have been delays that were Alstom's

24   responsibility, then; right?

25   ARNAUD LACAZE: Yes, yeah.

1   ANTHONY IMBESI: Okay. And then you're

2   also telling me that, through everything you were

3   telling me today, you were also facing delays that

4   Alstom believed were the responsibility of OLRTC?

5   ARNAUD LACAZE: Yes.

6   ANTHONY IMBESI: And that in dealing

7   with OLRTC and these ongoing scheduling

8   discussions, you were never granted any further

9   extensions beyond that finalized V5 schedule?

10   ARNAUD LACAZE: No, I -- I -- I suggest

11 them of -- I don't remember, V7, V9 schedule, but

12 based on the reality of -- on -- of the project,

13 and the reality is delays from Alstom and delays

14 from OLRTC or Thales or -- or the other one.

15   We were -- I did -- we did what we are

16 supposed to do, so to explain to our customer, This

17 is the situation of the project; this is where we

18 can mitigate; this is what we can do, and sometimes

19 this is where we will not be able to -- to

20 mitigate. So at the end, we will have X weeks,

21 months of delay.

22   So this is what we did every month with

23 them. Sometimes dedicated meeting -- I requested a

24 dedicating meeting on the schedule with them to

25 inform them of the situation and to also -- to also

1   receive from them -- try to receive from them also

2   the reality of the infrastructure, because you

3   cannot have 32 trains in March of 2018 if the

4   infrastructure is not here, so it make no sense.

5   So that's why you need this

6   collaboration. You need this discussion. Of

7   course you will have some contractual --

8   contractual dispute, okay, at a certain point, but

9   at least you need to have this transparency and

10 collaboration when -- with your suppliers, you need

11 to clearly indicate all the input of the equation

12 if you -- if you want to have something realistic.

13 Otherwise, you will continue to push the date,

14 saying, okay, you need to keep that date, but if

15 you cannot -- if your supplier is not able to reach

16 these dates, it makes no sense. And at a

17 certain -- at a certain point, we arrived at this

18 contradiction with them.

19   ANTHONY IMBESI: Sorry, a contradiction

20 in when you were talking about delayed

21 infrastructure?

22   ARNAUD LACAZE: Contradiction, yes.

23 Contradiction where we knew that the infrastructure

24 was not here, it was not ready, and the fact that

25 they still wanted to -- to have all the 32

1   trains -- I don't remember. I think it was in

2   February or March 2018, around these dates. Around

3   the original -- the V5 schedule. So...

4   ANTHONY IMBESI: And was there a

5   certain point, then, when Alstom would have come to

6   understand that the original revenue service

7   availability date of May of 2018 wouldn't be met?

8   ARNAUD LACAZE: Yes. Yes.

9   ANTHONY IMBESI: And how did that

10   factor into the discussions with OLRTC on

11   scheduling?

12   ARNAUD LACAZE: It was -- it was a

13   start for us. It's -- we are -- we are -- in the

14   industry, we know the business, so we know -- we

15   know what is needed to make infrastructure, to make

16   a system, train operational. So at a certain

17   point, we tried -- it's -- it was our customer

18   also, so you cannot -- you cannot go like this in

19   front of them, but we tried to make them realize

20   that we knew -- we knew the reality of the

21   situation.

22   ANTHONY IMBESI: During your time on

23   the project, did you or anyone at Alstom have any

24   knowledge about any scheduling extensions that were

25   granted to Thales?

1   ARNAUD LACAZE: To Thales, no, no, no.

2   ANTHONY IMBESI: So I'd just like to

3   turn back to speaking about the MSF, the

4   maintenance and storage facility in particular.

5   Leaving aside the issues with access that we'd

6   already talked about, how did you view the

7   suitability of the MSF for the assembly of LRVs?

8   ARNAUD LACAZE: Suitability, you mean

9   effective -- the -- the fact that it was well --

10 well-built for -- for that?

11   ANTHONY IMBESI: Well, I guess what I'm

12 driving at is, so leaving aside all the issues with

13 the fact that you didn't have access to certain

14 areas that you say were necessary, was it a

15 suitable place to be assembling LRVs, and how does

16 it compare to Alstom's other facilities?

17   ARNAUD LACAZE: No, no, no, it was --

18 honestly, I was impressed when I arrived in

19 September to -- of this facility. It -- it was --

20 I don't like to use this terminology, but it's --

21 because it's a software terminology, the agility,

22 but it was very well think [sic] in terms of flow,

23 in terms of production.

24   With -- with the time, with my

25 industrial manager, we -- the flow of production

1   was good except to do the water test, we needed to

2   go outside the production line and to go back.

3   Because the water test was outside the production

4   line, so it was -- it was a way of thinking of

5   improvement for future -- a future contract, for

6   example, to rethink the localization of the water

7   bay, the water test in the production line.

8   Otherwise, it's -- honestly, it's a --

9   it's a very good -- very good footprint. It's --

10   everything is -- is well organized, and it's

11   sufficient. So...

12   ANTHONY IMBESI: Okay.

13   ARNAUD LACAZE: Except this improvement

14   that -- I don't know what they did with the new

15   contract, but yes, it was something that we were

16   thinking.

17   ANTHONY IMBESI: Was there sufficient

18   space or capacity at the MSF to perform both the

19   retrofit work and the serial production?

20   ARNAUD LACAZE: No, no, no, no.

21   It's -- in terms of -- in terms of flow of

22   production, it was good. If you have to add -- if

23   you have to add a retrofit line, it was -- it was

24   not fit to have -- to have the retrofit line. So

25   yes, it was -- it was very -- it was very difficult

1   to find -- to find a place to be able to do

2   retrofit. That's why we ask OLRTC to use the

3   storage bay outside to effectively park some of the

4   trains here, to be able to do some retrofit.

5   So we received the authorization of

6   OLRTC to use one or two line - I don't remember -

7   and went -- a scaffold, we put some infrastructure

8   outside, to be able to do the retrofit outside --

9   outside the production line inside.

10   ANTHONY IMBESI: And so with the MSF

11   and the project being in Ottawa, did Alstom have

12   any staffing challenges? Was it difficult to -- to

13   obtain the sufficient number of employees or

14   sufficient number of qualified employees for the

15   project?

16   ARNAUD LACAZE: No, we had -- we had

17   people coming from different -- different sites all

18   over the world in terms of expertise. And locally,

19   we -- we were -- we worked with a company -- I

20   don't remember the name of this company, but this

21   company was able to provide us -- we had a contract

22   with them, and they were able to provide manpower

23   to us in terms of production, in terms of quality

24   and testing. So no, it -- it has never been an

25   issue in terms of staffing.

1   ANTHONY IMBESI: And in terms of the

2 Canadian content requirements or the vehicles which

3 you touched on at the start of the interview today,

4 did those requirements pose any challenges to

5 Alstom?

6   ARNAUD LACAZE: It's at -- yes. It's

7 mainly -- I would say mainly at the beginning,

8 mainly, I guess, before I came on this project

9 because, at that time, you were -- it was mandatory

10 to build -- to build our supply chain and to build

11 our new supplier, but we had a -- we had a team, a

12 sourcing team and an industrial team to build -- to

13 build -- to build this local frame with us, so...

14   ANTHONY IMBESI: So did you feel that

15 those --

16   ARNAUD LACAZE: When I was here, it was

17 not something -- it was behind me. It was most --

18 during my time, it was most -- some production

19 issues, but it's -- I would say it's normal. It's

20 normal. Normal that -- it's not because the

21 company was in Canada, if you understand what I

22 mean. It's -- it was more -- it was more a

23 production issue of maybe some of the supplier.

24 The way -- the fact to develop a local supplier, it

25 was -- it was before me.

1   ANTHONY IMBESI: Okay. So you didn't

2   see any real impacts, then, on the project as a

3   result of the Canadian content requirement?

4   ARNAUD LACAZE: No, because -- when I

5   arrived, the footprint was already here, so all the

6   supplier was -- were already identified, and -- and

7   they -- they started the production when I arrived.

8   ANTHONY IMBESI: And so when you left

9   the -- the project, then, in or around October of

10   2018, what was the status of the retrofit campaign

11   that was ongoing?

12   ARNAUD LACAZE: The retrofit, like, was

13   ongoing. We -- I remember, at that time, we had --

14   we had a daily standup meeting with OLRTC, Thales,

15   everybody. We have -- every day at 4, we had some

16   standup meeting to explain the situation, but also

17   to explain the -- the global situation of the

18   project.

19   And after that, we had weekly detailed

20   meeting in terms of schedule with OLRTC. So we

21   developed effectively -- train by train, we

22   developed all of the retrofit activities to be

23   performed with a detailed schedule, and we

24   follow -- we follow that on a regular basis with

25   OLRTC. And then we had an agreement in terms of

1 time frame, in terms of implementation, and in

2 terms of priority.

3   Because, once again, the train was --

4 most of the train were already provisionally

5 accepted, and so these trains were used by Thales

6 or they were used by the City, so we had a schedule

7 with OLRTC, saying, Okay, we can use this train, I

8 don't know, 2 days this week to do the retrofit.

9 So we planned everything like this.

10   ANTHONY IMBESI: And so in terms of the

11 agreement that you just mentioned for the timeline

12 and the priority to perform some of this work, at

13 the time that you left, was Alstom on schedule as

14 agreed upon?

15   ARNAUD LACAZE: Honestly, I think so,

16 yes. I -- I didn't -- I didn't remember a big new

17 negotiation on this one.

18   ANTHONY IMBESI: And --

19   ARNAUD LACAZE: Honestly, I don't

20 remember. I remember that we -- we set some

21 priorities; we set the schedule. I don't -- I

22 don't remember any big issues.

23   ANTHONY IMBESI: And then in terms of

24 the testing and commissioning of the system overall

25 and the LRVs, what was the status of that when you

1   left in October of 2018?

2   ARNAUD LACAZE: For me, it was -- we

3   say just the beginning because when I left, I think

4   we had access just a couple of months or weeks

5   before to the full main line, to the full line. So

6   yes, during -- during my period, we were able to do

7   some tests on the 2 kilometres of tracks. We were

8   able, step by step, to have access to the tunnel,

9   for example.

10   But, really, I think when I left it was

11 only the beginning of the test on the full line,

12 with the full Thales system operational, with the

13 full system operational in terms of catenary, in

14 terms of radios, so it was really the beginning

15 of -- I would say the full integrated system at

16 that time. So...

17   ANTHONY IMBESI: Okay. So by October

18 '18, then, the full integration of everything

19 coming together on the full line, that was sort of

20 just beginning?

21   ARNAUD LACAZE: Yes. From my point of

22 view, it was really the beginning. Before that, it

23 was some sporadic validation -- again, I'm talking

24 here -- I'm not talking anymore about the rolling

25 stock alone. I'm talking about the full system,

1   rolling stock and everything around the rolling

2   stock.

3   Before that, we were able to do some

4   touch point, but yes, at -- from what I remember,

5   at that time, in fall 2018, it was really the

6   beginning of, okay, let's validate now the full

7   system.

8   ANTHONY IMBESI: Okay. And so as part

9   of the Commission's mandate, we are tasked with

10 investigating the commercial and technical

11 circumstances that led to the breakdowns and

12 derailments that ultimately occurred on the system.

13   Besides everything that we've gone over

14 today, is there anything else that you feel we

15 haven't touched upon that's relevant to that

16 mandate?

17   ARNAUD LACAZE: No, I think -- I think

18 I've -- I think we spoke about everything I did

19 during my mandate at that time, yeah.

20   ANTHONY IMBESI: And so also as part of

21 the Commissioner's role, he's tasked with making

22 recommendations in furtherance of that mandate. Is

23 there anything that comes to mind in terms of

24 recommendations that you would propose in terms of

25 addressing these types of situations?

1   ARNAUD LACAZE: The derailment, you

2   mean, or?

3   ANTHONY IMBESI: Yeah, the

4   circumstances that led to the breakdowns and

5   derailments. Is there anything that comes to mind

6   in terms of recommendations on how to change things

7   or to do anything going forward?

8   ARNAUD LACAZE: Honestly, no. I

9   don't -- I -- and honestly, I don't know this --

10   this subject. I'm not -- I'm not living in Ottawa,

11   so... I cannot -- I cannot speak about that or

12   give any recommendation on this subject, honestly.

