Briefing: Secretary
FOR INFORMATION

Post travel report: Messrs Jake Linnenbank, John Chan, and Shaun Padt to Beasain, Spain

NSW GOVERNMENT | Transport for NSW

Purpose: To report to the Secretary on the recent overseas travel to the Construcciones y Auxiliar de Ferrocarriles (CAF) design and production facility in Beasain, Spain, on 15 September 2022 to progress key design issues related to critical train systems as part of the Regional Rail Project (RRP), specifically technical packages A15 (Train Control and Functionality) and A17 (Communication and Information Systems).

Analysis: The objectives of the trip as outlined in the approved Briefing Note were achieved, with significant progress made to close-out outstanding Detailed Design Review (DDR) comments and resolve key design issues. Daily technical workshops were held face to face with the CAF technical team engineers, as well as in-person visits to the trains currently under production to perform a number of inspections, trials and tests.

Summary:

1. Significant progress achieved to work through outstanding DDR comments against Technical Packages A07, A14 and A15, resolving a total of 137 comments against the three packages.
2. Development, review, and update of several Verification Procedures (part of Technical Package A15) prior to formal submission to reduce the number of comments returned and thus improve the testing program.
3. Reviewed progress on the development of the CCTV design, including testing with the r2p (CCTV sub-supplier) test bench to demonstrate functionality.
4. Discussed submission strategy for the Technical Package A17 DDR submission with CAF and r2p to progress with DDR close-out.
5. Reviewed and tested the hearing loop design implemented on LR01.
6. Reviewed the CAF Signaling European Train Control System (ETCS) solution, including a walkthrough of the solution on the CAF Signaling test bench to demonstrate compliance and functionality.
7. Reviewed progress of production and static testing on train units LR01, LR02 and LR03.
8. Reviewed and tested the design of the Train-Based Warning System to be implemented on the New Fleet.
9. Inspected, trialed, and tested miscellaneous aspects of the as-built design on the production train.

Contact: Jake Linnenbank, Engineering Manager - Fleet, Technical Services, Infrastructure and Place
M: [redacted]

Key learnings and outcomes

Resolution of Technical Package A07 Lighting Comments

Workshops were held with the CAF lighting engineer (Mr Manuel Jesus Molina) to resolve outstanding DDR comments against the Train's lighting sub-system (which forms part of Technical Package A07). Significant progress was made on the outstanding DDR comments, as summarised in the below table:

Document	Comments		
	Unresolved prior to trip	Resolved during trip	Unresolved after trip
C.L3.93.071.00	7	6	1
C.L3.97.086.10	32	26	6
C.L3.97.086.11	11	10	1
C.L3.97.290.02	8	8	0
Total	**58**	**50**	**8**

Resolution of Residual Issues on Technical Package A14

Workshops were held with CAF engineers (including Messrs Peio Alonso, Mikel Bustos, Eneko Ramirez and Miguel Ocio) to resolve outstanding DDR comments as well as discuss items related to upcoming testing and commissioning activities. Progress on the outstanding DDR comments is summarised in the below table:

	Number of comments
Unresolved comments prior to trip	18
Comments resolved during trip	9
Remaining unresolved comments after trip	9

Further discussions also took place relating to ICE radio type approval and technical functions including interfaces with the PIS and configuration data. The remaining nine (9) open DDR comments are being worked through as part of the design development process and do not present a significant barrier to the completion of DDR.

Progress on Technical Package A15 Comments

Multiple workshops were held with CAF engineers (including Messrs Javier Bustamante, Asier Elola, Mikel Bustos and Guillermo Rodriguez, and Mses Leire Eguiluz and Ane Peiea) to resolve outstanding DDR comments against Technical Package A15. Significant progress was made on the outstanding DDR comments, as summarised in the below table:

	Number of comments
Unresolved comments prior to trip	118
Comments resolved during trip	78
Remaining unresolved comments after trip	40

Following these workshops, all comments related to contentious design issues as part of Technical Package A15 have been resolved. The remaining 40 open DDR comments are being worked through as part of the design development process and do not present a significant barrier to the completion of DDR.

