SCHEDULE 6.2

TESTING

VERSION CONTROL

VERSION NUMBER	DATE	COMMENT
1.0	27 June 2018	Executed by the Parties

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APPENDIX 1 – OUTLINE TEST STRATEGY

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SCHEDULE 6.2 – TESTING

1. PURPOSE

1.1 This Schedule sets out the Testing Process for the relevant Deliverables (including the RTO System as a whole) in respect of:

1.1.1 the initial development of the RTO System;

1.1.2 each Roadmap Project and Innovation Project; and

1.1.3 each applicable Contract Change and Operational Change.

2. TEST STAGES

2.1 Unless TTL approves otherwise in writing, the Supplier shall ensure that the Testing Process shall conform with the following Test Stages where applicable:

2.1.1 **Unit & System Testing:** Testing of individual components when operating in isolation or a collection of components organised to accomplish a specific function or set of functions;

2.1.2 **Integration & End-to-end Testing:** Testing of the interoperability of a Deliverable in the context of connected, adjacent or related parts of the relevant Services or Roadmap Project or Innovation Project;

2.1.3 **Regression Testing:** Testing to demonstrate that the relevant Deliverable has not adversely affected the other Services or Roadmap Projects or Innovation Projects;

2.1.4 **Factory Acceptance Testing:** Testing, including load and performance testing, conducted at the Supplier Sites to determine whether or not a component or Deliverable meets the relevant agreed requirements for that component or Deliverable;

2.1.5 **User Acceptance Testing:** Testing to prove or demonstrate that a Deliverable meets the relevant agreed requirements from a User perspective;

2.1.6 **Interoperability Testing:** Testing to prove or demonstrate that a signed-off Deliverable meets the relevant agreed requirements by interacting with one or more specified external components;

2.1.7 **Site Acceptance Testing:** Testing to ensure successful transition such that each signed-off Deliverable can successfully be migrated with the relevant components;

2.1.8 **Service Operational Testing:** Testing to ensure that the Users who will operate Deliverables on a day to day basis are appropriately trained to carry out their tasks; and

2.1.9 **Service Readiness Testing:** Testing to ensure a signed-off Deliverable is supportable by the Supplier's Service Management functions in accordance with this Agreement; and

2.1.10 **Data Migration Testing:** Testing to ensure that legacy UTC/SCOOT System configuration data, which defines how to control and receive data from traffic control equipment, has been successfully migrated to the RTO System in accordance with the Migration Strategy.

3. TEST STRATEGY

3.1 The Outline Test Strategy is set out at Appendix 1.

3.2 The Supplier shall, in accordance with the timescales identified within Schedule 6.1 (Transition), submit the Test Strategy to TTL for Approval.

3.3 The Test Strategy shall be based on the Outline Test Strategy and shall set out:

3.3.1 the Testing approach in respect of:

(a) the initial development of the RTO System;

(b) each Roadmap Project and Innovation Project; and

(c) each applicable Contract Change and Operational Change;

3.3.2 the scope, objectives and assumptions of the different Testing approaches;

3.3.3 the Test methodologies to be used by the Supplier;

3.3.4 the Testing Process and controls;

3.3.5 the Testing lifecycle of the different Testing approaches which shall define what Testing is to be undertaken and why, including at least:

(a) details of the different Test Stages including entry and exit criteria;

(b) the Test types and techniques to be carried out by the Supplier, including what non-functional Testing is to be included (if any);

(c) the generic criteria upon which the specific Test Success Criteria in each Test Plan shall be based;

(d) the Test Environments;

(e) the Test Data strategy;

(f) the Test Tools and Test Assets (e.g. the use of stubs, simulators, automated test equipment, test management tools, etc.);

(g) the strategy for Test Issue Management;

(h) the Supplier Test organisation;

(i) Test design inputs and Test scripts;

(j) Test Deliverables;

(k) the number of Working Days following successful completion of a Test Stage (if any) within which any outstanding Test Issues will be resolved or an acceptable remediation plan be agreed with TTL;

(l) how the Testing will be managed and details of how/when/what information will be reported to TTL;

(m) Test measurement approach and Test process improvement;

(n) key risks and mitigation;

(o) the role of TTL and any dependencies the Supplier may have on TTL;

(p) the role (if any) of Other SITS Suppliers or Third Parties and any dependencies the Supplier may have; and

(q) how information will be communicated to TTL.

