RTGE Joint Venture

CONTEMPLATED CHANGE NOTICE

Project Name: Ottawa Light Rail Transit - Confederation Line	Project Number: OILC-11-00-P006

Date	8-Jan-16	
Originator of Variation	OLRTC	**CCN-0087R3**
Variation Enquiry/Variation Directive Number	N/A	
Contemplated Change Notice Number	CCN-0087	
Contemplated Change Notice Revision Number	3	

Reason for Variation

The agreement between the EJV and OLRTC requires the engineering design and technical specifications to be developed by the EJV and testing & commissioning procedures to be developed by OLRTC. OLRTC have requested the EJV to assume the responsibility for generating the required integration test procedures for the Systems under the scope of the EJV. This CCN provides an outline and lump sum costing for OLRTC consideration.

Contractual Rationale for CCN

Schedule 14, Section 1.6 of the Project Agreement. Identification of required test procedures, and evidence of engineering design compliance.

Description/Scope of Variation

1. Scope Item #1.
Identify the required tests to demonstrate successful integration and subsequently produce the test protocols/procedures for execution by the OLRTC.
1.1 Test Procedure Development.
RTGEJV will develop integration testing processes and procedures that will need to be completed prior to operational testing or trial running on the network for revenue service. This will be completed by developing an integration matrix that shows the integration connections between system components.

Vehicle and Signaling tests are not included. FAI, FAT, SAT, PICO will be the responsibility of others. The scope excludes preparation of test plans. The team will only review these for consistency and accuracy.

2. Scope Item #2.
Ensure the Project Agreement (PA) Design requirements contained within the DOORs database have been included into the Engineering design and to indicate evidence of compliance where found.
2.1 Requirements Analysis
Many of the requirements of the OLRT subsystems have already been captured in DOORS. RTGEJV will review the repository and identify any gaps.

Vehicle, signalling, architectural and any other non-systems elements are not included in this scope.

The following activities are currently foreseen to start the project.
1) Validation of SIT program
1.1) Identify all systems on the OLRT project;
1.2) Gather T&C documentation (T&P plan, Project Agreement, Procurement Plan and other relevant documents) and perform gap analysis. For each sub system identify all the test procedures that need to be in place including Integration tests; Derive and develop list of integration tests from the Interface Matrix. Generate an Interface Matrix and Work Breakdown Structure (WBS) if not in place for all subsystems and identify interfaces in detail; (e.g., OCS with vehicle Pantograph). Modify the list of integration tests as required. A preliminary list of integration points has been compiled per Attachment A.

2) Test Procedure Production
2.1) For each test procedure generate a synopsis and outline;
2.2) Generate test procedure;

3) Compliance Matrix Completion
3.1) Gap Analysis - Review and identify gaps in the requirements database; Note:Closing of Gaps is assumed to be the responsability of RTGEJV.
3.2) Review the existing captured requirements in DOORS;
3.3) Record evidence of design compliance through coordination with OLRTC and RTGEJV systems team, QA and other stakeholders as required.

PLEASE NOTE: THAT NO WORK WILL COMMMENCE UNTIL SUCH TIME AS THIS CCN HAS BEEN APPROVED BY OLRTC.

List of Drawings, Sketches and Specifications (if applicable)

An initial list of tests is attached to this CCN. This may evolve as we complete our gap analysis. 141 integration tests have been listed but a number may be combined into one or more test procedures and currently it is estimated that approximately 75-100 procedures will be required.

Systems to be Commissioned:
The latest review indicates that two categories of equipment have been identified in Schedule 14, sections 1.8 and 1.9. These are:
a) Light Rail Systems and Vehicles to be Commissioned:
1) Traction Power System;
2) Revenue Vehicles;
3) Non Revenue Vehicles;
4) Train Control Systems;
5) Communication system;
6) YCC/BCC and TSCC;
7) Corrosion control system;
8) Tracks;
9) OCS.

b) Guideway and Building Systems to be Commissioned:
1) SCADA system;
2) Maintenance equipment systems;
3) Site development;
4) Building envelope;
5) Elevators and escalators;
6) Fire protection systems;
7) Plumbing systems;
8) HVAC systems;
9) Building automation systems;
10) Electrical systems;
11) Security and safety systems;
12) Communication systems (excluding radio system);
13) CCTV;
14) Interfaces with buildings connected to OLRT stations;
15) Passenger information systems; and
16) Intrusion detection systems.