DDR Submission Strategy for Technical Package A17

Multiple workshops were held with CAF engineers (including Messrs Asier Elola, Jon Bilbao and Guillermo Rodriguez, and Ms Leire Herran) on Technical Package A17.

This Technical Package has not yet been submitted to TfNSW for review and many of the workshops were focused on identifying content which should form part of the submission, informally workshopping any available draft documentation to provide early feedback, and determining any areas that need to be addressed prior to submission to reduce the number of comments returned against the package once formally submitted.

The strategy for support from the TfNSW SMEs, and appropriate actions for both CAF and TfNSW have been developed and will be implemented to fast-track the close-out of the DDR submission.

Development of Verification Procedures

Draft verification procedures previously submitted to TfNSW identified significant issues with the proposed procedures and it was agreed that workshops would be convened to resolve the identified issues. Whilst some workshops have been conducted via remote meetings, the trip offered a unique opportunity to workshop the procedures in proximity of the train product that was to be tested. This enabled easier collaboration on the procedures where language barriers such as use of different technical terminology was more easily overcome, and the face-to-face nature of the workshops allowed for a more collaborative working environment compared to the more formal remote meetings previously held.

In addition to reviewing and resolving issues on previously submitted draft verification procedures, the trip enabled new verification procedures to be developed collaboratively with the aim of ensuring the new documents are as complete and error-free as possible. This verification procedure has since been submitted and has received ‘no comments’ from both TfNSW as well as the Independent Certifier.

CAF Signalling ETCS Demonstration

A meeting was held between TfNSW, CAF and CAF Signalling to discuss upcoming testing and commissioning activities (including signal interference testing with non-ETCS trackside equipment) and clarifications on the type approval process for the ETCS equipment.

CAF Signalling provided a tour of their testing area and demonstration of the test bench for the Regional Rail Project ETCS solution. CAF Signalling explained their high-level testing process which includes over 3000 automated test steps.

Messrs Linnenbank, Chan and Padt were provided a demonstration of several ETCS scenarios and given the opportunity for free play with the HMI. Through the process, CAF Signalling responded to any questions posed.

Progress Update on LR02 / LR03 Production

Messrs Linnenbank, Chan, and Padt were provided a walkthrough of the production line for the new fleet. The car bodies have been completed, and the cars were at different stages of painting, external fit out and internal fit out. Through-out the various phases of construction, both the components as well as the construction workmanship appeared to be of appreciable standard with no obvious defects or faults.

Review of Train-Based Warning System (Quacker) Design

Messrs Linnenbank, Chan, and Padt engaged with CAF on the design solution for the 'train-based warning system' as a control to mitigate the maintenance facility hazard of moving vehicles within the depot. The proposed warning device was temporarily fitted onto the train for qualitative assessments on the suitability of the mounting location and audibility of the alarm at various locations around the train. Some reference measurements of the volume of the warning device were also taken for consideration and comparison to similar devices on TfNSW's fleets.

Review of Hearing Loop Design

Messrs Linnenbank, Chan, and Padt undertook a trial of the current hearing loop design implemented on LR01 and it was noted that the field levels were less than the values that CAF expected. Qualitatively, a sample announcement played can be clearly heard within the car under test. Discussions were held on potential reasons why the field levels were less than expected and potential options to maximise hearing loop usability for the travelling public. It was agreed that CAF will conduct further trials to see if there are any alternative design strategies for optimising the hearing loop performance.

Review of CCTV Design

The CCTV design documentation had not been submitted to TfNSW prior to the visit, so whilst in Spain, Messrs Linnenbank, Chan, and Padt took the opportunity to discuss the detailed detail with the CCTV sub-supplier (r2p), which had prepared some design documentation as well as the on-board software based on this design. An r2p representative was on site to demonstrate the on-board software as well as discuss some of the concerns held by Messrs Linnenbank, Chan and Padt on various aspects of the design.