3.4 Inclusion of non-functional Testing shall be considered within the Test Strategy for all Test Stages. Where the Supplier determines that non-functional testing is not required, it shall document the rationale for this within the Test Strategy.

4. GENERAL TESTING PROCEDURES

4.1 The Supplier shall ensure that all Supplier Personnel involved in the delivery of Testing are suitably trained and qualified.

4.2 The following procedures shall apply to the Testing of Deliverables:

4.2.1 the Supplier shall conduct the Testing in accordance with the Test Strategy and the relevant Test Plan and the timescales specified therein;

4.2.2 the Supplier shall provide TTL with all reasonably necessary assistance and information in connection with the conduct of the Testing;

4.2.3 the Supplier shall undertake Tests in accordance with Good Industry Practice, the Standards and any agreed methods and processes identified in this Agreement;

4.2.4 where Other SITS Suppliers or Third Parties are involved in a Test, the Supplier shall provide them with all reasonable assistance and information in connection with the conduct of any such Tests; and

4.2.5 where the Supplier, in meeting its obligations under this Schedule, consults or otherwise directly works with Other SITS Suppliers or Third Parties, the Supplier shall provide TTL with reasonable visibility of such interaction.

4.3 Prior to the commencement of Testing, the Supplier shall conduct such activities as are necessary to ensure that the relevant Deliverable is ready for Testing, and shall, if required by the Test Strategy, demonstrate this to TTL in accordance with any entry criteria specified in the Test Strategy.

4.4 If required by the Test Strategy, the Supplier shall hold a formal Test readiness review to demonstrate to TTL that all of the entry criteria specified in the Test Strategy have been successfully met and that the Supplier is ready to start Testing. A formal written record of this review shall be provided to TTL within two (2) days following completion of the review.

4.5 If required by the Test Strategy, the Supplier shall hold formal Testing completion reviews to demonstrate to TTL that the exit criteria specified in the Test Strategy have been successfully completed and met. A formal written record of this review shall be provided to TTL within two (2) days following completion of the review.

4.6 All Testing shall be conducted in accordance with Schedule 2.4 (Security Management) where applicable.

4.7 The Supplier shall, during the conduct of any Tests, maintain an up-to-date record of all Test results, whether successful or unsuccessful, and shall provide TTL with access to the Test results on request.

4.8 The Supplier shall keep evidence of the Test results that failed or passed, and shall ensure all Tests are repeatable.

4.9 The Supplier shall provide a copy of any Test Reports to TTL for inspection by TTL in accordance with the relevant Test Plan.

4.10 The Supplier shall perform the following, as may be required in the relevant Test Plan:

4.10.1 provide evidence that the entry criteria for the required Test Stage (if any) specified in the Test Strategy has been met;

4.10.2 demonstrate to TTL that the Supplier has in place the necessary Supplier Personnel, accommodation, Test Environments, equipment, facilities and other resources to complete the Testing of the relevant Deliverables;

4.10.3 undertake the Test, or activities required in connection with the Test; and

4.10.4 provide reasonable notice of no less than twenty (20) Working Days to TTL of Test commencement so that, if necessary, TTL can arrange resources to witness the Test.

4.11 TTL reserves the right to require the Supplier to provide TTL with visibility during the Test Stages via read access to the Test Tools, and the Supplier shall take account of TTL's requirements in this respect when preparing the Test Plan.

4.12 The Supplier shall perform Regression Testing as necessary to demonstrate that the relevant Deliverables have no adverse impact on the RTO System, the Services and (where applicable) the relevant Roadmap Projects and Innovation Projects.

4.13 Unless agreed otherwise by TTL in writing, the Supplier shall at no additional cost to TTL provide and operate all equipment required for Testing, including without limitation the Test Tools, Test Environments and Test Assets necessary in order to perform its Test obligations.

5. AVAILABILITY OF TEST INFORMATION

5.1 The Supplier shall make available to TTL (either as required by the Test Strategy, or on request) all information produced for the purposes of Testing including:

5.1.1 the high level Test approach;

5.1.2 the Test Plan;

5.1.3 the Test specification;

5.1.4 the Test sequence;

5.1.5 the Test Data;

5.1.6 the Test scripts;

5.1.7 the Test Success Criteria and the expected results;

5.1.8 the actual results, including all Test Issue reports;

5.1.9 the Test Issue resolution plans;

5.1.10 the Test Environment configurations;

5.1.11 the configuration of elements passing through the Test (including which versions of what software and hardware are to be Tested in each Test);

5.1.12 the details and configurations of any Test Assets used;

5.1.13 written confirmation that the Test has been conducted in accordance with the relevant security requirements described in Schedule 2.4 (Security Management);

5.1.14 the Requirements Traceability Matrix for the purpose of demonstrating linkage between the Tests and TTL's functional and service management requirements;

5.1.15 the Test Report; and

5.1.16 the Test Certificate.

