



SAHAYA
CONSULTING

Briony Croft

Director,
Sahaya Consulting (Canada)
and Acoustic Studio (Australia)



Procurement and Contracts for New Systems

PRINCIPLES COURSE



SEATTLE, WA

WRI2025RT



August 26-28,
2025

Overview

Project delivery models – implications for wheel/rail interface

Development of procurement specifications

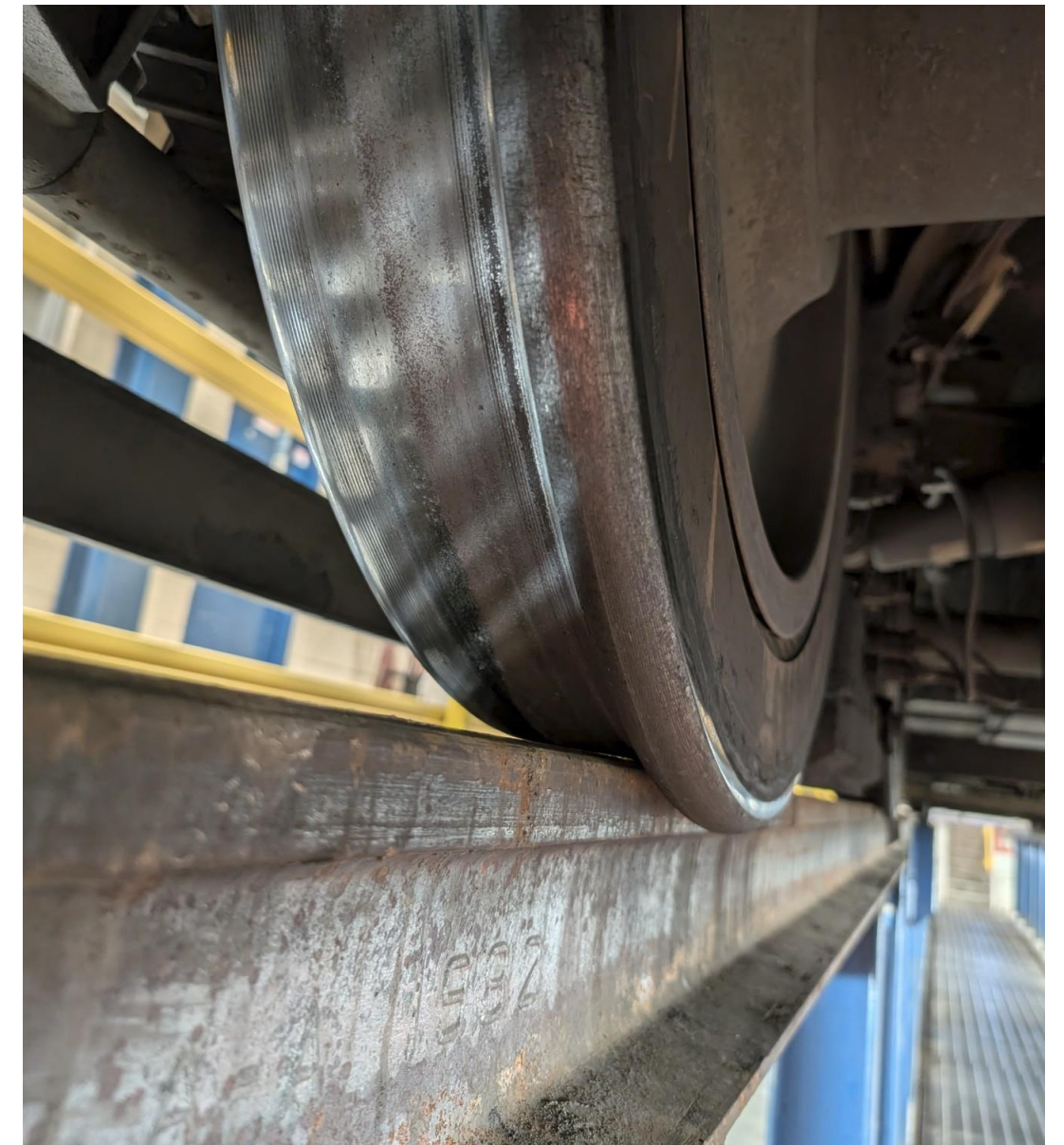
- Track
- Vehicles
- Wheel/rail interface