Communication Strategy

In line with the approved Briefing Note, Messrs Linnenbank, Chan and Padt ensured regular communication with the RRP Project Team in Australia (via emails, and Microsoft Teams chats and video calls) to provide frequent updates on progress and design development. This included updates to key metrics, such as number of resolved comments against unconfirmed technical packages / submitted documents, and the status of key design issues. Summaries from each day were also shared with CAF, including actions and tasks (refer to Attachments A-J).

Upon return to Australia, key individuals from the RRP Project Team, including the RRP Project Director, Engineering Directors and Project Managers were provided with a detailed summary of the outcomes from the trip. Other members of the RRP Project Team have also been engaged as appropriate for specific updates on targeted topics.

Messrs Linnenbank, Chan and Padt are currently in the process of developing a number of one-page technical summaries for outstanding contentious design issues, such that they can be escalated for resolution by the RRP Senior Leadership / Executive Team prior to the close-out of DDR.

Alignment with Future Transport Strategy

In alignment with the Future Transport 'Accessible Services' principle, the design of the Regional Rail fleet is focused on accessibility and providing the features that are important to our customers. Many of the outstanding design issues discussed in the workshops arose from detailed consultation with NSW TrainLink staff and our customers. These features are guided by Future Transport's 'Customer Focused' and 'Safety and Performance' principles.

Disclosure Summary

Date	Organisation/Individual	Purpose of Meeting
19/09/2022	Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted]	▪ Introductions and planning for the visit
	Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted]	▪ On-train walkthrough of LR01 and LR02 ▪ Tour and demonstration of the integrated electronics lab
	Mr [redacted] Mr [redacted]	▪ A15 comment workshop ▪ Quacker/Train-Based Warning System (TBWS) discussion
20/09/2022	Mr [redacted] Mr [redacted] Mr [redacted]	▪ A15 comment workshop (Human Factors focused)
	Ms [redacted] Ms [redacted] Mr [redacted]	▪ A15 comment workshop (RAMS focused)
	Mr [redacted] Mr [redacted] Mr [redacted]	▪ A14 residual comments workshop ▪ Automatic Selective Door Operation (ASDO) database discussion ▪ HMI film discussion
	Mr [redacted]	▪ Internal Emergency Door Release (IEDR) discussion
21/09/2022	Mr [redacted] Ms [redacted] Mr [redacted] Mr [redacted]	▪ A17 Networks & Low Power/Emergency messaging discussion ▪ A17 OpenData timetable formats/dictionary discussion ▪ Review of CCTV coverage & issues ▪ Review of A17 non-R2P scope

Date	Organisation/Individual	Purpose of Meeting
22/09/2022	Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted]	▪ Review of A17 camera configurations ▪ On-Train visit, including: ○ CCTV trials ○ quacker trials ○ access & egress demo for NSWTL SMEs
	Mr [redacted]	▪ A08 Status discussion
23/09/202	Mr [redacted]	▪ A07 lighting comments workshop
	Mr [redacted]	▪ Configuration Items List discussion
26/09/2022	Mr [redacted] Mr [redacted] Ms [redacted]	▪ DAS/RMS comments and user interface workshop
	Mr [redacted]	▪ Review of ICE Radio type approval/testing ▪ Event Recorder comments discussion ▪ ASDO parameters discussion
	Mr [redacted]	▪ Quacker location discussion
	Ms [redacted] Mr [redacted]	▪ Train Control and Monitoring System (TCMS) Verification Procedure workshop
27/09/2022	Mr [redacted] Mr [redacted] Mr [redacted] Ms [redacted]	▪ Request for train access planning: ○ hearing loop test ○ external speakers test ○ crew buzzer/bell test ○ Operator Enable System (OEH/OEP) test ▪ A17 non-R2P DDR workshop ▪ CCTV- AIS interface discussion ▪ CCTV alerts/intercom mapping ▪ ICE Radio to R2P interface risk discussion
28/09/2022	Mr [redacted] Mr [redacted] Mr [redacted]	▪ A15 comments workshop ▪ TCMS controls review
	Mr [redacted] Mr [redacted] Mr [redacted]	▪ Hearing loop design history discussion
	Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted]	▪ On-Train testing: ○ hearing loop demonstrations ○ crew buzzer ○ passenger bodyside door cycling