13   ANTHONY IMBESI: Okay. Thank you.

14   Ms. Boghasian, did you have any

15   follow-up questions for -- for Mr. Lacaze?

16   TARA BOGHOSIAN: I don't.

17   ANTHONY IMBESI: Okay. Mr. Valo, did

18   you have any questions for Mr. Lacaze?

19   MICHAEL VALO: I have just one -- one

20   question, if I could.

21   Mr. Lacaze, you were explaining earlier

22   to Mr. Imbesi the consequences of changes to, for

23   example, the P25 radio or Thales changes that

24   required -- I think you had said an addition of a

25   cable or changes to cabling in the vehicles. I'm

1   wondering if you could just explain, for the

2   record, what that involves. What's the work

3   involved, the extent of the work involved in making

4   a change to the cabling in the cars?

5   ARNAUD LACAZE: Yes. In fact, when you

6   have these kind of -- of changes, you need to --

7   first, to bring, again, your technical team to

8   rethink -- to see, effectively, what Thales's new

9   interface is. So the technical team need to

10   reestablish, to rethink about the interfaces, to

11   understand, effectively, what are the new

12   interfaces first.

13   Following that -- so we need to have an

14   agreement with the subsupplier about these new

15   interfaces, freeze these new interfaces, and

16   following that go back to the industrial team and

17   to the production team to clearly understand how

18   these changes would be able to be implemented in

19   terms of production and in terms of the sequence in

20   the production.

21   So you would understand that it's --

22   it's like a new product, in fact, that you have to

23   restart. You have to -- you have to redo this V

24   cycle that I was explaining at the beginning. You

25   need to redo the design, the implementation of this

1 design, and revalidate this design. So you need to

2 redo this V cycle.

3   And when it's at the beginning of the

4 project, we do understand that, okay, it's not a

5 big deal, but when you have a production line, we

6 have everybody focussing on the suppliers, the

7 production, and so on, it's a huge impact.

8   If you need to add some cable, for

9 example, it means you need to add some connectors,

10 so you have to change your bill of material. You

11 have to reestablish a new purchase order. You have

12 to find some supplier. So it's a huge -- it's

13 huge, huge new project or new tasks that you have

14 to do, or to redo most of the time.

15   MICHAEL VALO: Okay. Thank you,

16 Mr. Lacaze. I appreciate that. No other

17 questions.

18   ANTHONY IMBESI: Okay. Thank you,

19 Mr. Lacaze. We can go off record.

20 -- Concluded at 4:40 p.m.

21

22

23

24

25

1   REPORTER'S CERTIFICATE

2

3   I, JOANNE A. LAWRENCE, Registered

4   Professional Reporter, certify;

5   That the foregoing proceedings were

6   taken before me at the time and place therein set

7   forth, at which time the witness was put under oath

8   by me;

9   That the testimony of the witness

10   and all objections made at the time of the

11   examination were recorded stenographically by me

12   and were thereafter transcribed;

13   That the foregoing is a true and

14   correct transcript of my shorthand notes so taken.

15

16   Dated this 9th day of June, 2022.

17

18
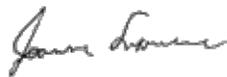
19   _____

20   NEESONS, A VERITEXT COMPANY

21   PER: JOANNE LAWRENCE, RPR, CSR

22   COURT REPORTER

23

24

25

Anthony 2:*3*
3:*2, 3* 5:*20* 6:*4,*
24 7:*3* 8:*21*
9:*4, 14, 23* 10:*7,*
11 11:*2, 11, 15,*
22 12:*3, 7* 13:*4,*
9, 14 14:*1, 8*
15:*1, 9, 17* 16:*2,*
6, 12 17:*5, 16,*
21 18:*4, 18, 23*
19:*1, 14, 20*
20:*1, 6, 15, 22*
21:*4, 12, 18, 21*
23:*11* 24:*2, 7,*
10, 14 25:*18*
26:*5* 27:*4, 10,*
17, 22 28:*3, 13*
29:*13, 21* 30:*21*
31:*20* 32:*8*
33:*5* 34:*2, 12,*
17 35:*3, 10*
36:*12, 18, 25*
37:*7* 38:*2, 5*
39:*11, 24* 40:*22*
41:*5, 15* 42:*24*
43:*5, 24* 45:*4, 9*
46:*14, 17* 47:*22*
48:*19* 49:*22*
50:*12, 18, 23*
51:*9* 52:*4, 8*
53:*25* 54:*5, 19,*
24 55:*4, 9, 14*
56:*9, 16, 21*
57:*3, 5, 17, 21*
58:*4* 59:*11*
60:*14* 61:*4, 8*
62:*19, 23* 63:*6*
64:*2, 23* 65:*21*
66:*11, 16* 67:*14,*
18 69:*2, 7, 12,*
14 70:*3, 19*
71:*2* 72:*8, 13*
73:*6, 16, 21*
74:*22* 75:*14, 24*
76:*6* 77:*8, 14,*
20, 24 78:*4, 10,*
16 79:*23* 80:*16,*
24 82:*20* 83:*8,*
12, 15, 19, 25
85:*16, 23* 86:*4,*
8, 12 87:*18, 23*
88:*5, 20* 89:*14,*
19 90:*23* 91:*4,*
15 92:*9* 93:*2*
94:*4, 11, 16, 25*

95:*6, 10, 19*
96:*1, 16, 22*
97:*1, 6* 98:*19*
99:*4, 9, 22*
100:*2, 11*
101:*12, 17*
102:*10* 103:*1,*
14 104:*1, 8*
105:*10, 18, 23*
106:*17* 107:*8,*
20 108:*3, 13, 17*
110:*18*
anymore 43:*16*
59:*7* 64:*11*
82:*8* 106:*24*
anyway 15:*15*
19:*13* 29:*11*
appended 4:*8*
apply 39:*3, 6*
appreciate
46:*14* 48:*2, 20*
110:*16*
approach 57:*24,*
25
Approximately
6:*2*
April 64:*9* 70:*7*
area 8:*4* 26:*15,*
18 28:*19* 29:*17*
31:*11* 33:*14*
73:*13*
areas 25:*15*
31:*19* 100:*14*
ARNAUD 1:*7*
2:*8* 5:*11, 24*
6:*10* 7:*1, 11*
9:*2, 5, 20, 24*
10:*10, 13* 11:*7,*
13, 18 12:*2, 6,*
14 13:*8, 12, 19*
14:*4, 14* 15:*6,*
10, 18 16:*5, 7,*
19 17:*10, 18, 24*
18:*8, 22, 25*
19:*6, 16, 22*
20:*5, 8, 18* 21:*1,*
6, 17, 20 22:*2*
23:*18* 24:*4, 9,*
13, 20 25:*23*
26:*8* 27:*9, 13,*
18, 24 28:*6, 17*
29:*14* 30:*4, 25*
31:*25* 32:*13*
33:*10* 34:*4, 16,*
20 35:*8, 12*

36:*16, 19* 37:*5,*
10 38:*4, 12*
39:*17* 40:*4, 24*
41:*10, 19* 43:*3,*
7 44:*8* 45:*8, 13*
46:*24* 48:*4*
49:*2* 50:*1, 16,*
21, 24 51:*13*
52:*7, 15* 54:*3, 8,*
21 55:*2, 7, 12,*
18 56:*12, 18, 22*
57:*4, 9, 19* 58:*1,*
6 59:*16* 60:*17*
61:*6, 12* 62:*22,*
24 63:*8* 64:*5*
65:*2, 25* 66:*15,*
20 67:*17, 25*
69:*5, 10, 13, 16*
70:*9, 23* 71:*3*
72:*10, 18* 73:*9*
74:*2* 75:*2, 18,*
25 76:*11* 77:*10,*
15, 21 78:*3, 6,*
13, 19 79:*25*
80:*22* 81:*1*
82:*24* 83:*11, 14,*
16, 23 84:*3*
85:*22, 24* 86:*7,*
9, 19 87:*21*
88:*1, 10* 89:*3,*
18, 23 91:*2, 10,*
17 92:*13* 93:*9*
94:*8, 13, 19*
95:*5, 9, 11, 25*
96:*2, 21, 25*
97:*5, 10* 98:*22*
99:*8, 12* 100:*1,*
8, 17 101:*13, 20*
102:*16* 103:*6,*
16 104:*4, 12*
105:*15, 19*
106:*2, 21*
107:*17* 108:*1, 8*
109:*5*
arose 38:*3* 44:*3*
arrangements
11:*24*
arrival 25:*20*
95:*3*
arrive 23:*19*
26:*22* 28:*7*
30:*16* 63:*11*
72:*6*
arrived 23:*17,*
18, 19 24:*15, 20*

27:*24* 85:*4*
87:*10* 98:*17*
100:*18* 104:*5, 7*
aside 32:*9*
100:*5, 12*
asked 4:*14*
20:*2* 29:*14*
46:*7* 49:*2, 5, 23*
52:*20* 53:*1, 6, 7*
54:*12*
asking 16:*13*
46:*19*
aspect 56:*19,*
23 86:*23*
aspects 56:*6*
69:*19* 93:*22*
assembled
80:*17*
assembling
100:*15*
assembly 26:*6*
27:*8* 100:*7*
assumed 29:*25*
ATC 9:*7* 67:*10*
attending 1:*14*
August 24:*22*
authorization
102:*5*
availability
87:*25* 99:*7*
available 29:*24*
40:*2*
aware 41:*25*
55:*25* 65:*4*
Azur 8:*18*

< B >
back 8:*15, 18*
29:*11* 30:*1, 13,*
19 45:*15* 48:*22*
53:*12* 58:*20*
68:*10, 23* 84:*21*
86:*18* 87:*1, 5,*
15 88:*7, 14*
89:*22* 90:*15*
92:*9* 100:*3*
101:*2* 109:*16*
balance 13:*1*
30:*1* 78:*5*
base 14:*5*
based 5:*21* 6:*1*
41:*5* 58:*8* 75:*5*
89:*5, 13* 97:*12*
baseline 25:*5*
47:*13* 64:*7*

basis 4:*3*
104:*24*
batch 38:*25*
39:*9*
bay 27:*15, 25*
86:*23* 101:*7*
102:*3*
beginning
12:*23* 19:*23*
21:*9* 23:*22, 23*
24:*12* 32:*3*
34:*6* 40:*5* 42:*3,*
9, 21 47:*2* 50:*4,*
10, 13 51:*5*
54:*22* 56:*13*
63:*9* 71:*8*
72:*11, 21* 73:*14*
82:*2* 83:*4*
86:*22* 103:*7*
106:*3, 11, 14, 20,*
22 107:*6*
109:*24* 110:*3*
begins 35:*7*
behaviour 49:*16*
Belfort 7:*12*
believe 52:*10*
92:*10*
believed 97:*4*
Benjamin 2:*14*
Bergeron 56:*20,*
21, 22 57:*6, 13*
best 16:*13*
23:*15*
better 16:*9*
44:*20* 94:*1*
big 37:*25*
68:*12* 80:*13*
105:*16, 22* 110:*5*
Bilgen 2:*14*
bill 110:*10*
bit 23:*13* 57:*22*
72:*2* 73:*16, 22*
blaming 64:*17,*
18
board 38:*19*
Boghasian
108:*14*
Boghosian 2:*4*
3:*4, 12* 108:*16*
bogie 17:*7, 10,*
11, 15, 17, 22
72:*23*
bogies 15:*20*
17:*13*

Bombardier
5:*14* 10:*5, 21*
19:*12* 66:*7, 9*
bought 8:*7*
Bowles 2:*9*
box 71:*10, 18,*
22 72:*3, 6* 79:*5,*
17, 21
break 73:*18*
breakdowns
107:*11* 108:*4*
bring 16:*15*
58:*16* 109:*7*
budget 12:*22*
build 40:*7* 62:*8*
68:*3, 6, 8*
103:*10, 12, 13*
building 31:*13*
business 99:*14*