This CCN only considers items 1.8 and 1.9 of Schedule 14 which are considered "System" elements and not architectural (e.g., elevators and escalators).
The type of tests required for commissioning are:
a) Factory Acceptance Tests (FAT)
b) Post Installation Check Outs (PICO)
c) Site Acceptance Tests (SAT)
d) Subsystem Integration Tests (SSIT)
e) System Integration Tests (SIT)

The pricing includes SIT's and specific SAT's related to tunnel ventilation and traction power supply. Further review may indicate that other procedures are required for SAT and SSIT, but at this point it is assumed that OLRTC have required suppliers to provide these directly in the procurement documents. Identification of missing tests will be form part of task 3.4 a) below.
It should also be noted that Trial Running Tests are not included in this analysis. It is assumed that OLRTC will develop and execute that program as indicated in Schedule 14 of the Project Agreement.

Schedule Impact

RTGEJV propose to deliver the program using the following steps:
a) Form a Project Team;
b) Hold a kick off meeting to confirm scope, direction and first pass of available information;
c) Proceed through executing the steps of Gap Analysis, Test Procedure Production and DOORS database population for the systems identified in the "Systems to be Commissioned" described above
d) Issue the integration protocols;
e) Issue Compliance Matrix populated with available information from OLRTC and suppliers where necessary;
f) Handover to the OLRTC management team.

Impact on Other Disciplines and Team Members
None.

Assumptions
In order to prepare this CCN, a number of project assumptions have been taken in order to solidify a defined direction and cost.
These project assumptions are the following:
• Documentation for infrastructure and wayside elements for design, construction and test conformance as well as other related information is readily available and expeditiously provided by OLRTC and / or their suppliers.
• The OLRTC Management Team will fully support and participate in the execution of this work.
• The Scope of work planned consists of an initial gap analysis phase followed by preparation of test procedures and population of the DOORS database. For the purposes of estimating the price, it is assumed that 75-100 new test protocols/procedures (Approx 140 test cases per Appendix A) of various complexity would be required.
• No work will commence until such time as this CCN has been approved by OLRTC.
• We understand that vehicle on-track testing will commence on or about August 2016. In order to meet this date, the approval of this CCN is required by October 5th 2015. Project is anticipated to be approximately 8 months in duration.
• As a priority test procedures will be produced to meet the needs the Vehicle on-track testing in Segment 4 & 5 and the MSF.
• It is anticipated that each test to take 2 weeks to develop and approve on average.
• The project system support & review staff will be taking part in the reviewing and approval of all test plans and procedures following their production.
• Since the kick off meeting has been held and the scope confirmed this price is now a lump sum.
• The document "RTGEJV CCN-0087 Clarifications" forms part of this CCN.

RTGEJV Cost Estimate

Name	Std. Category Description	Company	Hourly Rate	Hours	Fees
Project Management					
Dominique Quesnel	Design Manager	MMM	$210.00	80	$16,800.00
Christine Bergsma	Project Manager	MMM	$155.00	16	$2,480.00
Clive Packham	Manager	SNC-Lavalin	$155.00	512	$79,360.00
					$0.00
Test Plan Development Team					$0.00
Peter Taslimi	Senior Project Manager	SNC-Lavalin	$210.00	200	$42,000.00
Bill Williams	Senior Project Manager	SNC-Lavalin	$210.00	552	$115,920.00
Yosi Grunberg	Senior Specialist	SNC-Lavalin	$185.00	840	$155,400.00
Fredrick Adlhoch	Professional	SNC-Lavalin	$110.00	940	$103,400.00
Arya Rais-Firouz	Professional	SNC-Lavalin	$110.00	520	$57,200.00
Richard Catlaw	Senior Specialist	SNC-Lavalin	$210.00	520	$109,200.00
Richard Duncan	Senior Specialist	SNC-Lavalin	$185.00	840	$155,400.00
Michael Markoulakis	Professional	SNC-Lavalin	$110.00	940	$103,400.00
Andrew Grainger	Senior Specialist	SNC-Lavalin	$200.00	680	$136,000.00
Manny Salem	Senior Specialist	SNC-Lavalin	$185.00	360	$66,600.00
John Jelley	Project Manager	SNC-Lavalin	$155.00	360	$55,800.00
Systems, M&E Support & Review					
Keith Brown	Manager	SNC-Lavalin	$210.00	256	$53,760.00
Melissa Duckham	Senior Specialist	SNC-Lavalin	$185.00	256	$47,360.00
Phil Lee	Manager	SNC-Lavalin	$155.00	256	$39,680.00
Kevin Voxey	Manager	SNC-Lavalin	$155.00	256	$39,680.00
Hugh Collins	Manager	SNC-Lavalin	$155.00	128	$19,840.00
Christine Blair	Professional	SNC-Lavalin	$110.00	128	$14,080.00
Roman Trochanowski	Manager	MMM	$155.00	128	$19,840.00
Sam Waterman	Senior Specialist	MMM	$185.00	128	$23,680.00
Test & Commissioning					
Mohan Ghangus	Senior Specialist	SNC-Lavalin	$185.00	160	$29,600.00
Subtotal RTGEJV				**9,056.00**	**$1,486,480.00**