Date	Organisation/Individual	Purpose of Meeting
29/09/2022	Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted]	▪ CCTV workshop at r2p office ○ demonstration of CCTV system ○ discussions on CCTV behavior and design decisions ○ strategy for DDR Technical Package submission
	Mr [redacted] Mr [redacted] Mr [redacted]	▪ ETCS type approval workshop ▪ ETCS test scope discussions ▪ ETCS test bench demonstration & TfNSW interactive
30/09/2022	Mr [redacted] Mr [redacted] Mr [redacted] Mr [redacted]	▪ Hearing loop discussions and next steps
	Mr [redacted] Mr [redacted] Mr [redacted]	▪ Review actions and discussion points ▪ Review and discuss A15/A17 Technical Package submissions ▪ Discuss potential future Sydney/Spain visits for DDR

Note: all individuals listed in the above table are from CAF unless otherwise specified.

Next steps

Following the trip, there are a number of actions and next steps to be completed by both the travellers and CAF:

- CAF engineers to capture sample footage from the external CCTV cameras with the correct lens installed
- CAF engineers to trial the agreed hearing loop options in order to try and optimize the design for usability and compliance
- CAF to formally submit Technical Package A15 to close out resolved comments
- CAF to provide draft documentation for Technical Package A17 for TfNSW to undertake an informal review to streamline the document review process
- CAF to arrange for workshops between TfNSW, CAF and r2p to further progress Passenger Information System and CCTV design
- RRP Technical Team to procure test equipment for hearing loop to provide independent validation and verification of the hearing loop design to ensure usability for the travelling public is maximised
- Approval process started for future visits to Spain for the RRP Technical Team to undertake testing and commissioning activities
- CAF to consider benefit of CAF engineers travelling to Australia to continue face-to-face workshops on topics including Passenger Information System, CCTV, etc.

Expense Summary

The actual costs incurred by Mr Linnenbank are summarised in the table below:

Breakdown of all costs incurred	Estimated Cost	Actual Cost
Airfares – GL 534030	$9,338.32	$7,410.32
Accommodation – GL 534040	$5,055.04	$5,355.33
Official hospitality – GL 534050	$0.00	$0.00
Attendance fees for delegates – GL 534050	$0.00	$0.00
Ground transport – GL 534050	$4,640.00	$30.19
Meals and refreshments – GL 534050		$845.36
Other miscellaneous costs – GL 534050		$31.67
Total	**$19,033.36**	**$13,672.87**

The estimated cost of Mr Linnenbank was noted in the approved Briefing Note as approximately $19,033.36. The discrepancy between the estimate and the actual costs incurred for accommodation is due to the need for emergency accommodation in Dallas, USA, which was a result of delays and missed connections.

The actual costs incurred by Messrs Chan and Padt through the Ricardo Rail Professional Services contract ISD-17-6880 are summarised in the table below:

Breakdown of all costs incurred	Estimated Cost	Actual Cost
Airfares	$18,676.64	$16,371.94
Per diem daily disbursement fee to cover accommodation, taxis, meals and other incidental costs	$6,176.00	$13,770.00
Total	**$24,852.64**	**$30,141.94**

The estimated cost for Messrs Chan and Padt was noted in the approved Briefing Note as approximately $24,852.64. The discrepancy between the estimate and the actual cost is due to an increase in contractual rates for the per diem daily disbursement fee that was enacted on 18 July 2019, after contract ISD-17-6880 was awarded (letter reference 6315133).