Integration through project delivery

Operations and maintenance contracts

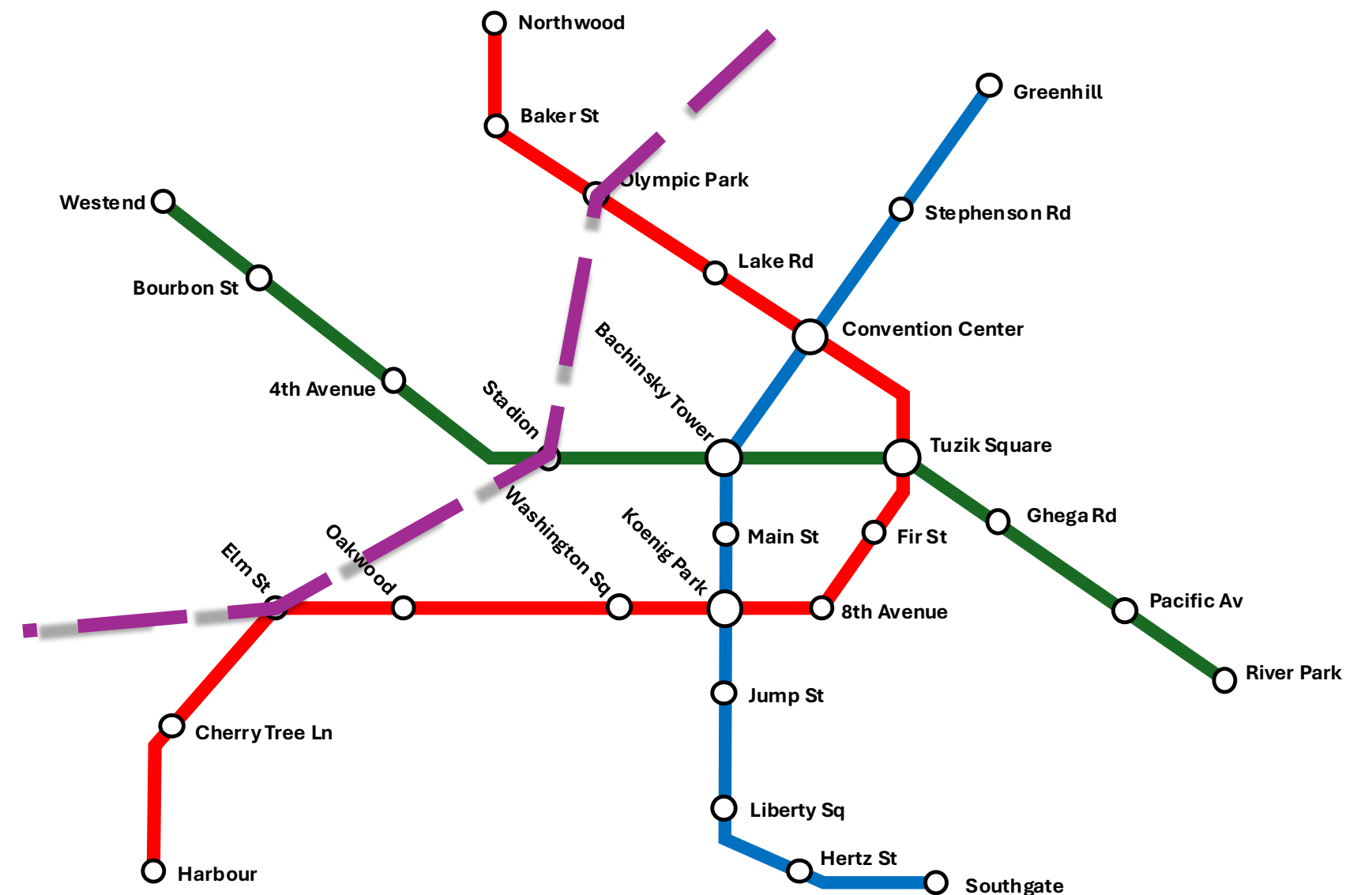
Lessons learnt (public domain examples)