< C >
cable 108:*25*
110:*8*
cables 20:*11*
73:*4* 81:*9*
cabling 81:*8*
90:*21* 92:*25*
108:*25* 109:*4*
call 7:*25* 9:*7*
14:*19* 15:*7, 15*
16:*4, 23* 19:*2*
24:*6* 26:*15*
29:*16* 31:*3*
33:*11, 17, 19*
34:*7, 13* 38:*18*
49:*3, 14*
called 13:*23*
14:*11, 12, 18*
32:*4, 20* 33:*11*
39:*1*
campaign
104:*10*
CANADA 1:*7*
2:*8* 5:*6* 6:*20*
7:*5, 9* 16:*24*
18:*2* 103:*21*
Canadian 17:*1,*
4 103:*2* 104:*3*
capable 33:*16*
capacity 60:*24*
101:*18*
career 6:*17*
7:*12, 14*
cars 109:*4*

case 12:*5* 43:*4,*
5, 6 58:*15* 93:*3*
catenary 28:*23*
32:*2, 7, 17, 19*
106:*13*
CBTC 9:*7*
21:*15, 23* 67:*23*
70:*7, 20* 72:*17*
CCB 38:*18*
certain 3:*13*
8:*16* 26:*14*
28:*25* 29:*7, 12*
30:*7, 17, 19*
32:*16, 25* 35:*20*
36:*9* 41:*1, 25*
42:*25* 46:*13*
48:*24* 49:*24*
50:*2, 25* 66:*13*
74:*23* 84:*10*
87:*6, 15* 88:*16*
90:*9, 13* 91:*6,*
22 98:*8, 17*
99:*5, 16* 100:*13*
certainly 23:*12*
91:*5*
CERTIFICATE
111:*1*
certify 111:*4*
chain 18:*11, 16*
103:*10*
chains 18:*5, 20*
challenge 22:*4,*
16, 17, 24
challenges
21:*25* 102:*12*
103:*4*
chance 63:*20*
change 37:*16*
39:*12* 53:*13, 19,*
24 66:*25* 67:*12*
81:*7, 8* 82:*16*
90:*7, 20, 21*
91:*20* 92:*4, 5,*
24 108:*6* 109:*4*
110:*10*
changed 81:*17*
82:*12* 90:*16, 22*
91:*12* 92:*21, 22*
changes 20:*17*
68:*21* 90:*3, 4*
91:*6* 108:*22, 23,*
25 109:*6, 18*
characteristics
72:*16*

charge 5:*19*
26:*23*
Charles 2:*9*
check 71:*17*
83:*1*
choice 18:*14*
60:*20*
choose 33:*23*
circumstances
55:*15* 95:*21*
107:*11* 108:*4*
Citadis 13:*15,*
16, 17, 20, 24
14:*2, 10, 11, 23*
15:*23* 16:*3, 15*
17:*8, 9* 19:*3, 18*
city 7:*12, 23, 24*
35:*14, 16* 48:*14*
51:*21* 88:*13, 23*
89:*10* 92:*12*
93:*15, 16* 105:*6*
City's 93:*7*
civil 4:*18*
clarify 90:*25*
classic 78:*7*
classical 24:*25*
clear 41:*19*
46:*6, 9, 12*
84:*14* 91:*24*
clearly 19:*7, 8,*
11, 24 20:*19*
23:*1, 3* 27:*2, 6*
28:*23, 24* 30:*9*
41:*12* 43:*18, 22*
47:*14, 16* 48:*18*
58:*7, 10* 60:*11,*
12 61:*2, 23*
63:*14* 64:*5, 15*
66:*22* 69:*20*
70:*16* 71:*25*
79:*21* 80:*2*
93:*10* 94:*14*
95:*16* 98:*11*
109:*17*
clips 53:*17*
co-counsel 3:*12*
collaboration
59:*13* 60:*12, 22*
61:*2, 25* 64:*21*
98:*6, 10*
collaborative
3:*11* 63:*9*
colleague 3:*4*
come 29:*10*
30:*1, 19* 40:*12*

58:*20* 68:*10, 23*
87:*1, 5* 88:*7*
99:*5*
comes 107:*23*
108:*5*
coming 43:*21*
102:*17* 106:*19*
command 8:*1*
commence 3:*20*
commencing
3:*1*
comment 64:*25*
commercial
35:*19* 36:*22*
42:*15* 48:*9*
55:*16, 22* 56:*7*
107:*10*
COMMISSION
1:*6* 3:*5, 17*
Commissioner's
107:*21*
commissioning
44:*5, 6, 10, 19*
45:*6, 11, 15*
46:*8, 10, 11, 22*
105:*24*
Commission's
3:*10, 18, 22* 4:*2*
107:*9*
common 9:*25*
21:*10* 36:*8*
41:*22*
communicate
58:*14* 60:*6*
71:*10* 80:*12*
82:*10*
communicated
89:*4*
communication
23:*8* 43:*20*
71:*24*
communications
9:*18*
companies
59:*10* 62:*1*
company 6:*14,*
16 7:*22* 8:*8, 10,*
12 10:*1, 14, 18,*
22 11:*1, 19*
22:*22* 72:*24*
102:*19, 20, 21*
103:*21* 111:*20*
compare 100:*16*
compared 17:*8*
24:*18*

comparison
47:*23*
competitor 66:*8*
competitors
65:*22*
complete 29:*11,*
19 30:*13, 20*
31:*13* 32:*1, 2, 6,*
24 33:*4* 37:*19*
45:*2* 87:*7* 88:*3,*
15
completed
16:*21* 31:*21*
35:*7* 75:*4*
86:*16, 24* 87:*2,*
16
completely
37:*20* 68:*23*
completing
32:*12*
complex 67:*10*
complicated
72:*2*
component 34:*3*
components
10:*9* 17:*23*
35:*6* 78:*21*
compress 44:*22*
compressed
44:*7, 9, 10*
compressor
70:*25* 71:*4, 5, 7*
78:*23*
concerning
81:*14*
Concluded
110:*20*
condition 16:*24*
conduct 37:*3*
confidential 4:*3*
configuration
38:*13* 39:*1, 3,*
10, 21 64:*10*
82:*16* 90:*12, 13,*
14, 16, 22 91:*12,*
20, 24, 25
confirmation
67:*1*
confirmed 67:*3*
conflict 88:*11*
conformity
69:*21* 71:*19*
congested 52:*5*
connect 68:*9*
71:*12* 72:*7* 77:*2*

connection
67:*9* 77:2 79:*3*
connections
82:*5*
connectivity
72:*5* 78:*14*
79:*4, 10, 14, 19*
connectors
110:*9*
consequences
108:*22*
consider 34:*23*
consistent
54:*14, 15*
consortium
5:*14* 11:*8*
construction
31:*21*
contact 11:*14*
23:*2* 55:*5, 10,*
20 93:*11*
contemplated
89:*1*
content 17:*1, 4*
103:*2* 104:*3*
contestation
61:*1* 79:*12*
continue 27:*2*
29:*3, 5, 15*
30:*18* 98:*13*
continued 86:*25*
contract 10:*23*
11:*4, 5, 6, 8, 9,*
25 13:*3* 18:*10*
45:*21* 56:*18, 19*
59:*25* 61:*14, 17,*
18, 21, 22 62:*3*
63:*15, 17* 66:*8*
69:*10, 15, 20, 21,*
22 70:*6* 76:*12,*
17 84:*8, 13*
85:*3* 89:*5, 13,*
14 93:*23* 101:*5,*
15 102:*21*
contractor 93:*14*
contracts 10:*17*
contractual
63:*15, 18, 19*
67:*21* 70:*4*
93:*4* 98:*7, 8*
contradiction
98:*18, 19, 22, 23*
contributor 61:*7*
control 8:*1*
9:*18* 12:*1*

20:*24* 31:*24*
38:*19* 65:*23*
87:*4*
correct 4:*5*
27:*8* 52:2, *18,*
20, 25 53:*5, 7*
54:*23* 77:*19*
95:*4* 111:*14*
correction 38:*17*
corrections
3:*23* 4:*1, 8*
cost 12:*17*
COUNSEL 2:*1,*
3, 4 3:*5, 14* 4:*2*
counterpart 57:*2*
counterparts
56:*10*
countries 13:*22*
couple 25:*4*
50:*7* 53:*11*
58:*20* 75:*13*
77:*12* 81:*1, 2*
106:*4*
course 35:*25*
37:*12* 39:*20*
55:*22* 56:*8*
69:*13* 71:*16*
72:*1* 76:*1* 98:*7*
COURT 111:*22*
create 18:*8*
65:*16, 17*
created 18:*6*
92:*23*
Creusot 17:*13*
crowded 52:*3*
Crown 4:*20*
CSR 111:*21*
current 59:*3*
customer 41:*23*
42:*11, 19, 22*
56:*5* 59:*19, 20*
60:*1* 95:*14*
97:*16* 99:*17*
cut 37:*8* 72:*9*
CV 6:*5*
cycle 22:*14*
109:*24* 110:*2*

< D >
daily 55:*20*
104:*14*
damage 55:2, *3*
dark 58:*20*

date 51:*4*
70:*10* 98:*13, 14*
99:*7*
dated 27:*19*
111:*16*
dates 44:*18*
98:*16* 99:*2*
day 1:*14* 45:*25*
47:*6* 63:*23*
82:*3, 22* 83:*4*
104:*15* 111:*16*
days 6:*2* 44:*19,*
21 83:*5* 105:*8*
deadline 44:*13*
deal 55:*19*
62:*20* 71:*15*
73:*1* 78:*22*
79:*9* 81:*21, 22*
94:*2, 6* 110:*5*
dealing 8:*23*
55:*14, 15, 25*
56:*6, 11, 25*
61:*9* 95:*7* 97:*6*
dealt 38:*10*
43:*1* 80:*25*
decided 35:*24*
decision 18:*5*
37:*2* 62:*1, 4, 18*
decisionmaking
92:*12*
decisions 62:*19*
93:*8*
declaration 3:*10*
dedicate 73:*12*
dedicated 15:*8*
18:*11, 13* 23:*4,*
7 39:*5, 14* 40:*1*
41:*11, 13, 18*
57:*15* 75:*11*
97:*23*
dedicating 97:*24*
deemed 4:*13*
deferred 43:*1*
define 35:*16*
38:*20* 39:*1*
72:*12* 77:*13*
defined 22:*20*
definitely 67:*11*
defreeze 20:*13*
degree 6:*12*
delay 29:*12*
42:*13* 44:*5*
82:*18* 96:*17*
97:*21*

delayed 63:*10*
92:*11* 98:*20*
delays 12:*17*
30:*12* 35:*13, 15*
45:*7, 11* 88:*17*
95:*14* 96:*15, 19,*
23 97:*3, 13*
deliver 70:*6*
85:*25* 89:*6*
deliverables
83:*20* 93:*7*
delivered 90:*12,*
13
delivers 89:*15*
93:*23*
delivery 84:*12*
depending
34:*25*
depends 6:*2*
deployed 13:*23*
derailment
108:*1*
derailments
107:*12* 108:*5*
describe 5:*9*
57:*23* 63:*6*
design 16:*20*
17:*8* 22:*4, 5*
33:*21* 35:*14, 17*
36:*22* 37:*13*
38:*24* 66:*13, 18*
67:*19, 23* 68:*2,*
17 72:*15* 73:*1*
76:*20* 92:*14*
93:*8* 109:*25*
110:*1*
designed 15:*5*
despite 45:*6, 11*
detail 38:*7*
detailed 104:*19,*
23
develop 18:*1*
33:*20* 103:*24*
developed
15:*25* 17:*2*
18:*10, 16* 19:*11,*
23 104:*21, 22*
developing
18:*20*
differed 18:*6*
difference 17:*22*
differences 15:*5*
different 6:*21*
8:*4* 17:*7* 33:*6*
68:*24* 102:*17*

difficult 22:*18*
42:*4* 53:*22*
101:*25* 102:*12*
difficulties 25:*8,*
11 69:*23*
dilemma 70:*18*
direct 10:*17, 19*
11:*7* 23:*2*
61:*14* 63:*17*
93:*3, 10* 94:*3*
directions 63:*2*
directly 7:*14*
11:*4, 9* 39:*7*
94:*2*
director 5:*13,*
16 8:*20* 12:*9,*
12, 16 13:*5, 10*
24:*24* 55:*8*
70:*1* 95:*13*
discover 64:*8*
65:*5*
discovered 64:*6*
78:*17*
discuss 96:*15*
discussion
35:*24* 53:*10*
61:*25* 86:*22*
90:*19* 98:*6*
discussions
97:*8* 99:*10*
dispatch 39:*22*
dispute 98:*8*
disputes 95:*20,*
23
distance 14:*22*
54:*1, 4*
distances 15:*13*
disturb 40:*10*
disturbed 40:*18*
division 9:*1, 5, 6*
doing 6:*14*
8:*12, 23* 23:*25*
24:*5* 27:*8, 25*
35:*1* 36:*12*
49:*7* 51:*19, 20,*
21 55:*20* 59:*3*
76:*9* 78:*2* 88:*5*
89:*20* 90:*2*
downtown 15:*8*
draw 41:*7*
driving 100:*12*
due 16:*25*
37:*11, 13* 53:*17*
dynamic 27:*21*
28:*2* 29:*10, 25*