The total actual costs for all travellers incurred for the whole trip is tabulated below:

Traveller that incurred costs	Estimated Cost	Actual Cost
Mr Jake Linnenbank	$19,033.36	$13,672.87
Messrs John Chan and Shaun Padt	$24,852.64	$30,141.94
Total	**$43,886.00**	**$43,814.81**

Traveller endorsement

Jake Linnenbank Engineering Manager - Fleet Infrastructure and Place Date: 07/11/2022	**John Chan** Technical Advisor Infrastructure and Place Date: 07/11/2022	**Shaun Padt** Technical Advisor Infrastructure and Place Date: 07/11/2022
Rod Tippett Executive Director Infrastructure and Place Date: 10/10/2023	**Camilla Drover** Deputy Secretary Infrastructure and Place Date: 14/03/2023	**Rob Sharp** Secretary Noted Date: 15/03/2023

Attachments

Attachment	Title
A	Noteworthy photos from trip

Attachment A: Noteworthy photos from trip

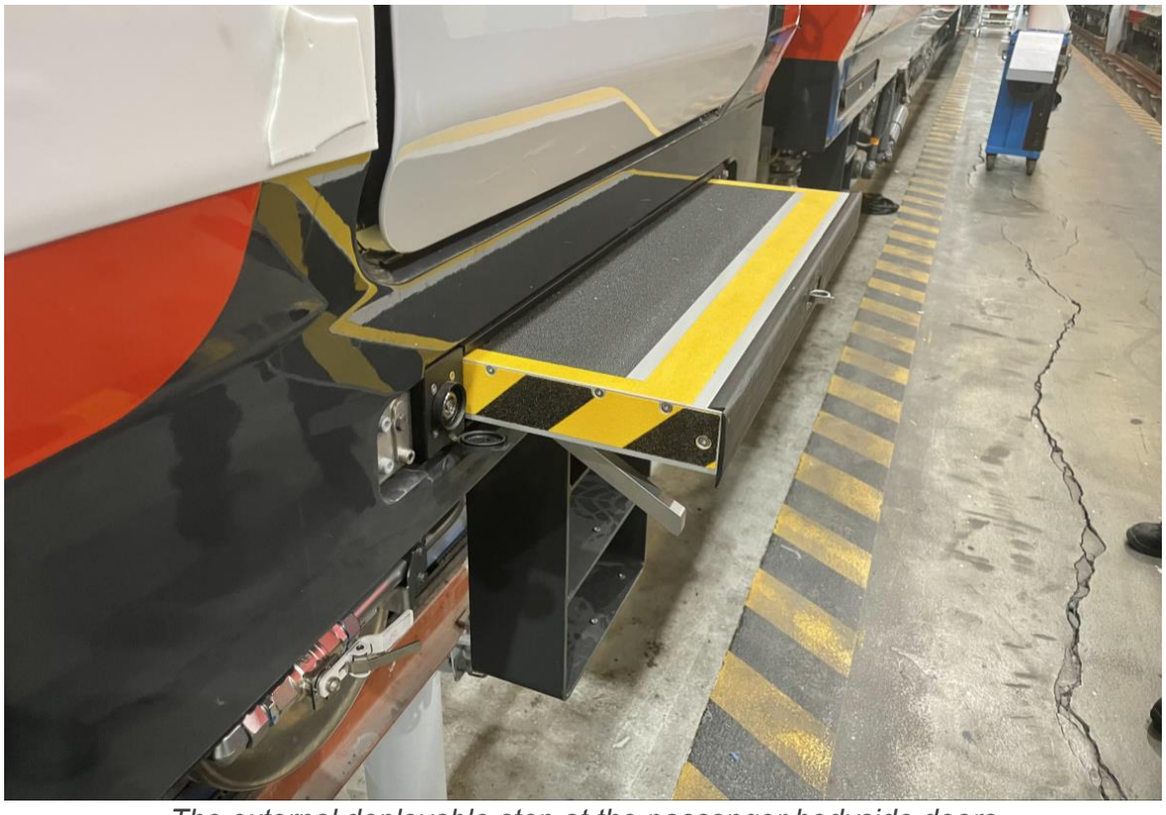
LR01 car being fitted out with interior panels and fixtures