- Ottawa Light Rail Transit Public Inquiry
- Honolulu lawsuit



Metropolis is getting a new light rail system

- City is planning to host major international sporting events
- Need extra capacity linking venues
- Light rail proposed along existing bus transitway
- Route constrained
- Budget constraints are reason for light rail rather than extension of existing heavy rail system



Whole new system vs extension/addition

Element	Extension of existing system	Full new system – first light rail transit in city
Owner	Owner / principal has direct experience	Owner / principal with no light rail experience
Rolling stock	Increasing fleet numbers, maintaining compatibility (extensions)	New rolling stock unconstrained by compatibility with existing system, needs to be compatible with proposed track infrastructure
Track	Consistency of components with existing for maintenance / spares?	Options – consider capital costs vs whole of life costs
Operations	Existing operator with direct experience	Contracted private operator or public operator
Maintenance	Additional capacity in facilities? Maintainer has direct experience	Contracted? In house? Will need a new depot



Options for project delivery models

- Design Bid Build
- Design-Build
- Public Private Partnership
- Integrated Project Delivery
- Alliance / Partnership models
- Many others – plus combinations of models

“Risk transfer” vs “Risk embrace”



Example: Design-Bid-Build

The owner contracts separately with a designer, a builder, and with a vehicle supplier:

- Designer creates detailed plans and specifications
- Contractors bid on construction based on those plans
- Vehicle suppliers bid to provide the rolling stock

The owner maintains a high degree of control over the project but also assumes more risk

Owner must manage interfaces and procure operations and maintenance services



Example: Design - Build – Operate - Maintain

The owner contracts with a single entity that handles the design and construction phases, procurement of vehicles and the operations and maintenance of the system.

Can streamline the project, potentially reducing costs and timelines.

The design-build entity takes on more responsibility and risk, which can incentivize innovation and efficiency – but they will need to price the risk into their bids.

Less owner control: reliant on quality of specifications in achieving desired outcomes.



Considerations in choosing a delivery model

- The project size and degree of engineering complexity
- How much control the Principal wants to retain
- Budget constraints
- Time constraints
- The experience, resources and capability of the Principal
- The depth of the Contractor/consultant market
- Requirements of external stakeholders (government, funding providers)



Implications

The wheel rail interface must be considered

There are many parties / contractors involved

- One contractor building track
- Rolling stock supplier
- Operator / maintainer

Multiple contracts require understanding of processes / interfaces / system integration – it is more complex than simply specifying end outcome.

What would a performance based WRI requirement specification look like anyway?

The interfaces are the same even if the Owner / Principal contracts with a single entity to design, build, supply operate and maintain the system

Need to ensure that responsibility for wheel/rail interface compatibility is clearly assigned

Need to ensure that the wheel/rail interface is studied during design, with attention paid throughout delivery, testing, operation and maintenance stages.