6. TEST MANAGEMENT

6.1 The Supplier shall notify TTL of its Test Manager as soon as practicable and in any event prior to the Achievement of Milestone MS1.

6.2 The Supplier shall ensure that the Test Manager is responsible for managing the Supplier's obligations under this Schedule. This includes:

6.2.1 coordinating the development and Approval of the:

(a) Test Strategy;

(b) Test Plans;

(c) Test specifications; and

(d) Test Reports;

6.2.2 coordinating the implementation of all Tests and their execution; and

6.2.3 monitoring and reporting on the progress of all Tests in accordance with this Schedule.

7. TEST PLANS

7.1 The Supplier shall provide to TTL for Approval the Test Plan for:

7.1.1 the initial development of the RTO System; and

7.1.2 each Roadmap Project, Innovation Project and, where applicable, each Contract Change and Operational Change at the time the arrangements for the relevant Roadmap Project, Innovation Project, Contract Change or Operational Change are agreed in accordance with this Agreement.

7.2 Each Test Plan shall set out (or justify any reasons for not setting out):

7.2.1 the relevant Test definition and the purpose of the Test, the Deliverables to which it relates, the scope of requirements being Tested and, for each Test, the specific Test Success Criteria to be satisfied;

7.2.2 a detailed procedure for the Tests to be carried out encompassing:

(a) the timetable for the Tests, including start and end dates;

(b) the Testing mechanism;

(c) the dates and methods by which TTL can inspect Test results or witness the Tests in order to establish that the Test Success Criteria have been met;

(d) the Test scripts, including a detailed procedure for the Tests to be carried out;

(e) the specification of the required Test Data, including its source, scope, volume and management, a request (if applicable) for relevant Test Data to be provided by TTL, and the extent to which it is equivalent to TTL Data;

(f) the Test Environment(s) to be provided and utilised;

(g) the mechanism for ensuring the quality, completeness and relevance of the Tests;

(h) the format and an example of a Test Report;

(i) the process which TTL will use to review Test Issues and the Supplier's progress in resolving these in a timely basis;

(j) the Test schedule;

(k) the re-Test procedure, the timetable and the resources which would be required for re-Testing;

(l) the process for escalating unresolved Test Issues;

(m) any additional TTL requirements to be Tested; and

(n) Test resources.

7.3 The Supplier shall ensure that each Test Plan is proportionate and appropriate to the nature of the Deliverables being Tested. As such, the Supplier shall consult with TTL, Other SITS Suppliers and Third Parties that may be involved in the Testing regarding the preparation of the relevant Test Plan. In particular, the Supplier shall consult regarding the acceptability and relevance of the proposed scope, duration and timing of the Tests, the proposed Test Stages (if any), the proposed sources of Test Data, the Test Environments and any proposed TTL, Other SITS Supplier or Third Party responsibilities in preparing for, monitoring or undertaking the Tests.

7.4 TTL reserves the right to create and conduct its own tests within the Testing Process, including developing associated test specifications and directly managing such tests, and TTL may consult the Supplier in regards to such tests. The Supplier shall take account of TTL's requirements in this respect when preparing the Test Plan and allocate the necessary resources and time, and shall include this additional scope within the entry criteria and exit criteria in the Test Strategy.

7.5 TTL reserves the right to provide Test Data for use within a Test. The Supplier shall consider and comply with any of TTL's reasonable requirements in this respect when preparing the Test Plan, and shall allocate the necessary resources and time to achieve this.

7.6 The Supplier shall provide all other Test Data that is required to allow the Test to be performed, and shall ensure that such Test Data is both relevant and adequate for the purposes of the Tests for which it is being used. The Supplier (or TTL where it has supplied the Test Data) shall ensure that the proposed sources and use of Test Data would cause neither the Supplier nor TTL to breach any of its applicable obligations under the Data

Protection Laws. In particular, the Supplier shall not use any TTL Data for Test purposes without TTL's prior written consent.