LR01 car following interior panel and fixture fit out

LR02 undergoing wiring fit out

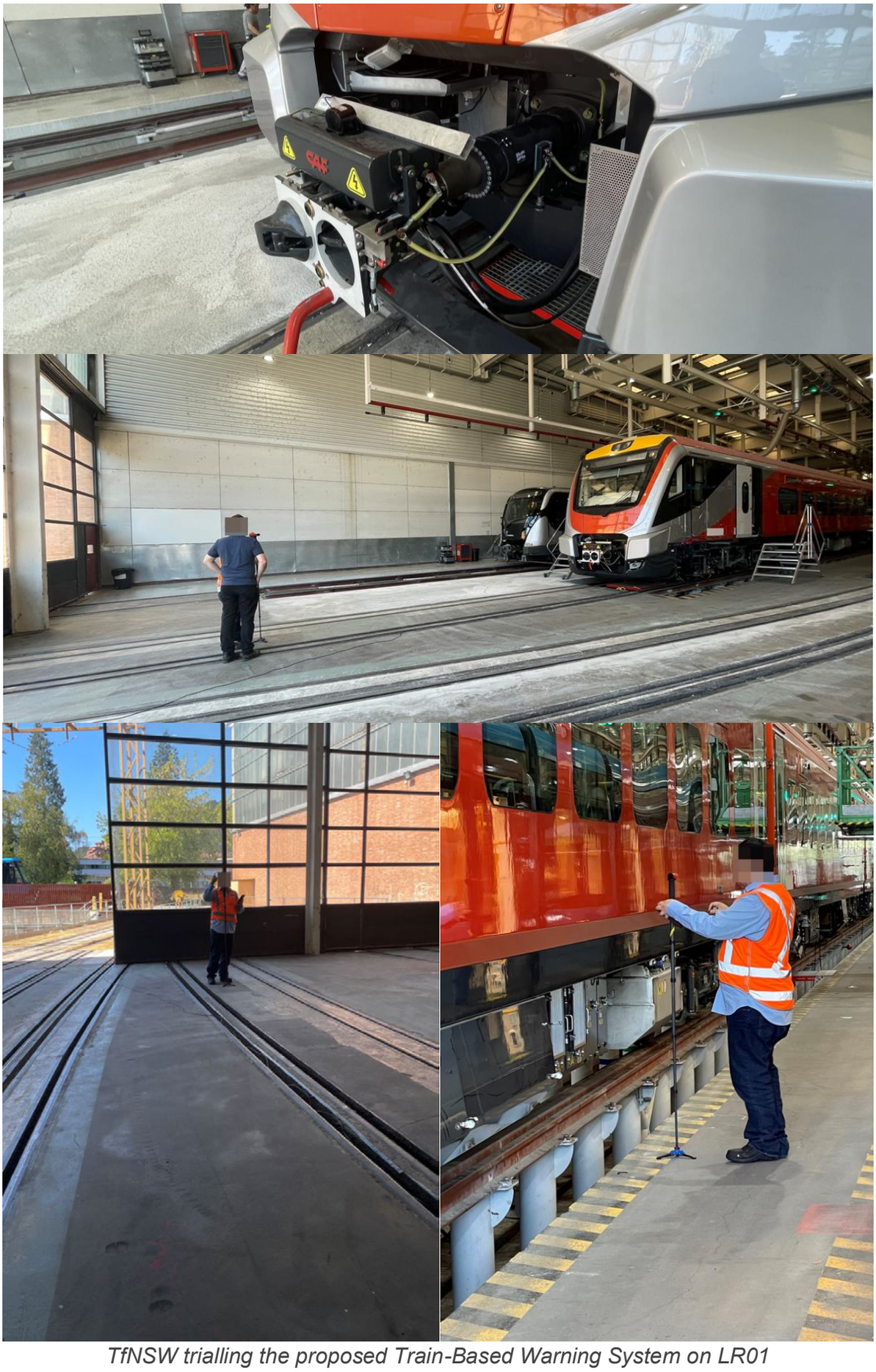
LR03 carbody waiting to undergo painting