Contract structure

Owner may establish multiple contracts with various parties, or via a project agreement with a single entity / consortium

Project Agreement

Whatever the structure, WRI needs to be considered in multiple contracts and specifications

Construction contract

Vehicle supply contract

Maintenance contract

Operations contract

Subcontractors

Subcontractors

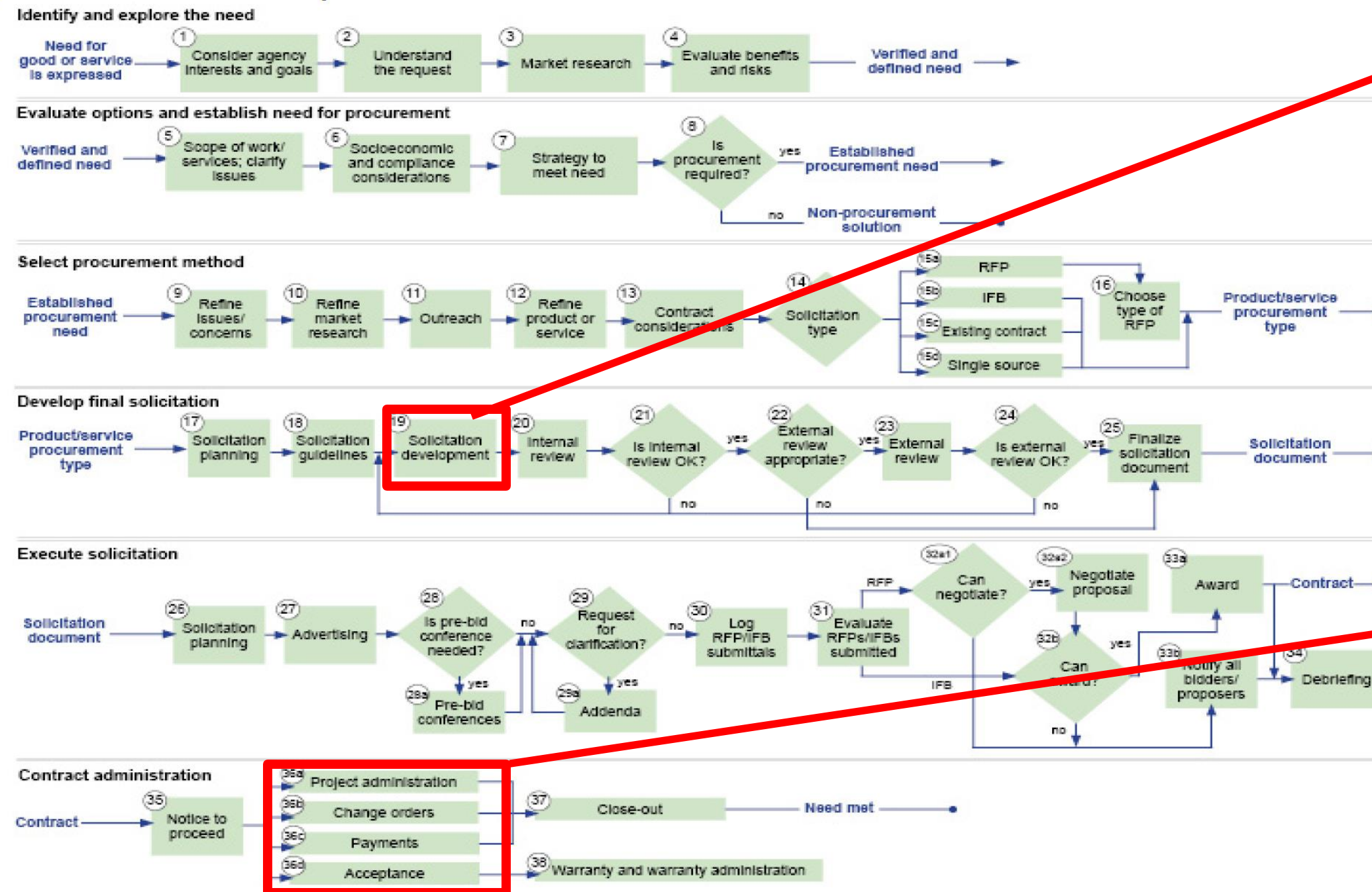
Maintenance subcontractors



Extract from APTA PS-PP-RP-007 -13

The Process of Transit Procurement

Appendix A: Procurement process overview



Solicitation development – where wheel/rail interface requirements need to be incorporated