Team Member Cost Estimate

Name	Position	Company	Hourly Rate	Hours	Fees
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
Subtotal Team Member(s)					**$0.00**

Mark-up on Team Member(s) (5%)	$0.00
Subtotal Team Member(s) (incl. mark-up)	$0.00
Subtotal RTGEJV + Team Member	$1,486,480.00
HST (13%)	$193,242.40
Total	$1,679,722.40

RTGEJV Design Manager Review

	OLRTC Authorization
Date _____	
Design Manager signature _____	
RTGEJV Approval	**OLRTC Authorization**
Date __2016-01-14_____	Proceed with Variation (Yes/No/Hold)
RTGEJV Deputy Design Manager signature _____	
Date __2016-01-14_____	Date _____
RTGEJV Design Manager signature_____	OLRTC Technical Director signature

Attachment A - Preliminary List of Integration Tests
Rev: 1

Column headers (diagonal): Tunney's Pasture | Bayview | Pimisi | Lyon | Parliament | Rideau | UOttawa | Lees | Hurdman | Tremblay | St Laurent | Cyrville | Blair | MSF | TSCC | Transit Law | Systemwide

Traction Power System
- Traction Power System - Revenue vehicle
- Traction Power Stinger - Revenue vehicle
- Traction Power System - Non-Revenue Vehicles -
- TP Substation - TP Substation (Transfer Trip)
- Traction Power System - OCS
- Traction Power - Stray Current Monitoring System
- Traction Power System - SCADA System
- Traction Power Substation - CTS
- Traction Power substation - Telephony
- Traction Power Substation - IAC
- Traction Power Substation - FDAS
- Traction Power - Power Trip

Revenue Vehicles
- Revenue Vehicle - Guideway (Gauge, Clearances, etc.)
- Revenue Vehicle - Non-Revenue Vehicles
- Revenue Vehicle - Train Control System (multiple tests.)
- Revenue Vehicle - Communication system
- Revenue Vehicle - City P25 radio
- Revenue Vehicle - HSDR
- Revenue Vehicle - Passenger Counting System
- Revenue Vehicle - YCC/BCC and TSCC
- Revenue Vehicle - OCS
- Revenue Vehicle - SCADA System
- Revenue Vehicle - CCTV (onboard)
- Revenue Vehicle - CCTV (wayside)
- Revenue Vehicle - Passenger Information System (onboard)
- Revenue Vehicle - Guideway/Portal Intrusion Detection System

Non-Revenue Vehicles (Tow Vehicles ?)
- Non-Revenue Vehicles - Guideway (Guage, Clearances, etc.)
- Non-Revenue Vehicles - Train Control System
- Non-Revenue Vehicles - Communication system;
- Non-Revenue Vehicle - City P25 radio
- Non-Revenue Vehicles - YCC/BCC and TSCC
- Non-Revenue Vehicles - OCS
- Non-Revenue Vehicles - Communication systems (excluding radio system)
- Non-Revenue Vehicles - Passenger information systems
- Non-Revenue Vehicles - Guideway/Portal Intrusion Detection System