34:*11*, *15*, *19*, *22*
35:*2*, *6* 50:*17*
51:*20* 64:*13*
84:*6*, *11* 85:*13*,
18 86:*1* 88:*12*
90:*2*

< E >
earlier 57:*22*
65:*4* 67:*15*
68:*17* 71:*8*
92:*11* 108:*21*
early 25:*22*
33:*7* 64:*7*
67:*23* 73:*14*
87:*9*
effected 41:*9*
effective 100:*9*
effectively
17:*25* 25:*7*
38:*20* 42:*12*
48:*8* 53:*13*
67:*3* 72:*4* 89:*6*
102:*3* 104:*21*
109:*8*, *11*
effort 60:*4*
electrical 68:*13*
electronic 7:*24*
8:*1*, *13* 79:*5*, *17*,
21 80:*2*
electronics 8:*23*
element 43:*19*
employees
102:*13*, *14*
encountered
76:*10*
energy 42:*7*
engineer 6:*9*, *15*,
18 7:*17* 55:*23*
engineering
6:*11*, *13*
English 47:*12*
ensure 46:*9*
enter 3:*17*
entered 3:*23*
4:*3*, *7*
enters 11:*25*
entire 28:*11*
49:*1* 54:*6*
equation 98:*11*
equipment 22:*8*,
21 62:*6*, *12*
71:*6* 76:*21*
78:*8* 79:*1*

81:*19* 90:*20*
92:*1*, *2*
error 67:*2*
errors 4:*6*
ERTMS 9:*8*
especially 94:*3*
essentially
80:*19*
establish 4:*17*
Europe 9:*8*
13:*21* 14:*10*, *19*
17:*12* 18:*15*
19:*3*
European 16:*3*
everybody
58:*25* 89:*7*
104:*15* 110:*6*
evidence 3:*9*,
18, *24* 4:*4*, *7*, *23*
5:*3*, *7* 90:*24*
evolving 66:*13*,
18 67:*19*
exactly 14:*15*
25:*25* 31:*4*
35:*16* 42:*7*
50:*25* 51:*4*
54:*13* 55:*19*
62:*3*, *22* 88:*1*
89:*18*
examination
111:*11*
example 10:*4*,
20, *21* 14:*10*
15:*10*, *11* 18:*15*
23:*2* 25:*15*
32:*2* 37:*15*
38:*15* 39:*2*, *4*
42:*16* 45:*23*
47:*4* 68:*15*
71:*1*, *3*, *5* 77:*7*
78:*23*, *24* 79:*6*
87:*22* 90:*14*
93:*5* 95:*21*
96:*12* 101:*6*
106:*9* 108:*23*
110:*9*
exchange 42:*22*
72:*21*
excuse 35:*5*
91:*2*
exist 14:*9*
17:*13*
existing 11:*20*
17:*11* 19:*2*, *21*
20:*20*, *21*

exists 13:*21*
14:*2*, *5* 18:*14*
65:*11*
expected 59:*14*
80:*17*
expecting 72:*1*
experience 6:*7*
7:*6* 8:*22* 11:*23*
38:*14*, *16* 40:*10*
41:*1* 43:*14*
53:*2* 58:*9* 59:*2*,
3 60:*15*, *18*
94:*20*
experienced
28:*4* 45:*12* 48:*2*
expert 53:*2*
expertise 7:*21*
8:*17* 102:*18*
explain 7:*8*
12:*11* 15:*2*
23:*15* 76:*7*
82:*15* 84:*1*
97:*16* 104:*16*,
17 109:*1*
explained 15:*4*
24:*15*
explaining
108:*21* 109:*24*
explanation
56:*2* 66:*24*
extension 46:*24*,
25 47:*18* 67:*6*
82:*15*
extensions
95:*22* 97:*9*
99:*24*
extensive 89:*21*
extent 16:*17*
66:*13* 109:*3*
external 21:*10*

< F >
face 42:*12*
facet 57:*25*
facilitate 61:*24*
facilities 100:*16*
facility 100:*4*, *19*
facing 94:*22*
96:*5*, *7* 97:*3*
fact 32:*19*
38:*13* 53:*12*
64:*21* 65:*22*
75:*2* 76:*11*, *16*
81:*16* 92:*4*
93:*2* 94:*8* 96:*4*

98:*24* 100:*9*, *13*
103:*24* 109:*5*, *22*
factor 99:*10*
factors 52:*12*
factory 33:*11*
failure 59:*12*
fair 20:*15*
30:*11* 66:*14*
80:*21*
fairly 7:*4* 36:*14*
42:*25*
fall 25:*22* 107:*5*
familiar 69:*14*
fast 53:*17*
feature 19:*21*
February 99:*2*
feel 45:*9* 60:*14*
64:*2* 94:*17*
103:*14* 107:*14*
felt 46:*20*
field 39:*7* 43:*12*
final 86:*10*
88:*25* 91:*22*, *23*
finalized 67:*23*
70:*6*, *20* 72:*17*
97:*9*
finally 8:*6*
52:*22* 53:*3*, *11*,
23 64:*10* 65:*6*
79:*14* 81:*21*, *25*
92:*20*
find 13:*1* 28:*9*
29:*7* 30:*10*
42:*13* 56:*2*, *3*
60:*9* 63:*3*, *24*
102:*1* 110:*12*
fine 21:*22* 91:*5*
finish 88:*7*
finishes 89:*15*
fit 101:*24*
Fitzgerald 57:*12*,
13, *17*, *18*, *19*
fix 58:*17*
fleet 78:*5*
floor 19:*4*, *8*, *13*,
19 20:*9*, *10*
21:*14*, *16*, *24*
floors 20:*9*
flow 100:*22*, *25*
101:*21*
focus 93:*22*
94:*5*
focussed 9:*10*
40:*16* 41:*14*
94:*12*, *13*

focussing 94:*9*
110:*6*
follow 62:*11*, *13*
104:*24*
following 7:*20*
32:*17* 38:*18*
73:*22* 74:*7*
75:*9* 95:*6*
109:*13*, *16*
follow-up 3:*14*
108:*15*
footprint 101:*9*
104:*5*
foregoing 111:*5*,
13
forth 111:*7*
forward 39:*12*
108:*7*
frame 103:*13*
105:*1*
framework 11:*1*
88:*22*
France 6:*11*, *12*
7:*12*, *23* 17:*14*,
19
Frank 57:*18*, *19*
free 59:*6*
freeze 62:*5*
64:*6* 68:*2*, *16*
109:*15*
front 99:*19*
frozen 37:*14*, *21*,
23, *24* 64:*11*
75:*4*, *12*, *15*, *19*
76:*1* 92:*17*
frustration 65:*17*
full 10:*2* 26:*12*
27:*11* 29:*16*, *17*,
18 30:*22*, *25*
31:*2*, *3*, *20* 47:*3*,
4 49:*12*, *14*
51:*14*, *15* 53:*8*
70:*12* 78:*20*, *24*,
25 79:*16* 82:*8*
106:*5*, *11*, *12*, *13*,
15, *18*, *19*, *25*
107:*6*
fully 37:*13*, *14*,
23, *24* 71:*6*
80:*8*, *17*
functional
29:*20* 32:*3*
42:*16* 80:*8*
functionalities
29:*19* 35:*18*

23, 24 58:*3, 8,
10, 12, 24* 59:*4,
8* 61:*9, 11, 20,
23* 62:*13, 21*
67:*16* 73:*23, 24*
77:*17* 79:*2*
81:*3, 4* 94:*10*
106:*18*
integrator 59:*25*
62:*17* 71:*17*
78:*8* 80:*6, 7*
94:*7*
intends 3:*17*
intents 86:*15*
interaction 73:*7*
interested 18:*20*
interface 22:*4, 6,
7* 37:*14, 15, 22*
38:*8* 44:*3* 64:*7*
67:*11* 68:*17*
70:*23* 71:*20*
73:*2* 74:*20, 21*
75:*5, 12, 15, 22,
25* 76:*19* 77:*5,
12, 17, 23* 78:*9*
79:*15* 81:*5, 16,
17* 90:*3* 92:*16,
25* 93:*25* 109:*9*
interfaces 37:*20,
22* 62:*5, 8, 14*
68:*3, 4* 72:*12,
25* 75:*3, 18*
79:*18* 92:*22*
94:*14* 109:*10,
12, 15*
international
8:*4, 5* 16:*9*
internet 37:*8*
interrupt 46:*5*
intervene 3:*13*
interview 3:*7, 8,
11, 15, 16* 103:*3*
inventory 96:*9*
investigating
107:*10*
involve 9:*17*
involved 69:*7*
74:*25* 109:*3*
involvement
5:*10* 10:*9* 95:*7*
involves 109:*2*
involving 74:*1*
issue 27:*10*
32:*9* 33:*3* 47:*8*
53:*7* 54:*17*

58:*17* 59:*13*
62:*16, 24, 25*
64:*19* 68:*12*
76:*10* 78:*17*
80:*13, 25* 94:*22*
95:*17* 102:*25*
103:*23*
issues 13:*2*
25:*14* 28:*4*
32:*18* 44:*2*
52:*2, 9, 10, 11*
53:*18* 55:*16, 17,
22* 62:*20* 64:*1,
20, 24* 65:*14*
67:*15* 74:*16*
76:*2* 89:*24*
90:*11* 93:*16*
94:*5* 95:*8, 14,
23* 96:*5, 7, 8, 9,
10, 18* 100:*5, 12*
103:*19* 105:*22*
item 86:*24*
items 43:*1*

< J >
Jacques 56:*21,
22* 57:*6*
Joanne 2:*13*
111:*3, 21*
job 22:*23*
40:*14* 60:*16, 24*
62:*9* 71:*9*
joined 5:*15*
25:*21*
judge 60:*18, 23*
July 24:*22*
74:*4, 25* 87:*13*
June 74:*4, 24*
87:*13* 111:*16*
jurisdiction 87:*2*

< K >
kept 6:*1* 66:*13*
key 59:*1* 68:*1*
kilometre 51:*24*
kilometres
45:*23* 48:*25*
49:*3, 6, 7, 23, 25*
50:*9, 11, 20*
51:*11, 12, 17, 18*
52:*12, 14* 53:*6*
106:*7*
kind 8:*17*
19:*10* 20:*14*

30:*9* 62:*6, 9*
88:*3, 4* 109:*6*
kinds 49:*17*
62:*16*
knew 67:*7, 12*
76:*2* 87:*14*
98:*23* 99:*20*
knowledge
16:*13* 20:*23*
21:*15* 48:*21*
85:*23* 99:*24*
known 87:*3*