Project delivery

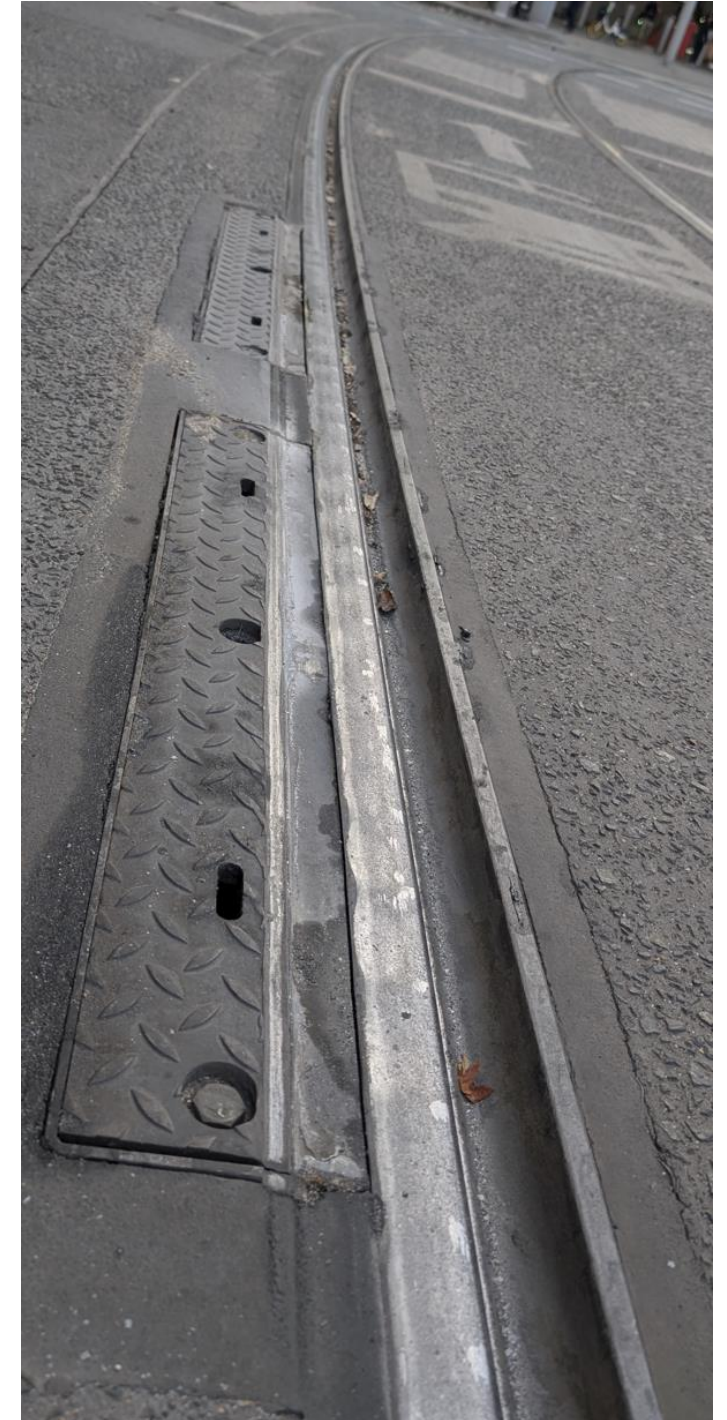


Track specifications

Specifications based simply on general reference to AREMA engineering manual recommended practices for track design, construction and maintenance do not in isolation address the wheel rail interface.

Include requirements that require the track design and construction to consider appropriate vehicle parameters and to be developed iteratively alongside the vehicle

Design information exchange is key



Vehicle specifications

There are advantages to selecting a service proven, existing vehicle design and many vehicle suppliers operate globally.