Train Control Systems
- CBTC - Guideway (chainage, etc.)
- CBTC - Trackside (Switch machines, track circuits, etc.)
- CBTC - Wayside (WRUs, Signals, etc.)
- CBTC - Tunnel ventilation
- CBTC - SCADA
- CBTC - ATIS
- CBTC - PMS (or whatever acronym RTM are using)
- CBTC - Video Walls
- CBTC - GIDS/PIDS
- CBTC - Fibre network
- CBTC - ESB Buttons
- CBTC - MSF Building doors
- Corrosion control system-Train Control Systems;

Communication Systems
- SCADA - Passenger Information System
- SCADA - CCTV
- SCADA - IAC
- SCADA - BMS
- SCADA - ATIS
- SCADA - Video Wall
- SCADA - Tunnel Ventilation
- SCADA - PMS (or whatever acronym RTM are using)
- SCADA - GIDS
- SCADA - PIDS
- SCADA - Station/MSF Facilities
- SCADA - OC Transpo Faregates
- CCTV - Video Walls
- CCTV - Portal Intrusion
- CCTV - Stations / MSF
- CCTV - FCP
- Telephone - SCADA
- Telephone - Station / MSF
- Telephone - OC Transpo PABX
- FDAS Telephone - Tunnel
- HFI Telephones - Yard
- IAC - Station /MSF Doors, gates and entrances/exits
- CTS - SCADA
- CTS - CCTV
- CTS - IAC
- CTS - PIS
- CTS - OC Transpo Corporate Network
- CTS - OC Transpo Fare Gate Network (VPN tests)
- PIS - Stations /MSF
- PIS - FDAS

Attachment A - Preliminary List of Integration Tests
Rev: 1

	Tunney's Pasture	Bayview	Pimisi	Lyon	Parliament	Rideau	UOttawa	Lees	Hurdman	Tremblay	St Laurent	Cyrville	Blair	MSF	TSCC	Transit Law	Systemwide
FDAS																	
FDAS - Fibre Network																	
FDAS - Station / MSF Facilities																	
FDAS - OC Transpo Faregates																	
FDAS - 3rd Party buildings																	
FDAS - Gas suppression																	
YCC/BCC/TSCC																	
YCC/BCC - CBTC																	
TSCC - CBTC																	
YCC/BCC - SCADA																	
TSCC - SCADA																	
YCC/BCC - CCTV																	
TSCC - CCTV																	
Transit Law - CCTV																	
YCC/BCC - IAC																	
TSCC - IAC																	
Transit Law - IAC																	
Transit Law - Emergency Telephones																	
YCC/BCC - FDAS																	
TSCC - FDAS																	
Transit Law - FDAS																	
YCC/BCC - PIS																	
TSCC - PIS																	
Transit Law - PIS																	
YCC/BCC - Millwork																	
TSCC - Millwork																	
Transit Law - Millwork																	
Corrosion control system-YCC/BCC and TSCC;																	
Tracks/ Guideway																	
Tracks - Traction Power (NSF, IJs, etc.)																	
Tracks - Level crossings																	
Guideway - Operational Signage																	
Guideway - Drainage																	
Overhead Catenary System																	
OCS - Revenue Vehicle																	
OCS - MSF Work platforms																	
Tunnel Ventilation																	
Tunnel Ventilation - Station Doors																	
Tunnel Ventilation - Tunnel Ventilation																	
Tunnel Ventilation FCP- Station FCP																	
Station Facilities																	
Station - UPS																	
Station - Fire Protection and Suppression																	
Station - Vertical Transporattion																	
Station - Wayfinding Signage																	
Station - Doors/Grills, etc																	
Station - Hydro Ottawa power (incl. changeovers)																	
Station - Lighting (Normal and Emergency)																	
Station - Headhouses in 3rd Party buildings																	
Station - Environmental management systems (HVAC, buidling water, drainage, etc.)																	
MSF Facilities																	
MSF - UPS																	
MSF - Generator																	
MSF - Fire Protection and Suppression																	
MSF - Vertical Transporattion																	
MSF - Wayfinding Signage																	
MSF - Doors/Grills, gates, etc																	
MSF - Hydro Ottawa power (incl. changeovers)																	
MSF - Lighting (Normal and Emergency)																	
MSF - Environmental management systems (HVAC, buidling water, drainage, etc.)																	
MSF - Operational Signage																	
MSF - Car wash																	
MSF - Sanding system																	
MSF - Wheel lathe																	
MSF - Cranes																	
MSF - Jacking Systems																	
MSF - Bogey press																	
MSF - MOW																	
MSF - Car cleaning facilities																	
MSF - Workshops																	

Total   141

RTGEJV - CCN-0087
Clarification to Information that is Contained in CCN-0087

The following is an update / clarification to the scope of work defined in the above referenced CCN identified by the sections highlighted in yellow.