7.7 The Supplier shall ensure that to the extent reasonably possible, the Tests set out in the relevant Test Strategies and Test Plans are designed in such a way as to minimise any potential disruption to TTL and the Users.

7.8 In planning the Tests the Supplier shall consider and agree with TTL what Other SITS Supplier or Third Party involvement is appropriate. The Supplier shall consult with such Other SITS Suppliers or Third Parties regarding the planning of Tests accordingly.

7.9 The Testing shall not deviate from previously Approved Testing document unless agreed in advance by TTL in writing.

8. TEST WITNESSING, TEST REPORTING, TEST ISSUES, TEST SUCCESS AND TEST FAILURE

8.1 Test Witnessing

8.1.1 TTL may, in its sole discretion, require the attendance at any Test of one (1) or more Test Witnesses, each of whom shall have appropriate skills to fulfil the role of a Test Witness.

8.1.2 The Supplier shall give the Test Witness access to documentation and Test Environments reasonably necessary and requested by the Test Witnesses to perform their role as a Test Witness in respect of the relevant Tests.

8.1.3 The Test Witness:

(a) may review the Test documentation;

(b) may attend and engage in the performance of the Tests so as to enable TTL to gain an informed view of whether a Test Issue may be closed or whether the relevant element of the Test should be re-Tested;

(c) shall not be involved in the execution of any Test;

(d) may be required to verify that the Supplier conducted the Tests in accordance with the Test Success Criteria and the relevant Test Plan and Test specification;

(e) may produce and deliver their own, independent reports on the Testing, which may be used by TTL when determining if it is Assured that the applicable Test Success Criteria have been met;

(f) may raise Test Issues on the Test Issue Management Log in respect of any Testing; and

(g) may require the Supplier to demonstrate the modifications made to any Deliverable before a Test Issue is closed.

8.2 Test Reporting

8.2.1 The Supplier shall run the Tests as defined by the relevant Test Plan and shall provide to TTL in relation to each Test:

(a) a progress Test Report not less than two (2) Working Days (or such other period as the Parties may agree in writing) prior to the date on which the Testing is planned to end; and

(b) the final Test Report within five (5) Working Days (or such other period as the Parties may agree in writing) of completion of Testing.

8.2.2 Each Test Report shall report on the Testing conducted in respect of a Deliverable, including:

(a) an overview of the Tests conducted;

(b) identification of the relevant Test Success Criteria that have been satisfied;

(c) identification of the relevant Test Success Criteria that have not been satisfied together with the Supplier's explanation of why those criteria have not been met;

(d) the Tests that were not completed together with the Supplier's explanation of why those Tests were not completed; and

(e) the specification for any Test Environments used throughout the Tests and any changes that were applied to that Test Environment during the Tests.

8.3 **Test Issues**

8.3.1 The Test Manager shall document all Test Issues encountered during the Tests, and shall categorise each Test Issue as one of the following:

Test Severity Levels	**Severity Definition**
Test Severity Level 1	The failure causes a non-recoverable condition where it is not possible to continue using a component (or components) of the Deliverable being Tested and which results (or will result) in a severe impact to the performance of the Services or relevant Roadmap Projects or Innovation Projects for which no satisfactory workaround exists.
Test Severity Level 2	The failure causes major impairment to one or more component of the Deliverable being Tested, or causes (or will cause) a major impairment to one or more critical Services or Roadmap Projects or Innovation Projects irrespective of whether a workaround exists; or the failure causes (or will cause) major impairment to one or more non-critical Services or Roadmap Projects or Innovation Projects for which a satisfactory workaround does not exist.
Test Severity Level 3	The failure causes minor impairment to one or more component of the Deliverable being tested, or causes (or will cause) a minor impairment of one or more critical Services or Roadmap Projects or Innovation Projects irrespective of whether a workaround exists; or the failure causes (or will cause) a major impairment to one or more non-critical Services or Roadmap Projects or Innovation Projects for which a satisfactory workaround does exist.
Test Severity Level 4	The failure is a cosmetic inconvenience / annoyance such that it does not (or will not) hinder TTL's ability to carry out business functions or decrease its productivity.

8.3.2 Prior to the commencement of each Test Stage, TTL shall determine the Test Issue Thresholds for that Test Stage, which shall be no greater than:

(a) zero (0) Test Severity Level 1 Test Issues;

(b) zero (0) Test Severity Level 2 Test Issues; and

(c) Test Severity Level 3 Test Issues and Test Severity Level 4 Test Issues at the relevant Test Issue Threshold.