However, a Canadian or American railway transit system will be built and maintained to North American standards, using local components and equipment.

Vehicle specifications should be clear on requirements for vehicles to be compatible / adaptable to local norms



Avoiding finger-pointing and lawsuits later...

- The early design stage is key
- Exchange information
- Do a wheel/rail interface study for the specific track alignment and proposed vehicle
- Both track and vehicle need to consider that willingness to accommodate small changes in their designs can save huge costs later
- Iterate – work together towards optimized solutions



Wheel rail interface specifications

Ensure there are requirements promoting compatibility of wheel/rail interface

Require a wheel rail interface study during design

Take expert advice during design

Verify during construction

Test during commissioning

Requirements to monitor wheel/rail interface performance and adapt maintenance practices to optimize during operations



Integration through project delivery

Owner / principal / integrator needs access to sufficient WRI expertise to assess design and monitor WRI through project delivery, construction, testing etc

Also needs to act on advice received



Operations and Maintenance Contracts

- Need to include quality specifications and performance requirements
- Differentiate between corrective, preventative and acoustic grinding
- Pay for quality of outcomes, not quantity of track ground



APTA Light Rail Vehicle RFP Procurement Guidelines

<https://www.apta.com/research-technical-resources/standards/procurement/apta-rt-lrt-gl-001-11/>

Section 6 is the Technical Specifications

TS 1.3.1 Infrastructure Description: The LRV shall operate safely on the infrastructure used by the Agency...



APTA Light Rail Vehicle RFP Procurement Guidelines

TS 2.2.5.7 Wheel Dimensions, Unpowered Truck:

3. The wheel tread profile shall be as shown in the Contract Drawings

TS 2.3.2 Vehicle Dynamic Analysis

The Contractor shall prepare a vehicle dynamic simulation model that shall be used to analyze the performance of the vehicle for safety against derailment during low-speed curving, and freedom from truck hunting at speeds up to [Agency to insert] mph ([Agency to insert] km/h).



APTA Light Rail Vehicle RFP Procurement Guidelines

TS 11.2.2.6 Truck Dynamic Performance

- 1. See TS 2 for vehicle dynamic performance requirements.*

Wheel-Rail Interface Forces

- 1. Vehicle dynamic characteristics shall be compatible with the design of bridges, track and track support structure.*

Wheels

Wheel Tread Profile and Rim Thickness

- 1. Tread profile shall be based on AAR 1B with minimum flange angle of 72 degrees, or other profile satisfying the requirements of TS 2.5, be compatible with the track design, and minimize predicted wheel and rail wear rates.*



Lessons learnt – specifying noise

Ottawa

'Like a CF-18 fighter jet': LRT noise disturbing condo dwellers

Promise of 'quieter neighbourhoods' hasn't come to pass for some residents near Confederation Line



Joanne Chianello · CBC News · Posted: Aug 20, 2019 4:00 AM EDT | Last Updated: August 21, 2019



The Confederation Line trains pass through an open trench as they travel between Tunney's Pasture and Bayview stations. This is the view from a balcony at 215 Parkdale Ave. (CBC)

<https://www.cbc.ca/news/canada/ottawa/loud-noise-light-rail-confederation-line-lrt-1.5245185>

CityNews
Everywhere

News ▾

Video ▾

Weather



Montrealers complaining about noise from new light-rail train network



Being woken up in the morning. It's not is not pleasant," says Geoffrey Stanley, a Griffintown resident, about the amount of noise made by Montreal's new light-rail train network or the REM. Felisha Adam reports.

By **News Staff**

Posted July 31, 2023 4:32 pm. Last Updated August 1, 2023 2:43 pm.