< L >
laboratory 43:*9*
LACAZE 1:*7*
2:*8* 3:*3* 5:*11,
24* 6:*10* 7:*1, 11*
9:*2, 5, 20, 24*
10:*10, 13* 11:*7,
13, 18* 12:*2, 6,
14* 13:*8, 12, 19*
14:*4, 14* 15:*6,
10, 18* 16:*5, 7,
19* 17:*10, 18, 24*
18:*8, 22, 25*
19:*6, 16, 22*
20:*5, 8, 18* 21:*1,
6, 17, 20* 22:*2*
23:*18* 24:*4, 9,
13, 20* 25:*23*
26:*8* 27:*9, 13,
18, 24* 28:*6, 17*
29:*14* 30:*4, 25*
31:*25* 32:*13*
33:*10* 34:*4, 16,
20* 35:*8, 12*
36:*16, 19* 37:*5,
10* 38:*4, 12*
39:*17* 40:*4, 24*
41:*10, 19* 43:*3,
7* 44:*8* 45:*8, 13*
46:*6, 24* 48:*4*
49:*2* 50:*1, 16,
21, 24* 51:*13*
52:*7, 15* 54:*3, 8,
21* 55:*2, 7, 12,
18* 56:*12, 18, 22*
57:*4, 9, 19* 58:*1,
6* 59:*16* 60:*17*
61:*6, 12* 62:*22,
24* 63:*8* 64:*5*
65:*2, 25* 66:*15,
20* 67:*17, 25*
69:*5, 10, 13, 16*

70:*9, 23* 71:*3*
72:*10, 18* 73:*9,
21* 74:*2* 75:*2,
18, 25* 76:*11*
77:*10, 15, 21*
78:*3, 6, 13, 19*
79:*25* 80:*22*
81:*1* 82:*24*
83:*11, 14, 16, 23*
84:*3* 85:*22, 24*
86:*7, 9, 19*
87:*21* 88:*1, 10*
89:*3, 18, 23*
91:*2, 10, 17*
92:*13* 93:*9*
94:*8, 13, 19*
95:*5, 9, 11, 25*
96:*2, 21, 25*
97:*5, 10* 98:*22*
99:*8, 12* 100:*1,
8, 17* 101:*13, 20*
102:*16* 103:*6,
16* 104:*4, 12*
105:*15, 19*
106:*2, 21*
107:*17* 108:*1, 8,
15, 18, 21* 109:*5*
110:*16, 19*
lack 58:*7, 10*
60:*12* 87:*24*
laptop 43:*10*
larger 14:*22*
15:*13*
late 65:*3, 16*
launch 35:*19*
36:*23* 42:*15*
43:*2* 48:*10*
Lawrence 2:*13*
111:*3, 21*
Le 17:*13*
lead 57:*14*
89:*21*
leader 13:*6*
leakage 26:*17*
learn 43:*13, 23*
leave 58:*19*
leaving 32:*9*
100:*5, 12*
led 81:*5* 95:*23*
107:*11* 108:*4*
left 6:*23* 31:*1*
38:*1* 48:*7, 10,
17, 21* 50:*6, 7*
73:*22* 104:*8*

105:*13* 106:*1, 3,
10*
length 49:*1*
52:*25*
letter 79:*8* 92:*3*
letters 91:*18*
level 7:*4* 12:*13,
14, 21* 63:*19*
L'Homme 26:*23*
liability 4:*18*
LIGHT 1:*6*
86:*23*
limitation 51:*16*
link 10:*19*
16:*22* 58:*25*
59:*9, 22* 60:*1*
79:*5*
linked 42:*17*
65:*19, 20* 81:*16*
85:*12* 92:*14, 15*
96:*5*
Litigation 2:*3, 4*
living 108:*10*
LLP 2:*9*
LMB 29:*17*
31:*6* 33:*1* 34:*7*
35:*1* 88:*3* 96:*13*
local 17:*2* 18:*1*
103:*13, 24*
localization
101:*6*
locally 102:*18*
locations 54:*7*
locomotive 7:*16*
long 50:*9*
longer 75:*17*
lot 20:*11* 37:*12*
44:*11* 48:*12*
51:*14* 58:*7*
64:*14* 65:*14, 15,
19* 67:*12* 90:*11,
22* 93:*15*
low 19:*4, 12, 13,
19* 21:*14, 16, 24*
LRT 5:*10* 12:*8*
13:*17*
LRV 5:*17*
13:*21* 21:*16, 24*
22:*18* 24:*3, 4, 7,
8, 9, 10, 12*
26:*15* 27:*23, 24*
36:*2* 38:*21*
49:*8* 51:*19*
64:*9* 74:*15, 18*

75:*9* 76:*5, 8, 14*
78:*17*
LRVs 14:*9, 10*
19:*21* 29:*24*
34:*18* 38:*11*
39:*12* 48:*11*
51:*17* 100:*7, 15*
105:*25*
Lyon 7:*23* 8:*9*
9:*6*

< M >
made 3:*23* 4:*1,
8* 16:*15* 17:*7,
13* 28:*8* 87:*8*
91:*7* 111:*10*
main 9:*11, 12*
12:*24* 22:*24*
27:*21* 28:*7*
36:*11* 41:*12*
44:*23* 55:*5*
56:*4* 57:*2*
59:*17* 61:*7*
81:*10, 12, 13*
90:*17* 106:*5*
maintain 44:*17*
53:*15, 19*
maintenance
86:*23* 100:*4*
majority 37:*1*
making 91:*6*
107:*21* 109:*3*
man 56:*12, 15*
manage 59:*12*
94:*7*
management
58:*11* 60:*21*
90:*1*
manager 6:*18,
19, 21* 7:*18*
8:*19* 39:*21*
56:*24* 69:*25*
100:*25*
mandate 107:*9,
16, 19, 22*
mandatory 32:*5*
72:*19* 103:*9*
manpower
102:*22*
manufacturer
68:*19*
manufacturing
26:*20*
March 98:*3*
99:*2*

market 14:*7*
18:*3* 65:*23*
markets 16:*1*
match 60:*9*
material 110:*10*
materials 96:*20*
matter 23:*5*
82:*4*
max 52:*6*
meaning 29:*18*
37:*18* 39:*4*
means 47:*20*
84:*17* 110:*9*
meant 46:*9*
53:*21*
measurement
54:*10*
mechanism
85:*14*
meeting 24:*23*
25:*1* 72:*20*
74:*3, 7, 9, 13, 20*
75:*11, 23* 97:*23,
24* 104:*14, 16, 20*
meetings 73:*25*
74:*10, 12, 14, 23*
75:*16*
Member 2:*3, 4*
mention 30:*12*
mentioned 3:*3*
7:*7* 8:*22* 9:*16*
12:*9* 20:*1* 23:*4*
28:*16* 29:*22*
30:*6* 45:*7* 52:*9*
67:*19* 68:*1, 18*
70:*5* 75:*6*
90:*25* 96:*17*
105:*11*
met 69:*17* 99:*7*
metro 5:*14*
8:*18, 19, 20*
Michael 2:*9*
46:*4, 16* 108:*19*
110:*15*
mid 31:*5*
middle 85:*5*
Milestone 83:*20*
84:*3, 15* 86:*10,
14* 89:*8, 9*
millimetres
54:*11*
mind 92:*21*
107:*23* 108:*5*
minus 54:*11*
minute 37:*16*

missed 58:*22*
59:*8*
missing 32:*11*
mitigate 13:*2*
27:*1* 29:*4* 30:*8,
17* 45:*19* 60:*10*
62:*17* 63:*25*
95:*15* 97:*18, 20*
mitigation 27:*5*
28:*9* 29:*22*
30:*9* 42:*13, 14*
56:*2*
mix 10:*5* 14:*18,
24* 15:*19, 22, 23*
model 14:*2*
19:*3*
models 16:*3*
17:*9*
modification
15:*14* 16:*22*
17:*14* 38:*17, 22,
24, 25* 39:*7, 10*
64:*14* 80:*4* 90:*9*
modifications
16:*14, 18* 17:*6*
20:*3*
modified 14:*12*
20:*4* 86:*13*
month 95:*25*
96:*2, 3, 9* 97:*22*
months 25:*4, 20*
47:*20* 50:*7*
53:*11* 58:*20*
65:*15* 70:*21*
75:*13* 81:*2*
97:*21* 106:*4*
Montreal 5:*13,
22, 25* 6:*1* 8:*7,
9, 18* 10:*4, 22*
25:*2* 93:*5*
motivation 9:*12*
move 8:*9* 34:*18*
moved 7:*21* 8:*6*
moving 53:*16*
MSF 25:*15, 16*
26:*11* 27:*7, 12,
20* 28:*11, 15*
29:*17* 30:*23*
86:*24* 87:*25*
100:*3, 7* 101:*18*
102:*10*

< N >
Nadia 13:*11, 12*

24:*23* 69:*18*
narrow 54:*7, 16*
natural 63:*21*
nature 7:*6*
55:*10, 13* 96:*20*
necessary 45:*5,
10* 60:*15* 100:*14*
needed 26:*18*
30:*18* 31:*22*
32:*1, 9, 22*
37:*19* 47:*24*
51:*25* 53:*23*
64:*14* 76:*12*
78:*22* 79:*14, 15,
18* 81:*7* 82:*12*
84:*5, 10* 85:*18*
92:*7, 8, 18, 24*
96:*11, 12, 13*
99:*15* 101:*1*
needing 41:*16*
needs 15:*12*
75:*20* 88:*12, 13*
89:*10*
NEESONS
111:*20*
negotiation
105:*17*
new 18:*10, 16,
20* 25:*4, 5*
39:*12* 65:*10*
66:*5* 67:*4*
74:*13, 21* 81:*16*
101:*14* 103:*11*
105:*16* 109:*8,
11, 14, 15, 22*
110:*11, 13*
newer 18:*9*
no-go 80:*2*
**non-
typographical**
4:*8*
normal 22:*3, 11*
43:*8* 64:*19, 24*
65:*12, 13* 93:*19,
20* 103:*19, 20*
normally 22:*2,
15, 17*
North 13:*20, 24*
14:*3, 6, 12, 17*
15:*25* 16:*16*
18:*2, 17, 20*
notes 111:*14*
November
50:*17, 19*

number 19:*10*
26:*10* 30:*15*
39:*4* 44:*14*
51:*17* 53:*4*
68:*18* 73:*3, 4*
79:*18, 19* 92:*1*
102:*13, 14*

< O >
Oakley 56:*14,
15* 57:*3, 4*
object 5:*5*
objected 4:*13*
objections
111:*10*
objective 59:*25*
obtain 3:*9*
102:*13*
obtaining 96:*19*
obvious 94:*1*
occurred 36:*13*
107:*12*
OCS 32:*20, 23*
October 5:*18*
6:*23* 12:*10*
48:*11* 63:*13*
74:*6* 75:*7*
104:*9* 106:*1, 17*
offhand 21:*4*
officially 91:*19*
OLR 48:*13*
OLRT 25:*13*
54:*12* 74:*19*
90:*19*
OLRTC 24:*23*
25:*5, 12, 13*
27:*1* 28:*8* 29:*4*
30:*18* 31:*8, 12*
32:*5* 33:*3*
35:*14, 15, 25*
37:*18* 41:*22*
45:*21* 47:*13, 16*
52:*20* 53:*7*
55:*5, 6, 10* 56:*3,
5, 10* 59:*8*
60:*15* 61:*3, 21*
66:*21, 25* 67:*3,
21, 22* 69:*4, 9,
11* 74:*1, 8, 11*
79:*8* 80:*13*
81:*4, 19, 23*
82:*15* 83:*13*
84:*5, 9, 18, 21*
85:*8, 10, 12, 14*
86:*5, 18* 87:*3, 5*

88:*21*, *25* 91:*19* 93:*1*, *13*, *14* 94:*6*, *11* 95:*7*, *23* 97:*4*, *7*, *14* 99:*10* 102:*2*, *6* 104:*14*, *20*, *25* 105:*7*
OLRTC's 31:*24* 57:*8*, *24* 59:*12* 61:*10*
ones 39:*14*
ongoing 97:*7* 104:*11*, *13*
onsite 63:*22*
open 80:*1*, *3* 88:*2*
operational 99:*16* 106:*12*, *13*
operators 88:*24*
opportunity 4:*4*
opposed 48:*25* 94:*6*
order 3:*20* 31:*23* 32:*10* 62:*25* 67:*5* 69:*24* 72:*16* 81:*23* 82:*14* 86:*4* 93:*1* 110:*11*
organization 74:*11*
organized 101:*10*
original 89:*12*, *13*, *14* 99:*3*, *6*
originally 24:*19*
OTTAWA 1:*6* 5:*15*, *17*, *21*, *23*, *25* 6:*3* 12:*4* 13:*17* 14:*23* 23:*20* 25:*2* 35:*10* 36:*13* 49:*19* 76:*16* 88:*23* 102:*11* 108:*10*
Ottawa's 5:*10* 12:*8*
output 71:*13*
outputs 71:*12*
outset 40:*1*
outside 14:*2* 15:*13* 25:*16* 26:*11*, *21* 27:*20* 28:*1* 29:*9* 34:*9* 39:*8* 40:*13*