8.3.3 As part of the Testing of Deliverables the Supplier shall be responsible for setting-up and maintaining the Test Issue Management Log and process.

8.3.4 The Supplier shall be responsible for updating the Test Issue Management Log, in respect of the Test Stage (if any) that is being managed, and for ensuring that its contents accurately represent the current status of each Test Issue at all times. The Supplier shall make the Test Issue Management Log available to TTL on request in any format reasonably requested by TTL.

8.3.5 The Test Manager shall categorise each Test Issue according to the Test Severity Levels set out in paragraph 8.3.1 and shall notify TTL of such categorisation. If TTL does not agree with such categorisation TTL may, acting reasonably, require the Supplier to re-categorise Test Issues into different Test Severity Levels.

8.3.6 The Test Manager shall analyse and attempt to resolve each Test Issue according to the Test Issue Management and Test Strategy procedures (as included within the Test Strategy).

8.3.7 A Test Stage shall be recorded as successful if, having completed all the planned Tests, the number of Test Issues unresolved at the end of the relevant Test Stage does not exceed the Test Issue Thresholds for that Test Stage.

8.3.8 Unless otherwise agreed between TTL and the Supplier, a condition of commencing a Test Stage shall be that any and all preceding Test Stages for the Deliverable were successful, including that the number of unresolved Test Issues did not exceed the Test Issue Thresholds for any preceding Test Stage.

8.3.9 Where Test Issues remain unresolved at the end of any Test Stage period, but the Test Issue Threshold for that Test Stage has not been exceeded, such Test Issues shall carry forward into the next required Test Stage and if still unresolved count towards the Test Issue Thresholds in that next Test Stage (or be reclassified where a different Test Severity Level applies).

8.4 Test Success

8.4.1 Once the Supplier believes that the applicable Test Success Criteria are met for a Test Stage and there are no outstanding Test Issues in excess of the applicable Test Issue Threshold, the Supplier shall issue to TTL a Test Certificate together with the relevant Test Report and any other information required by the relevant Test Strategy. TTL shall promptly countersign the Test Certificate if it agrees with its content.

8.4.2 If there are any Test Issues outstanding when TTL countersigns the Test Certificate pursuant to paragraph 8.4.1 that do not exceed the applicable Test Issue Threshold, the Supplier shall resolve such Test Issues in accordance with the timescale specified in the relevant Test Issues resolution plan if approved by TTL.

8.5 **Test Failure**

8.5.1 If the Supplier issues a Test Certificate under paragraph 8.4.1, TTL shall promptly notify the Supplier in writing if:

(a) there are outstanding Test Issues which in TTL's reasonable opinion are in excess of the applicable Test Issue Threshold; or

(b) there are outstanding Test Issues which do not exceed the applicable Test Issue Threshold, but in respect of which TTL reasonably considers that the outstanding Test Issues will not be resolved in accordance with the resolution plan appended to the Test Certificate,

and without prejudice to any other rights and remedies TTL has under this Agreement (including in relation to Delay and the Achievement of Milestones):

(c) the Parties shall promptly meet to discuss the status of the Test Certificate and, acting reasonably, agree next steps; and

(d) TfL shall be entitled to recover from the Supplier any reasonable additional costs it may incur as a direct result of further review or re-Testing undertaken to resolve any Test Issue.

APPENDIX 1 – OUTLINE TEST STRATEGY

REDACTED

APPENDIX 2 – TEST CERTIFICATE

To: Transport Trading Limited

FROM: Siemens Mobility Limited

[***Date***]

Dear Sirs,

TEST CERTIFICATE

Deliverable(s): [*insert description*]

We refer to the agreement relating to the provision of the RTO System and related services between Transport Trading Limited and Siemens Mobility Limited dated [***date***] (the **Agreement**).

Capitalised terms used in this certificate have the meanings given to them in Schedule 1 (Definitions) or Schedule 6.4 (Testing) of the Agreement.

We confirm that the Deliverables listed above have been Tested successfully in accordance with the Test Plan relevant to those Deliverables.

There are no outstanding Test Issues *__OR__ This Test Certificate is issued on the condition that any Test Issues are remedied in accordance with the Test Issues resolution plan attached to this certificate. *

**delete as appropriate*

Yours faithfully

[***Name***]

[***Position***]

acting on behalf of Siemens Mobility Limited

Assured by :

[***Name***]

[***Position***]

acting on behalf of Transport Trading Limited