<https://montreal.citynews.ca/2023/07/31/montrealers-complaining-about-noise-from-new-light-rail-train-network/>



Lessons learnt – other public domain examples

Honolulu lawsuit

- ongoing case, not resolved yet
- Limited public domain information is available from Hitachi's complaint
- no HART response is public

Ottawa derailments and public inquiry

- Not fully resolved
- Public Inquiry report and investigations are available

Blame is not the aim – this is a forum for constructive discussion



Honolulu

Hitachi's complaint is available online:

<https://www.documentcloud.org/documents/25483203-hi-cir-hon1-1ccv-24-0001819-d257159704e238-complaint-demand-for-jury-trial-summons/#document/p1>

Among other issues, it is alleged Hitachi was required to provide a wheel with particular dimensions, while the track designer was required provide turnouts to a particular specification.

The wheels and turnouts were found to be incompatible during testing and commissioning.

The short-term solution was welding the double-crossovers to fill the gap with the narrow wheels. The permanent solution was to replace all the wheels (<https://honolulutransit.org/hart-faqs/what-is-the-status-of-the-wheel-rail-issues/>)

Hitachi Rail sues HART for \$324m over Honolulu project contract

The Skyline rail project has experienced delays and mismanagement, resulting in higher costs for Hitachi Rail.

January 6, 2025

Share



The first segment of the Skyline project was opened in June 2024, following considerable delays. Credit: Brave Behind the Lenz/Shutterstock.

<https://www.railway-technology.com/news/hitachi-rail-honolulu-skyline-rail>



Ottawa

Recommended reading: Final report of the OLRT Public Inquiry

https://www.archives.gov.on.ca/en/e_records/olrtpi/documents/final-report/index.html

Ottawa LRT: Bolts left loose after August derailment led to September incident, TSB says



By **Craig Lord** • Global News

Posted November 4, 2021 4:56 pm • Updated November 4, 2021 5:14 pm • 3 min read



A wheel of a segment of an OC Transpo O-Train is seen off the tracks Monday, Sept. 20, 2021 after it derailed west of Tremblay LRT Station on Sunday, in Ottawa. **THE CANADIAN PRESS/Justin Tang**

<https://globalnews.ca/news/8350819/ottawa-lrt-loose-bolts-september-derailment/>