Description / Scope of Variation:

1. Scope Item #1.

Identify the required tests to demonstrate successful integration and subsequently produce the test protocols/procedures for execution by the OLRTC.

1.1 Test Procedure Development

RTGEJV will develop integration testing processes and procedures that will need to be completed prior to operational testing or trial running on the network for revenue service. This will be completed by developing an integration matrix that shows the integration connections between system components.

Vehicle and Signaling tests are not included. FAI, FAT, SAT, PICO will be the responsibility of others with the exception of those listed in the Exceptions & Clarification section below. The scope excludes preparation of test plans. The team will only review these for consistency and accuracy.

2. Scope Item #2.

Ensure the Project Agreement (PA) Design requirements contained within the DOORs database have been included into the Engineering design and to indicate evidence of compliance where found.

2.1 Requirements Analysis

Many of the requirements of the OLRT subsystems have already been captured in DOORS. RTGEJV will review the repository and identify any gaps.

Vehicle, signaling, architectural and any other non-systems elements are not included in this scope with the exception of those listed in the Exceptions & Clarification section below. For the non-system elements RTGEJV will submit a separate CCN.

The following activities are currently foreseen to start the project.
  1) Validation of SIT program
  1.1) Identify all systems on the OLRT project;
  1.2) Gather T&C documentation (T&P plan, Project Agreement, Procurement Plan and other relevant documents) and perform gap analysis. For each sub system identify all the test procedures that need to be in place including Integration tests; Derive and develop list of integration tests from the Interface Matrix. Generate an Interface Matrix and Work Breakdown Structure (WBS) if not in place for all subsystems and identify interfaces in detail; (e.g., OCS with vehicle Pantograph). Modify the list of integration tests as required. A preliminary list of integration points has been compiled per Attachment A.

  2) Test Procedure Production
  2.1) For each test procedure generate a synopsis and outline;
  2.2) Generate test procedure;
  2.3) Test Procedures will be validated by the responsible systems engineers before final issue.
  2.4) Strategy is to Issue first internally approved procedures (by EJV and DBJV) then submit to customer. Revisions / comments required by customer are included in this scope.

3) Compliance Matrix Completion
3.1) Gap Analysis - Review and identify gaps in the requirements database;
3.2) Review the existing captured requirements in DOORS;
    3.3) Record evidence of design compliance through coordination with OLRTC and RTGEJV systems team, QA and other stakeholders as required.

List of Drawings, Sketches and Specifications (if applicable):
.... *{Last Paragraph clarification}*

For the purposes of this estimate only SIT's have been considered **except where noted below**. Further review may indicate that other procedures are required for SAT and SSIT, but at this point it is assumed that OLRTC have required suppliers to provide these directly in the procurement documents. Identification of missing tests will be form part of task 3.4 a) below.
It should also be noted that Trial Running Tests are not included in this analysis. It is assumed that OLRTC will develop and execute that program as indicated in Schedule 14 of the Project Agreement.

Exceptions and Clarifications:

1. SCADA to CBTC SIT Level Test plans are included in this scope
2. Tunnel Ventilation and Power Supply and Distribution SIT / SAT Level test plans are included in this scope
3. With respect to the originally planned work outlined in the OLRTC PowerPoint presentation, it is noted that there is a high degree of alignment with this CCN with the following clarifications:
    a. No trial running tests are included
    b. Number of plans differ (64 estimated in plan, 75-100 estimated in CCN). The difference mainly arising from combining test cases vs. listing them separately. This number will be refined as the project progresses
    c. The difference in hours (4000 originally planned vs 9000 in CCN) also includes updating of requirements management in DOORS to complete the V&V process.
    d. The CCN does not include a dedicated person in Ottawa. However, the addition of an individual by OLRTC could enhance communication between the test production team and the client.