52:*17* 54:*23* 101:*2*, *3* 102:*3*, *8*, *9*
overall 46:*10* 105:*24*
overcome 21:*25*
owner 93:*4*

< P >
p.m 1:*15* 3:*1* 110:*20*
P25 108:*23*
pack 32:*19*
package 69:*25*
paid 29:*8*
parallel 36:*10*, *13* 37:*4* 41:*25*
parameters 3:*6*
Paris 15:*11*, *13*
park 102:*3*
part 10:*15*, *16* 30:*5* 37:*10*, *25* 49:*5* 59:*12* 69:*17*, *24* 70:*11*, *17* 92:*12* 95:*12* 107:*8*, *20*
participants 1:*14* 2:*6* 4:*2*, *7*
particular 13:*16* 26:*6* 46:*20* 77:*9* 100:*4*
particularly 9:*16*
parties 58:*14*, *19* 66:*5*
parts 7:*24* 18:*12*, *13* 29:*2* 47:*5* 96:*13*, *19*
party 22:*9* 58:*19* 61:*3*
pending 69:*22*
people 13:*2* 41:*12* 44:*14* 102:*17*
percent 19:*4*, *6*, *17* 21:*8* 29:*6* 36:*7* 42:*16* 46:*6*
perfect 40:*6*
perform 28:*15* 29:*6*, *23* 30:*1*, *23* 41:*16* 43:*25* 60:*16* 101:*18* 105:*12*
performed 46:*22* 80:*20* 104:*23*

performing 39:*14* 52:*13*
period 89:*2* 106:*6*
perjury 5:*2*
permit 31:*6*, *9*, *17*, *23* 32:*10*
permits 3:*14*
person 4:*20* 26:*23* 55:*5* 57:*15* 94:*20*
phase 33:*15*, *21* 34:*13* 35:*14* 36:*22* 41:*3* 68:*2*, *17* 76:*4*
physical 81:*10*
PICO 24:*6* 51:*20* 63:*13* 64:*13* 74:*5* 75:*6*, *8* 76:*13*, *23* 78:*4* 80:*9*, *10*, *20* 82:*1*, *2*, *7* 84:*6*, *11* 85:*13* 86:*1* 88:*13* 90:*2*, *4*, *5*, *7*, *8* 91:*11*
piece 70:*14*
place 5:*1* 31:*8* 60:*19* 73:*12* 85:*14* 95:*3* 100:*15* 102:*1* 111:*6*
plan 29:*22* 40:*5* 42:*13*, *14* 56:*3*
planned 24:*19* 39:*25* 105:*9*
play 66:*17*
player 88:*19*
plug 71:*22*
plugged 80:*19*
plus 54:*11*
point 8:*16* 26:*15* 28:*13*, *25* 29:*7*, *12* 30:*7*, *17*, *20* 32:*25* 35:*20* 36:*9* 37:*6* 41:*2*, *25* 48:*5*, *24* 49:*24* 50:*2*, *3*, *25* 52:*14* 66:*22* 74:*24* 76:*3* 84:*10* 85:*5* 87:*6*, *15* 88:*2* 90:*9* 91:*1*, *22*

92:*6* 98:*8*, *17* 99:*5*, *17* 106:*21* 107:*4*
pointing 64:*20*
points 67:*9* 88:*16*
portion 27:*7* 31:*23*
portions 28:*14*
pose 103:*4*
position 13:*10* 95:*22*
possibility 49:*9*, *18* 51:*14*
possible 25:*12* 27:*3* 79:*22* 91:*20* 95:*16*
possibly 83:*7*
posted 3:*21*
potential 95:*14*
Powell 2:*9*
power 28:*22* 32:*18*, *19*, *21*, *22* 33:*3* 52:*10*
practical 70:*19*
practice 66:*17*
precise 54:*9*
predecessors 70:*2*
prefer 93:*19*
preparation 62:*11*
prepare 71:*12* 72:*5*, *17* 73:*2*
prepared 76:*19*
PRESENT 2:*11* 19:*3* 58:*9* 72:*24*
pressure 44:*11*
pretty 93:*15*
prevent 54:*19*
prevented 52:*13*
preventing 32:*11*
previously 91:*9*
primarily 61:*5*
prior 6:*7* 25:*20* 89:*2* 95:*3*
priorities 105:*21*
priority 88:*18* 93:*11*, *18*, *21* 105:*2*, *12*
procedural 3:*19*
procedures 83:*7*
proceedings 4:*19*, *25* 111:*5*

process 22:*1*, *11* 26:*14* 59:*13* 62:*21*
produced 39:*13*, *15*
product 18:*9* 19:*13*, *18*, *25* 22:*5* 48:*8* 59:*20* 65:*10* 109:*22*
production 17:*19* 23:*20*, *21*, *22*, *24* 24:*8* 26:*12*, *13*, *14*, *23* 27:*3* 30:*8*, *15* 33:*12*, *13*, *14* 35:*1*, *7* 36:*3* 37:*4* 38:*11* 39:*4*, *8*, *18*, *20* 40:*3*, *11*, *12*, *13*, *15*, *16* 41:*8*, *13*, *24* 44:*2* 68:*14* 71:*21* 73:*11* 86:*25* 92:*19* 100:*23*, *25* 101:*2*, *3*, *7*, *19*, *22* 102:*9*, *23* 103:*18*, *23* 104:*7* 109:*17*, *19*, *20* 110:*5*, *7*
products 19:*11*
Professional 111:*4*
program 6:*21*
progress 28:*24* 51:*7*
project 5:*13*, *16*, *18*, *19* 6:*18*, *20* 8:*19* 11:*17* 12:*4*, *8*, *9*, *11*, *16*, *20*, *23* 13:*5*, *7*, *10* 16:*16*, *23* 18:*6*, *11* 19:*4* 23:*3*, *15*, *17* 24:*24* 31:*1* 34:*25* 36:*9*, *20* 40:*1* 41:*3*, *4* 42:*4* 48:*3*, *10*, *22* 49:*12* 55:*6*, *8* 56:*19*, *24* 57:*25* 59:*17* 60:*13* 61:*13* 63:*11* 64:*7* 65:*5*, *12*, *19* 67:*23* 68:*21*

69:*3, 8, 20, 25*
70:*22* 71:*8, 9*
72:*12* 73:*8, 15*
74:*24* 75:*1*
87:*9* 93:*6* 95:*3,
13, 20* 97:*12, 17*
99:*23* 102:*11,
15* 103:*8* 104:*2,
9, 18* 110:*4, 13*
projects 7:*10,
16* 8:*5* 9:*9, 15*
10:*8* 11:*23*
18:*7, 24* 21:*5*
36:*14* 42:*25*
70:*20*
properly 22:*10*
91:*14*
property 31:*7, 8*
propose 107:*24*
proprietary 9:*19*
prosecution 5:*2*
protection
20:*11, 20*
provide 80:*6, 7*
102:*21, 22*
provided 66:*14*
85:*20*
provider 9:*22*
providing 11:*20*
provision 68:*22*
provisional
83:*21* 84:*4*
85:*6, 8* 86:*15,
20* 87:*3, 8* 88:*6,
22* 91:*21*
provisionally
87:*11, 20* 89:*25*
105:*4*
public 3:*10, 18,
22* 4:*10*
purchase 110:*11*
purely 63:*18*
81:*3*
purpose 3:*8*
purposes 31:*22*
86:*16*
Pursuant 4:*10*
push 44:*20*
46:*2* 52:*23, 24*
53:*5* 93:*11, 12*
98:*13*
put 20:*9, 10, 12*
22:*21* 23:*4*
26:*15* 27:*14*
31:*8, 16* 44:*11*

52:*20* 60:*19*
68:*22* 72:*6*
73:*11* 76:*21*
77:*5, 11* 85:*14*
102:*7* 111:*7*

< Q >
QCD 12:*17*
qualification
33:*19* 34:*8, 10,
13, 23* 35:*4*
36:*1* 37:*3* 49:*4*
84:*14*
qualified 102:*14*
qualify 33:*21,
23, 25*
quality 12:*17,
21* 49:*14* 102:*23*
Quebec 17:*20*
question 4:*14*
5:*6* 27:*5* 94:*12,
14* 108:*20*
questions 3:*13,
15* 108:*15, 18*
110:*17*
quickly 15:*21*
20:*13* 28:*11*
33:*2* 34:*9* 90:*1*

< R >
rack 77:*9, 10*
78:*21* 79:*17*
80:*17* 81:*11*
racks 81:*12*
radio 37:*16, 22*
92:*16, 17, 19, 21,
22* 93:*18, 22, 23*
108:*23*
radios 106:*14*
RAIL 1:*6* 6:*25*
7:*2* 14:*23*
22:*25* 43:*21*
rails 54:*2, 4*
raised 65:*15*
range 50:*15*
54:*12, 23*
reach 18:*3*
98:*15*
read 4:*11*
reading 3:*6*
ready 26:*11, 19*
27:*23* 28:*1*
76:*18* 84:*17*
98:*24*

real 104:*2*
realistic 98:*12*
reality 14:*6*
40:*6* 43:*11*
97:*12, 13* 98:*2*
99:*20*
realize 33:*2*
90:*1* 99:*19*
realized 25:*7,
13* 26:*2* 37:*24*
52:*18* 54:*15*
64:*13* 74:*15*
78:*20* 79:*13, 20*
84:*5, 9* 88:*11*
90:*15, 19*
really 58:*25*
106:*10, 14, 22*
107:*5*
reason 75:*17,
23* 83:*20, 22, 24*
reasoning 84:*1*
reasons 38:*3*
recall 19:*12*
20:*9* 25:*25*
30:*22* 31:*1*
48:*11* 70:*7, 9,
10* 74:*8*
receivable 4:*23*
receive 22:*7*
60:*2* 62:*6, 12*
70:*12, 16, 25*
78:*20, 24, 25*
79:*1, 16* 85:*7, 8*
86:*14* 98:*1*
received 6:*12*
48:*25* 74:*17*
78:*21* 79:*17*
90:*14* 102:*5*
receiving 8:*16*
66:*19* 71:*6*
RECESS 73:*19*
recognize 96:*3*
recognized 96:*4*
recollection
23:*16*
recommendation
108:*12*
**recommendation
s** 107:*22, 24*
108:*6*
record 3:*6*
54:*1* 73:*18*
90:*25* 109:*2*
110:*19*

recorded 111:*11*
redefine 74:*20*
redefined 81:*4*
redesign 32:*23*
redo 74:*14, 19*
75:*7, 8* 76:*23*
91:*8* 92:*8*
109:*23, 25*
110:*2, 14*
reestablish
109:*10* 110:*11*
reference 91:*1*
referred 33:*8*
referring 67:*24,
25*
refusals 95:*22*
refused 54:*21*
81:*14, 17* 96:*14*
Registered
111:*3*
regular 73:*25*
74:*2, 3, 7* 104:*24*
relate 78:*9*
relationship
56:*5* 63:*7, 15,
19* 65:*24* 93:*4*
relay 71:*23*
relevant 107:*15*
remained 35:*20*
remaining 86:*17*
remember
14:*14, 15, 17, 23*
16:*7, 10* 17:*24*
28:*21* 31:*4*
32:*14, 16* 33:*10*
44:*10* 45:*22*
50:*1* 51:*4*
54:*10* 55:*19*
56:*13, 15* 70:*15*
76:*11* 82:*25*
83:*3, 5* 84:*15*
86:*9, 21, 22*
89:*8* 90:*5*
97:*11* 99:*1*
102:*6, 20*
104:*13* 105:*16,
20, 22* 107:*4*
remotely 1:*14*
repeat 37:*9*
45:*8*
Reporter 111:*4,
22*
REPORTER'S
111:*1*

request 52:*22*
67:*5* 79:*2* 82:*14*
requested
47:*15, 18* 67:*6*
74:*19* 97:*23*
requests 74:*14*
94:*7*
require 91:*8*
94:*5*
required 5:*4*
28:*15* 30:*23*
45:*10* 52:*6*
68:*5* 70:*6*
82:*21* 108:*24*
requirement
44:*4* 61:*19*
67:*22* 70:*4*
104:*3*
requirements
103:*2, 4*
reschedule
95:*17*
resolved 80:*25*
resources 41:*7*
respect 8:*24*
13:*6* 38:*7*
46:*22* 52:*10*
54:*12* 62:*13, 14*
76:*8* 89:*17*
95:*7, 24*
respond 66:*18*
responsibilities
12:*12* 61:*11*
responsibility
10:*24* 58:*13*
84:*20* 85:*10*
90:*6* 96:*24* 97:*4*
responsible
12:*16* 57:*7, 10*
78:*2, 8*
restart 76:*22*
109:*23*
result 104:*3*
résumé 6:*5*
RESUMING
73:*20*
rethink 68:*13,
14* 69:*1* 101:*6*
109:*8, 10*
retrofit 36:*5, 11*
37:*11, 12, 25*
39:*6, 16, 20*
40:*1, 19, 20*
41:*7, 14, 16, 20*
42:*2, 8* 45:*1, 3*