Ottawa Contractual Structure

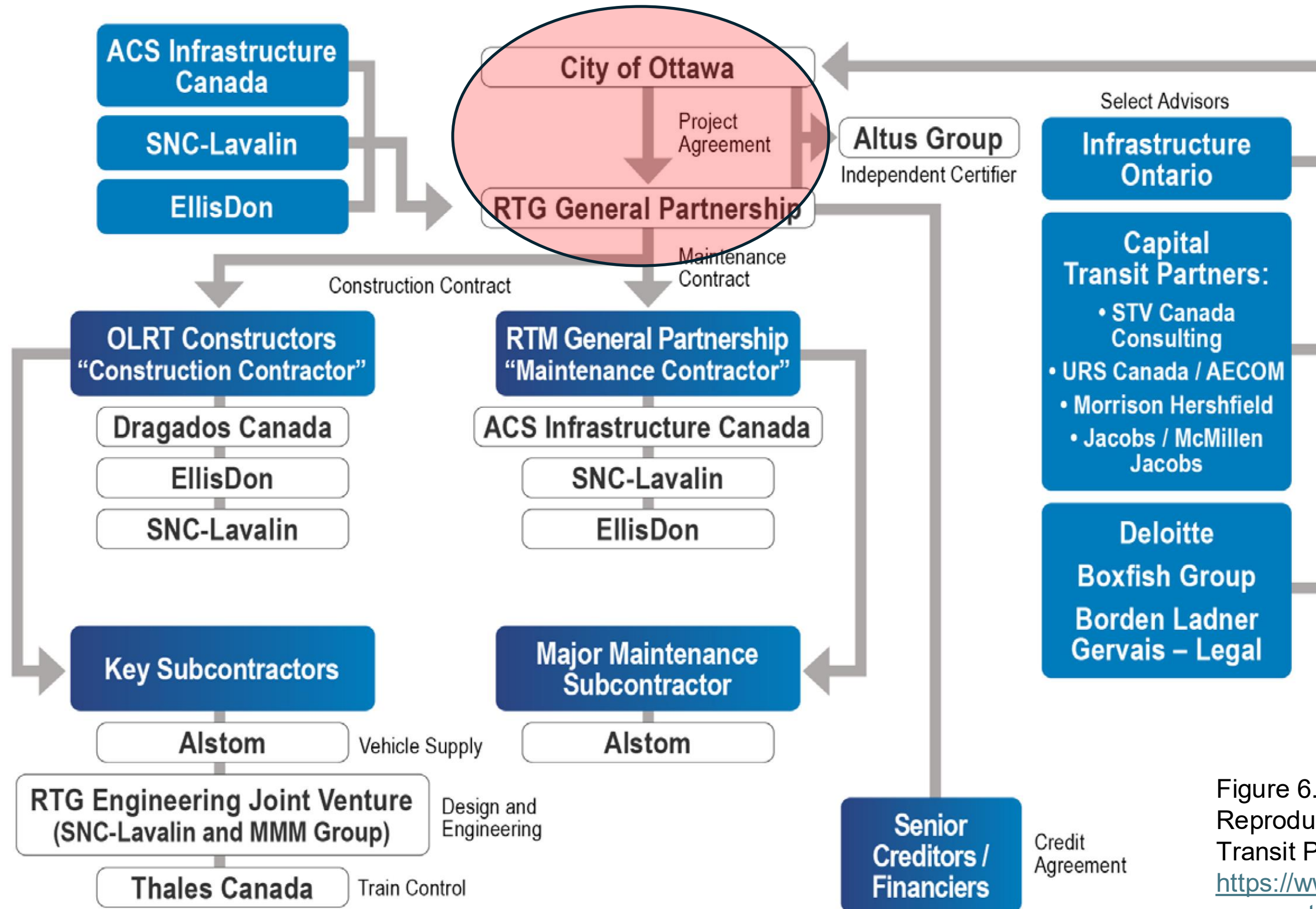


Figure 6.3 Contractual Structure
 Reproduced from Report of the Ottawa Light Rail
 Transit Public Enquiry, Final Report, November 2022
https://www.archives.gov.on.ca/en/e_records/olrtpi/documents/final-report/index.html

Recommendations from the Inquiry

- There are many – highlighting a few

An impediment to collaboration on the OLRT1 project was the parties' lack of experience with each other and with important elements of the system they had contracted to deliver, maintain and operate....

The entity charged with overseeing a project must ensure that its various subcontracts align and are consistent with each other, and that no gaps in project obligations or deliverables are left unaddressed.



Wheel/rail interface issues / recommendations

The track design has not undertaken any specific wheel-rail interface analysis and has not declared [that] any specific rail-head profile modifications are to be implemented to aid the conicity management. The specification of the rail was defined by the Client [the City], based upon the principles of the AREMA engineering manual. The profile of Citadis B15 wheel profile was proposed by Alstom, as part of their LRV specifications. This Safety Justification Report has made recommendations to establish a wheel-rail interface working group to monitor all parameters that could affect wheel and rail interface performance and prevent accelerated failure of the track.



Conclusions – issues arise when:

Project delivery model relies on the Owner having sufficient expertise and resources available

- For new rail transit systems often the Owner lacks wheel/rail interface experience

Project technical specifications are not tailored to the delivery model

- Gaps in definition of wheel/rail interface scope and responsibility

Compatibility of the track and rolling stock is assumed rather than intentionally designed, modelled and tested.



Conclusions – proactive steps we can take:

Prioritise the wheel/rail interface – pay attention during procurement, design, construction, testing & commissioning and operations

Focus on collaboration

Allow for design information exchange and an iterative approach

Share information, knowledge, experience – use the network you gain here to keep the conversations going.

