THE CITY OF EDMONTON

PROJECT AGREEMENT
VALLEY LINE WEST LRT

Schedule 5 – D&C Performance Requirements

Part 7: LRV Integration Requirements
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**PART 7 : LRV INTEGRATION REQUIREMENTS**

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PART 7: LRV INTEGRATION REQUIREMENTS

SECTION 7-1–INTEGRATION REQUIREMENTS OF ALL PARTIES

7-1.1 SCOPE

A. This Section describes the responsibilities of Project Co, the City, and the LRV Supplier regarding integration of the Infrastructure being supplied by Project Co under this Agreement with the Stage 1 LRVs and Stage 2 LRVs to be used on the Valley Line LRT.

7-1.2 PROJECT CO INTEGRATION REQUIREMENTS

7-1.2.1 Infrastructure Integration Requirements

A. Project Co shall:

1. provide all details relating to the Integration of the Infrastructure and the Stage 1 LRVs and Stage 2 LRVs in the Integration Management Sub-Plan described in Section 5.2.2.1 [Integration Management Sub-Plan] of Schedule 4 [Design and Construction Protocols] of this Agreement;

2. ensure that the Infrastructure is physically and electrically integrated with the LRVs in accordance with this Schedule;

3. ensure that the Infrastructure software and firmware configuration is integrated with the LRV software and firmware configuration in accordance with Part 6 [Systems] of this Schedule;

4. ensure that the Infrastructure and the LRVs meet the environmental requirements of Section 1-2.3 [Electromagnetic Compatibility] of this Schedule; and

5. perform all Infrastructure Integration testing in accordance with Section 9 [Commissioning] of Schedule 4 [Design and Construction Protocols] and this Schedule;

a. where Infrastructure Integration testing requires the use of one or more LRVs, Project Co shall only use Accepted Stage 2 LRVs and Stage 1 LRVs as applicable to the Infrastructure Integration testing being performed; and

b. where an Accepted Stage 2 LRV with outstanding deficiencies is used for Infrastructure Integration testing, Project Co shall provide written confirmation from the LRV Supplier that the outstanding deficiencies on such Stage 2 LRV will not invalidate the outcome of the Infrastructure Integration test such Stage 2 LRV is being used to conduct.

7-1.2.2 Gerry Wright OMF Readiness and Integration Requirements

A. Project Co shall:

1. achieve Phase 1 Construction Completion by the Target Phase 1 Construction Completion Date; and

2. coordinate with the Operator and the City in order to promptly correct Phase 1 Construction Completion Deficiencies and perform Warranty Work in respect of Phase 1 Project Work after the Phase 1 Construction Completion Date in accordance with this Agreement and so as to not interfere with LRV Commissioning.
7-1.2.3 Voice Radio System and Data Radio System

A. Project Co shall:
   1. define any space requirements, electrical connections, and onboard equipment needed for the Voice Radio System and Data Radio System for the LRV Supplier; and
   2. perform all configurations of these systems and equipment in coordination with the LRV Supplier.

7-1.3 CITY INTEGRATION OBLIGATIONS

A. The City shall:
   1. provide the following information with respect to Stage 1 LRVs:
      a. Stage 1 LRV dimensioned general arrangement drawings showing:
         i. LRV length, height, width;
         ii. bogie and axle locations and spacings;
         iii. position of sanding points;
         iv. wheel dimensions and profile; and
         v. position of major roof-mounted components;
      b. Stage 1 LRV lifting locations including:
         i. locations of bogies on the LRV for in ground bogie lifts; and
         ii. locations of all body lifting points;
      c. Stage 1 LRV clearance envelopes including:
         i. the vehicle static envelope for all AW masses;
         ii. the vehicle dynamic envelope;
         iii. the track clearance envelopes and maximum inswing and outswing for curves from 35 m to 300 m in 25 m increments, 350 m to 800 m in 50 m increments, and 900 m to 1200 m in 100 m increments;
         iv. underfloor clearances to top of track level on new wheels; and
         v. side skirt and roof skirt clear opening dimensions.
      d. Stage 1 LRV and component masses including:
         i. LRV at AW0 and AW4;
         ii. axle loading at AW0;
         iii. power bogie;
         iv. trailer bogie;
         v. traction control unit;
         vi. auxiliary control unit;
vii. pantograph assembly;
viii. brake resistor assembly; and
ix. HVAC;
e. Stage 1 LRV performance characteristics including:
i. acceleration and deceleration characteristics at AW0 through AW3 loadings;
f. Stage 1 LRV power requirements including:
i. tractive effort curves with 50 VDC increments from 500 VDC to 900 VDC;
ii. current draw curves with 50 VDC increments from 500 VDC to 900 VDC;
iii. continuous auxiliary power draw while connected to the overhead catenary system; and
iv. details required to power the LRV using a stinger connection;
g. Stage 1 LRV pantograph characteristics including:
i. pantograph position on the Stage 1 LRV;
ii. width of pantograph carbons; and
iii. pantograph working range and upwards pressure at all heights;
h. Stage 1 LRV details for overrun protection including:
i. dimensioned drawings of the coupler showing the LRV coupler in extended and stowed positions;
ii. dimensioned drawings of the anti-climbers showing the anti-climber and their locations relative to the centerline of Stage 1 LRV and top of rail; and
iii. details of crash energy management systems that involve, or in the event of an impact may cause repositioning of elements of, the coupler, draft gear, anti-climber, and front structure of the LRV;
i. Stage 1 LRV noise and vibration report; and
j. Stage 1 LRV platform interface investigations;
2. provide the following information with respect to Stage 2 LRVs:
a. Stage 2 LRV dimensioned general arrangement drawings showing:
i. LRV length, height, width;
ii. door locations and widths;
iii. bogie and axle locations and spacings;
iv. position of sanding points;
v. wheel dimensions and profile; and
vi. position of major roof-mounted components;
b. Stage 2 LRV clearance envelopes including:
   i. the vehicle static envelope for all AW masses;
   ii. the vehicle dynamic envelope;
   iii. the track clearance envelopes and maximum inswing and outswing for curves from 25 m to 300 m in 25 m increments, 350 m to 800 m in 50 m increments, and 900 m to 1200 m in 100 m increments;
   iv. underfloor clearances to top of track level on new wheels; and
   v. side skirt and roof skirt clear opening dimensions;