65:*17, 19* 67:*15*
81:*6, 13* 87:*6,*
17 89:*21* 94:*23*
101:*19, 23, 24*
102:*2, 4, 8*
104:*10, 12, 22*
105:*8*
retrofits 37:*1, 2*
38:*3, 6, 9* 39:*14*
43:*25* 44:*4*
92:*24*
retrofitting 88:*8*
return 38:*14*
40:*9* 43:*14*
reuse 12:*15*
18:*12, 14*
revalidate 110:*1*
revenue 43:*1*
99:*6*
review 4:*5*
reviewed 69:*3, 8*
reviews 39:*1*
revised 83:*21*
Revision 25:*24*
92:*2*
ride 49:*14*
rise 64:*25*
risk 35:*23* 36:*4,*
8, 11 37:*17*
41:*23, 24* 42:*23*
69:*23*
risks 42:*23*
role 5:*16, 21*
12:*8, 11, 24*
61:*20* 107:*21*
roles 7:*7, 8*
rolling 7:*9, 13,*
14 8:*15, 24* 9:*3,*
10, 12, 15, 17
10:*1, 4, 14, 15*
15:*7* 23:*10*
36:*9, 20* 48:*6*
66:*1* 68:*19*
77:*18* 78:*7, 11*
80:*7, 19* 106:*24*
107:*1*
room 58:*16*
routing 81:*8*
RPR 111:*21*
RSA 48:*3*
run 35:*2* 38:*23*

< S >
safety 42:*17*
72:*2* 81:*20*

Saturday 44:*15,*
25
scaffold 102:*7*
schedule 24:*17*
25:*6, 8, 9, 19, 25*
30:*10* 35:*21*
41:*17, 21* 42:*6*
47:*1, 13* 55:*21*
56:*7* 67:*8*
83:*18* 88:*9*
91:*16, 18* 95:*2,*
20 97:*9, 11, 24*
99:*3* 104:*20, 23*
105:*6, 13, 21*
scheduling
55:*17* 95:*1, 8,*
24 97:*7* 99:*11,*
24
school 6:*11, 12*
scope 62:*14*
86:*3*
season 53:*16*
secondly 29:*8*
Section 4:*10*
5:*4, 6*
sense 24:*11*
47:*25* 98:*4, 16*
sensors 72:*23*
73:*4*
separate 41:*11*
separately 41:*8*
September 5:*15*
12:*10* 23:*19*
24:*21* 25:*7*
26:*2* 63:*13*
74:*6* 75:*7*
100:*19*
sequence 76:*15*
109:*19*
serial 23:*23*
24:*5, 12* 26:*19*
34:*19* 35:*5, 7*
37:*4* 38:*11*
92:*1* 101:*19*
service 99:*6*
set 26:*10*
27:*19* 30:*14*
87:*12* 105:*20,*
21 111:*6*
shared 4:*1, 6*
sharing 64:*3*
Sharon 56:*14*
57:*2*
shifts 44:*16*
45:*2*

short 34:*22*
35:*2, 22* 36:*21*
shorthand
111:*14*
sic 100:*22*
side 15:*3*
22:*13* 49:*21*
Siemens 19:*12*
83:*2* 90:*2, 25*
signal 77:*5*
signalling 9:*1*
10:*11*
signed 25:*4, 23,*
24 61:*18*
similarly 66:*25*
simulation 43:*10*
single 81:*11*
sister 8:*8*
site 26:*24*
sites 102:*17*
situation 56:*1*
69:*19* 97:*17, 25*
99:*21* 104:*16, 17*
situations
107:*25*
slightly 25:*21*
small 68:*22*
94:*1*
smaller 93:*24*
software 8:*2, 13,*
24 71:*23* 100:*21*
solemn 3:*9*
solution 41:*4*
44:*23* 56:*3*
63:*4, 24*
solve 95:*18*
somewhat 9:*25*
soon 15:*12*
22:*19* 30:*16*
67:*2* 88:*11*
Sorel-Tracy
17:*20*
sorry 5:*20* 9:*23*
11:*2* 15:*1*
21:*18* 24:*2*
27:*22* 37:*7*
45:*8* 46:*4* 71:*2*
72:*9* 79:*23*
82:*20* 83:*3*
91:*3* 96:*1* 98:*19*
sort 20:*16*
106:*19*
sounds 66:*12*
sourcing 103:*12*

space 22:*20*
27:*12* 73:*3*
101:*18*
spare 68:*8*
speak 108:*11*
speaking 13:*15*
35:*3* 36:*25*
38:*8* 46:*15, 19*
61:*5* 67:*21*
73:*23* 100:*3*
specialized 7:*24*
specializes 7:*13*
specific 15:*20*
19:*25* 26:*18*
31:*6, 18* 33:*19*
57:*15, 16* 70:*4*
73:*12* 74:*8*
75:*23* 76:*3*
specifically
15:*25* 46:*15, 19*
59:*14* 73:*23*
specification
65:*8* 66:*23*
67:*20* 70:*7, 21*
72:*17* 74:*18, 21*
81:*5*
speed 14:*21*
51:*15* 52:*6*
spend 42:*8*
spent 5:*17* 6:*1,*
17, 22 7:*25* 8:*2,*
3, 11 82:*6* 83:*5*
Spirit 13:*16, 17,*
20, 24 14:*2, 11,*
16, 17 17:*8*
split 5:*22, 24, 25*
spoke 107:*18*
spoken 57:*22*
95:*2*
sporadic 106:*23*
staffing 102:*12,*
25
Stage 5:*10*
13:*18*
standup 104:*14,*
16
start 3:*5* 6:*13,*
17, 20 7:*11, 13,*
14 8:*17* 13:*15*
26:*20* 27:*20*
28:*1, 10, 12*
29:*9* 32:*16*
33:*1* 35:*25*
36:*3, 22* 38:*21*
39:*18* 40:*8, 9*

41:*24* 42:*14*
45:*17* 48:*9*
51:*6, 23* 63:*12*
64:*12* 72:*7*
73:*8, 10* 76:*16,*
20, 22 80:*1*
85:*10* 89:*7*
90:*20, 21* 92:*17,*
18, 19 99:*13*
103:*3*
started 5:*12*
6:*15* 23:*14*
25:*7, 9, 10, 11*
26:*3, 25* 32:*4,*
21 50:*14, 16*
104:*7*
starting 38:*21*
39:*3* 52:*3*
startup 8:*10*
state 23:*16*
static 24:*6*
27:*12, 13* 28:*15,*
17, 18 30:*2*
33:*7* 34:*8, 15,*
18, 21 35:*2, 5*
63:*12* 64:*13*
74:*5* 75:*6, 8*
76:*13, 23* 78:*4*
80:*9, 10, 20*
81:*25* 82:*2, 7*
90:*4, 5, 7, 8*
91:*11*
station 32:*23*
status 24:*15*
104:*10* 105:*25*
Stenographer/Tra
nscriptionist
2:*13*
stenographically
111:*11*
step 22:*12*
51:*2, 5* 106:*8*
STM 10:*21*
11:*4, 6, 8, 14, 21*
stock 7:*9, 13,*
15 8:*16, 24* 9:*3,*
10, 12, 15, 18
10:*1, 5, 15* 15:*7*
23:*10* 36:*9, 20*
48:*6* 66:*1*
68:*19* 77:*18*
78:*7, 11, 12*
80:*7, 19* 106:*25*
107:*1, 2*

stop 15:*21*
30:*7* 31:*15*
52:*19* 92:*4*
stopped 74:*24*
storage 100:*4*
102:*3*
strategy 37:*12*
structural 20:*17,*
18 43:*19*
sub 80:*5*
subcontract
69:*4, 9* 70:*11*
85:*20*
subcontractor
11:*16*
subject 9:*9*
59:*17* 75:*21*
76:*3* 81:*10*
83:*6* 88:*4*
90:*18* 94:*9, 24*
108:*10, 12*
subjects 6:*22*
sub-
subsuppliers
96:*18*
subsupplier
22:*8* 94:*2* 96:*8*
109:*14*
subway 5:*14*
9:*21* 10:*4*
sufficient 27:*11*
30:*22* 31:*22*
32:*20* 46:*21*
48:*1, 18* 64:*3*
94:*18, 21*
101:*11, 17*
102:*13, 14*
sufficiently
80:*18*
suggest 97:*10*
suitability 100:*7,*
8
suitable 100:*15*
summer 24:*21*
25:*22*
Sunday 44:*15,*
25
supplied 17:*23*
supplier 12:*1*
17:*2* 18:*1* 23:*8*
59:*22, 23, 24*
60:*7, 8* 71:*1, 6,*
7, 16 80:*5*
93:*12* 98:*15*

103:*11, 23, 24*
104:*6* 110:*12*
suppliers 17:*23,*
25 98:*10* 110:*6*
supply 18:*5, 11,*
16, 20 103:*10*
support 56:*1*
68:*25*
supposed 45:*22*
70:*11, 14, 16*
76:*25* 80:*3*
82:*2* 88:*23*
97:*16*
surprise 79:*7*
switch 77:*6*
system 7:*17*
8:*2* 9:*7, 19, 22*
10:*1, 12, 23*
11:*20* 20:*12, 21,*
24 21:*10, 15, 24*
22:*25* 33:*20, 22,*
23, 25 42:*17*
43:*17, 22* 46:*10*
52:*23* 53:*14*
57:*16* 64:*15*
65:*4, 7, 23* 66:*2*
67:*4, 10, 11, 16*
68:*5, 9, 14, 23,*
24 70:*12* 71:*4,*
13 72:*3* 73:*1,*
13 74:*16, 17*
76:*5* 77:*4, 6, 7,*
18, 22 78:*15, 24,*
25 79:*3, 4, 25*
80:*1, 5, 8, 10, 11*
81:*20, 21* 82:*9*
90:*17, 22* 91:*14*
99:*16* 105:*24*
106:*12, 13, 15,*
25 107:*7, 12*
systems 7:*21*
8:*13* 10:*3*
14:*25* 15:*24*
57:*7, 24* 70:*25*
77:*3, 16* 79:*11*
82:*10*

< T >
talked 94:*16*
100:*6*
talking 30:*14*
33:*5, 8* 38:*6*
43:*16* 46:*7*
47:*11, 12, 17, 23*
48:*23* 59:*2, 3, 5,*