TfNSW reviewing CCTV configurations on LR01 with CAF lead engineer and r2p

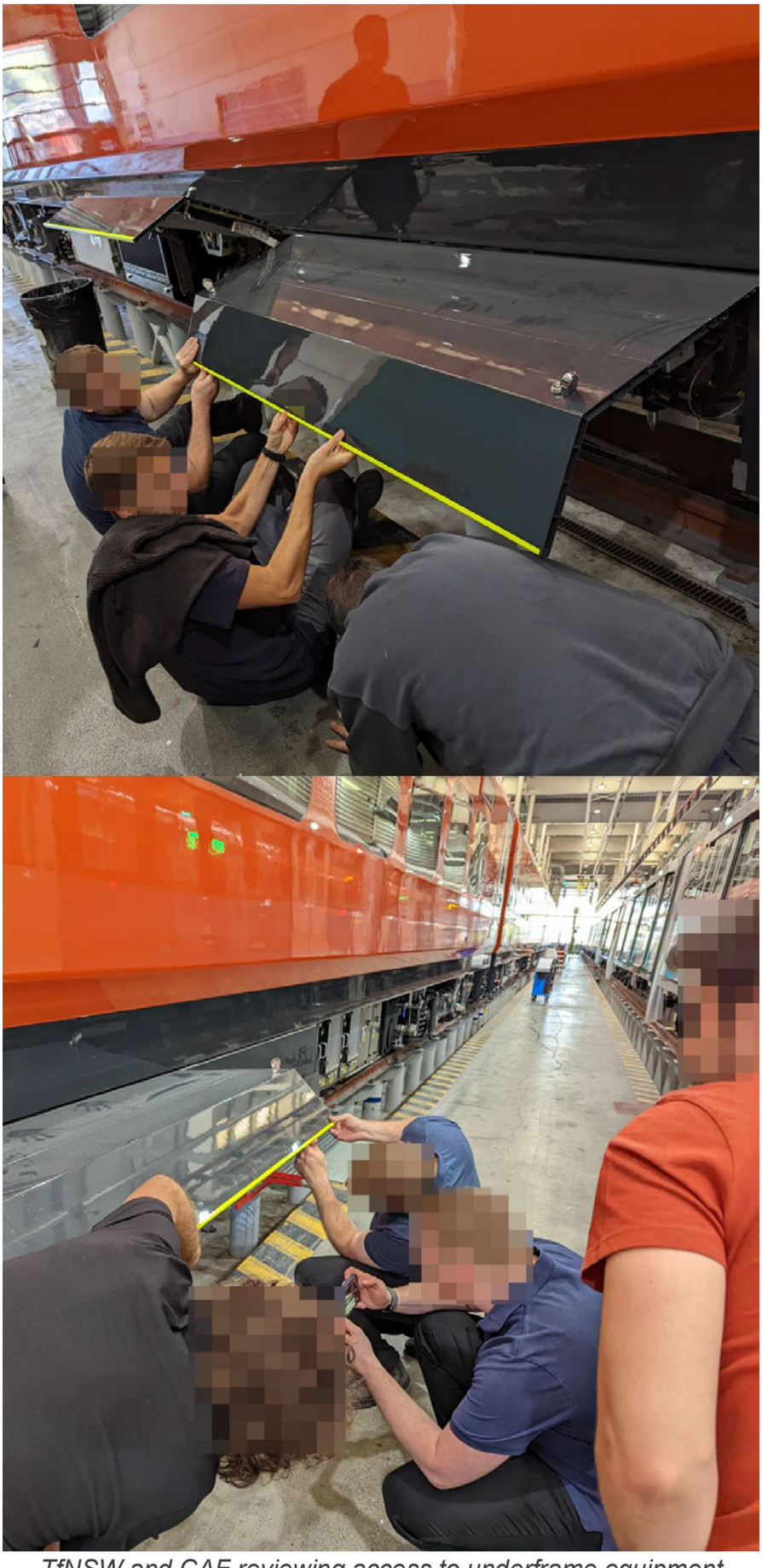


The external deployable step at the passenger bodyside doors

The crew workstation on LR01 undergoing modifications and testing



TfNSW trialling the proposed Train-Based Warning System on LR01



TfNSW and CAF reviewing access to underframe equipment

TfNSW and CAF reviewing the hearing loop installation on LR01

External view of LR01

The CAF electronics test bench to simulate and test the on-board systems

TfNSW and CAF reviewing the CCTV solution on the r2p test bench