c. Stage 2 LRV and component masses including:
   i. LRV mass at AW0;
   ii. axle loading at AW0; and
   iii. powered and unpowered bogie masses;

d. Stage 2 LRV power requirements including:
   i. tractive effort curves with 50 VDC increments from 500 VDC to 900 VDC;
   ii. current draw curves with 50 VDC increments from 500 VDC to 900 VDC;
   iii. LRV continuous auxiliary power draw while connected to the overhead catenary system; and
   iv. details required to power the LRV using a stinger connection in the Gerry Wright OMF Part B including the power and loading requirements, location, or locations, the stinger will plug into on the LRV, and the connection and protection strategy;

e. Stage 2 LRV pantograph characteristics including:
   i. pantograph position on the Stage 2 LRV;
   ii. width of pantograph carbons; and
   iii. pantograph working range and upwards pressure at all heights;

f. Stage 2 LRV details for overrun protection including:
   i. dimensioned drawings of the Stage 2 LRV coupler showing the LRV coupler in extended and stowed positions;
   ii. dimensioned drawings of the Stage 2 LRV anti-climbers showing the anti-climber and their locations on the Stage 2 LRV relative to the centerline of Stage 2 LRV and top of rail; and
   iii. details of crash energy management systems on the Stage 2 LRV that involve, or in the event of an impact may cause repositioning of elements of, the coupler, draft gear, anti-climber, and front structure of the Stage 2 LRV;

g. Stage 2 LRV lifting locations including:
   i. locations of bogies on the Stage 2 LRVs for in-ground bogie lifts; and
ii. locations of all body lifting points;

h. Stage 2 LRV special tooling requirements including:
   i. all large, fixed in place, special tools along with space requirements, masses, and mounting requirements;
   ii. bench test equipment; and
   iii. any system and component specific tooling required for system and component overhaul;

i. dimensions and masses of major Stage 2 LRV components including:
   i. the traction control unit (TCU);
   ii. the HVAC units;
   iii. the auxiliary power unit (APU);
   iv. the pantograph; and
   v. the powered and unpowered bogies; and

j. Stage 2 LRV noise and vibration specifications;

3. provide all other Stage 2 LRV design criteria identified by Project Co in the Stage 2 LRV OMF B Design Criteria document in accordance with Section 6.1 [General Design Considerations] of Schedule 4 [Design and Construction Protocols] of this Agreement; and

4. provide two (2) Stage 1 LRVs for Phase 1 Commissioning Work including the YCS, Yard TPSS, Yard Track, and Yard OCS.

7-1.4 LRV SUPPLIER INTEGRATION OBLIGATIONS

A. The Parties acknowledge that the obligations described in Section 7-1.4.2 [Stage 1 LRV General Integration Requirements] and Section 7-1.4.3 [LRV System Specific Integration Requirements] of this Schedule are obligations of the LRV Supplier.

7-1.4.1 Not Used

7-1.4.2 Stage 2 LRV General Integration Requirements

A. The LRV Supplier shall manage all aspects of Commissioning the Stage 2 LRVs at the Gerry Wright OMF Part B and on whichever of the Valley Line LRT Stage 1 or Valley Line LRT Stage 2 track is being used for testing and commissioning.

B. The LRV Supplier shall support Project Co during Stage 2 LRV-related Infrastructure Integration and during the resolution of any related issues.

7-1.4.3 Stage 2 LRV System Specific Integration Requirements

7-1.4.3.1 Train Control System (TCS) and Yard Control System (YCS) Integration Requirements

A. The LRV Supplier shall provide Stage 2 LRVs that are compatible with the TCS, as defined in Section 6-1.3 [Train Control System (TCS)] of this Schedule, and YCS, as defined in Section 6-1.3.2 [Yard Control System] of this Schedule.
7-1.4.3.2  Train Routing and Priority System (TRPS) Integration Requirements

A. The LRV Supplier shall provide Stage 2 LRVs that are compatible with the TRPS as defined in Section 6-1.3 [Train Control System (TCS)] of this Schedule and will be installing all onboard equipment required by the TRPS wayside infrastructure on the Stage 2 LRVs.

7-1.4.3.3  CCTV System Integration Requirements

A. The LRV Supplier shall provide an on-board CCTV system that is compatible with the wayside Valley Line CCTV system as described in Section 6-1.11.2 [Valley Line CCTV System] of this Schedule.

7-1.4.3.4  Radio System Integration Requirements

A. The LRV Supplier shall install on-board configured components of the Voice Radio System and Data Radio System into the Stage 2 LRVs as prescribed by Project Co.