6 67:*9* 73:*22*
82:*8, 9* 83:*6*
87:*12* 93:*6*
98:*20* 106:*23,*
24, 25
tandem 40:*2*
44:*1*
Tara 2:*4* 108:*16*
target 56:*4*
tasked 107:*9, 21*
tasks 110:*13*
team 12:*19*
23:*7, 9* 25:*10*
26:*2* 38:*20*
39:*5, 6, 14, 20,*
21 40:*2, 7, 15,*
20, 21, 23, 25
41:1, 2, 11, 13,
18 44:*12, 15, 20*
55:*24* 56:*1, 8*
65:*17* 66:*2*
103:*11, 12*
109:*7, 9, 16, 17*
teams 39:*19*
technical 6:*19*
7:18 22:*3, 11,*
16 38:*19* 53:*18*
55:*16, 22, 24*
56:*1, 7, 20, 23,*
24 57:*1* 62:*25*
63:*22, 25* 64:*18,*
19, 24 65:*12*
66:*22* 69:*19*
72:*20* 74:*9, 12,*
13, 14, 20, 23
75:*11, 23* 83:*2*
107:*10* 109:*7, 9*
Technician 2:*14*
techniques
20:*14*
tend 4:*16, 17*
terminology
100:*20, 21*
terms 8:*21*
16:*14* 17:*5*
19:*1* 25:*5, 6*
26:*20* 32:*21*
35:*17* 36:*21*
38:*16* 48:*6, 15,*
16 51:*7* 55:*4,*
21 57:*1* 61:*9,*
18, 19 62:*11*
66:*11, 21* 67:*16*
69:*18* 70:*3, 23*
71:*19, 20, 21*

72:*4, 15* 74:*11,*
12 76:*15* 81:*3*
87:*16* 88:*6*
89:*24* 90:*12*
93:*20* 94:*25*
96:*16* 100:*22,*
23 101:*21*
102:*18, 23, 25*
103:*1* 104:*20,*
25 105:*1, 2, 10,*
23 106:*13, 14*
107:*23, 24*
108:*6* 109:*19*
test 23:*23, 24,*
25 24:*5* 25:*15*
26:*10, 15* 27:*15,*
16, 18, 20, 21, 25
28:*2, 4, 10, 11,*
18 29:*5, 17*
30:*14* 31:*12, 15*
32:*22, 24* 33:*2*
34:*11, 22* 35:*2*
36:*2* 45:*24, 25*
46:*1* 47:*6, 15*
48:*23* 49:*15*
50:*3, 4, 16*
63:*13* 64:*13*
65:*5* 74:*5* 75:*6,*
8 76:*1, 5, 13, 14,*
23, 25 77:*1*
78:*5* 80:*11, 14*
82:*2, 22* 83:*7*
84:*6* 87:*16*
88:*2, 3, 13* 90:*2,*
4, 5, 7, 8 91:*12*
101:*1, 3, 7*
106:*11*
tested 67:*3*
74:*17* 80:*18*
testimony 111:*9*
testing 24:*12*
26:*7, 9* 27:*12,*
13 28:*15* 29:*23*
30:*1, 2, 3* 34:*15,*
19 35:*5* 37:*3*
44:*5, 6* 45:*5, 10*
46:*8, 21* 48:*1*
51:*20* 52:*13*
76:*9* 80:*20*
85:*18* 87:*18, 22,*
23 88:*7* 89:*17*
91:*8* 102:*24*
105:*24*
tests 24:*1, 6*
25:*17* 26:*16, 19*

27:*25* 28:*12, 16,*
25 29:*1, 3, 6, 10,*
12, 20 32:*4*
33:*4, 6, 7, 9, 12,*
15 34:*3, 4, 8, 14,*
24 37:*19* 38:*15,*
16 40:*8* 42:*10*
43:*9* 45:*14*
47:*7, 21* 49:*4, 8,*
17 50:*10, 13*
51:*19* 64:*13*
68:*20* 74:*12*
79:*20* 80:*4, 9*
81:*14, 15, 16, 18*
82:*1, 13, 17*
84:*11, 15, 22*
89:*11* 91:*13*
92:*8* 106:*7*
Thales 20:*24*
21:*2, 11* 23:*2*
24:*1, 6* 37:*15,*
21 38:*8* 44:*3*
51:*20* 57:*13*
61:*5, 6, 14, 15,*
22 62:*7, 13*
63:*1, 5, 7* 64:*3,*
18 65:*10, 20, 22*
66:*9, 14* 67:*2, 5*
70:*6* 72:*1, 14,*
22 73:*24* 74:*1,*
11 75:*3* 76:*2,*
12 77:*4, 18, 24*
78:*25* 79:*10*
81:*22, 23, 25*
84:*5, 9, 23*
85:*13, 18* 88:*12*
89:*10* 90:*9, 16*
91:*1, 3, 7* 97:*14*
99:*25* 100:*1*
104:*14* 105:*5*
106:*12* 108:*23*
Thales's 67:*16*
109:*8*
thing 8:*4, 12*
60:*21* 66:*9* 79:*8*
things 24:*16*
35:*23* 36:*10*
40:*18* 41:*24*
58:*22* 59:*4*
60:*5* 62:*16*
65:*14* 67:*12*
94:*5* 96:*20*
108:*6*
thinking 92:*20*
101:*4, 16*

third 10:*6, 14, 25* 22:*9* 61:*3* 66:*5* 80:*5*
tight 54:*16*
time 3:*13* 5:*12, 15, 19, 22, 24, 25* 6:*2, 22* 7:*17* 8:*2, 7* 10:*6* 12:*21* 13:*23* 16:*21* 21:*2* 23:*14* 24:*1* 25:*3, 13, 21, 24* 26:*8, 22* 31:*11, 14* 32:*16, 21* 34:*1* 38:*11* 39:*18* 40:*19* 42:*7* 44:*24* 45:*17, 18* 46:*25* 47:*14, 17, 18* 48:*12* 52:*14, 17* 55:*6, 19* 66:*7* 67:*6, 7* 69:*3, 15, 18* 70:*18* 75:*10* 76:*4* 77:*25* 82:*12, 15, 17, 21* 83:*17* 86:*6, 12* 89:*2, 4* 92:*8, 20* 93:*19* 95:*20* 99:*22* 100:*24* 103:*9, 18* 104:*13* 105:*1, 13* 106:*16* 107:*5, 19* 110:*14* 111:*6, 7, 10*
timeline 105:*11*
today 36:*20* 57:*22* 82:*6* 97:*3* 103:*3* 107:*14*
today's 3:*7, 8*
told 21:*13* 26:*24* 54:*22* 84:*23*
ton 38:*16*
topics 57:*1*
touch 107:*4*
touched 56:*16* 92:*10* 103:*3* 107:*15*
town 15:*8*
track 25:*16* 26:*10* 27:*18* 28:*5, 12* 34:*10* 43:*17* 45:*23*

47:*5, 10* 48:*23, 25* 49:*3, 7, 21* 50:*17* 51:*18, 24* 52:*1, 11, 16, 21, 24* 53:*5, 16, 19* 54:*6, 13, 18, 20* 96:*11*
tracks 51:*21* 106:*7*
traction 48:*7* 51:*15*
train 7:*16, 19* 8:*1* 9:*18* 11:*21, 25* 14:*19, 20* 15:*16, 17, 19* 16:*11* 20:*5, 7, 24* 23:*20, 21, 22, 24* 26:*10, 19* 27:*14, 19* 29:*9, 10* 30:*13, 14, 19* 32:*22* 34:*21* 35:*1* 36:*7* 37:*18* 38:*14* 39:*3, 19* 40:*12, 17* 41:*1* 43:*12, 17, 18* 48:*16* 49:*16* 51:*24* 52:*22, 24* 53:*1, 4* 62:*8, 11* 65:*23* 67:*13* 68:*3, 6, 8* 71:*11, 12, 22* 72:*5, 6, 16* 73:*2, 13* 76:*12, 15, 18, 22* 78:*1, 15* 80:*12* 82:*7, 13, 16, 19, 22, 23* 84:*6, 10, 12, 16, 17, 18, 19, 22, 24, 25* 85:*9, 11* 86:*1, 25* 87:*4, 11, 14* 88:*12, 13, 14, 15* 89:*10, 24* 90:*13, 15, 18, 20* 91:*25* 99:*16* 104:*21* 105:*3, 4, 7*
training 48:*14* 51:*22* 76:*24* 85:*12* 88:*23, 24* 89:*17*
train-per-train 85:*7*
trains 16:*4* 33:*24* 34:*25* 39:*8* 45:*3* 75:*5*

83:*10, 13* 84:*25* 86:*11, 14, 17* 87:*5* 88:*6* 89:*6, 16* 98:*3* 99:*1* 102:*4* 105:*5*
tram 14:*19, 20* 15:*3, 6, 7, 15, 17, 18* 16:*4, 11*
tramway 14:*19, 20, 21* 15:*7, 11, 12, 14, 15* 19:*10, 18*
transcribed 3:*16* 111:*12*
transcript 3:*17, 21, 25* 4:*5, 6, 9* 111:*14*
transfer 17:*12, 18, 19*
transparency 64:*21* 65:*1* 98:*9*
transparent 64:*16*
TRANSPORT 1:*7* 2:*8*
trial 4:*24*
triangle 12:*25* 30:*5*
true 111:*13*
trying 28:*8* 50:*14* 60:*9* 72:*14* 94:*7*
tune 80:*10*
tuned 80:*18*
tunnel 49:*19, 20* 50:*5* 51:*3* 106:*8*
turn 23:*13* 48:*22* 100:*3*
turning 12:*7* 57:*5* 92:*9*
type 34:*3, 4, 8, 10, 14, 15, 24* 49:*4*
types 70:*20* 107:*25*
typical 11:*23* 12:*15* 19:*15* 36:*14, 16, 18, 19* 42:*25* 78:*10, 13*
typically 15:*5* 21:*14* 33:*20* 34:*5* 37:*21* 43:*6* 73:*7*
typos 4:*5*

< U >
ultimately 47:*25* 107:*12*
underframe 72:*24*
understand 6:*8, 24* 8:*25* 11:*3* 14:*9* 17:*6* 18:*19* 24:*16* 25:*18* 30:*18* 36:*4* 42:*23* 60:*7* 63:*3, 16* 69:*20* 72:*14* 73:*9, 14* 82:*1* 85:*17* 99:*6* 103:*21* 109:*11, 17, 21* 110:*4*
understanding 16:*17* 24:*18* 50:*15* 61:*10* 70:*5* 91:*24*
understood 25:*3* 74:*3* 89:*5*
undertaken 33:*6*
unique 36:*15*
unpredictable 54:*17*
utilize 54:*20*

< V >
V5 25:*24* 95:*2* 97:*9* 99:*3*
V7 97:*11*
V9 97:*11*
validate 22:*6, 10, 14* 33:*22* 49:*15* 77:*2, 3, 4, 12, 17, 22, 23* 80:*1, 9* 107:*6*
validated 22:*8* 70:*12* 80:*8* 82:*9*
validation 33:*9, 17, 19* 34:*13* 35:*4* 36:*2* 37:*3* 46:*3* 71:*24* 72:*7* 106:*23*
validation/qualification 44:*1*
Valo 2:*9* 46:*4, 16* 108:*17, 19* 110:*15*
variation 62:*25* 67:*5* 69:*24*

81:*23* 82:*14* 93:*1*
vehicle 20:*17* 33:*13*
vehicles 19:*5* 20:*23* 21:*14* 26:*17* 46:*11, 15, 20, 23* 76:*14* 77:*1* 80:*23* 83:*22* 86:*5* 87:*20* 89:*1, 20* 103:*2* 108:*25*
verify 78:*14*
VERITEXT 111:*20*
version 14:*12* 95:*2*
versus 69:*20*
Videoconferencing 1:*13*
view 37:*6* 45:*5* 46:*17* 48:*1, 5* 66:*22* 100:*6* 106:*22*
Virtual 2:*14*
VOBC 77:*8, 10, 11* 79:*3* 80:*17*
VP 7:*1*

< W >
waiver 69:*22*
wanted 7:*20* 8:*15* 35:*17* 44:*12, 13* 45:*18* 46:*8* 47:*1* 49:*12* 66:*24* 98:*25*
wants 31:*12*
warranty 40:*21, 22* 41:*2* 85:*11*
water 26:*16* 27:*15, 16* 88:*2* 101:*1, 3, 6, 7*
wayside 9:*7* 28:*22* 32:*5* 43:*20* 51:*3*
weather 30:*2*
website 3:*22*
week 6:*3* 82:*7, 23* 105:*8*
weekly 104:*19*
weeks 47:*10* 97:*20* 106:*4*
weight 30:*3*