

**THE CITY OF EDMONTON**

**PROJECT AGREEMENT  
VALLEY LINE WEST LRT**

***Schedule 5 – D&C Performance Requirements***

***Part 8: Maintenance and Storage Facilities***

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## **PART 8: MAINTENANCE AND STORAGE FACILITIES**

### **SECTION 8-1– GENERAL PERFORMANCE REQUIREMENTS**

#### **8-1.1 INTRODUCTION**

- A. This Part 8 [*Maintenance and Storage Facilities*] sets out the general requirements for the Design and Construction of the Gerry Wright OMF Stage 2 and the Lewis Farms Storage Facility.
- B. The Maintenance and Storage Facilities and their respective sites, when completed, shall provide fully functional operations and maintenance campuses comprised of all facilities and equipment required for performance of the functions described in Section 8-1.2 [*Functions*] of this Schedule.
- C. For clarity, in this Part 8 [*Maintenance and Storage Facilities*] the following terms, when used to describe where one area will be situated with reference to another area(s), shall have the following meanings:
  - 1. “ready access” shall mean that the applicable areas are in close proximity and on the same level, but not necessarily adjoining; and
  - 2. “direct access” shall mean that the applicable areas are adjoining and interconnected, unless noted otherwise.

#### **8-1.2 GENERAL FUNCTIONS**

- A. The Maintenance and Storage Facilities and their respective sites shall be designed and constructed to provide the following Project related functions:
  - 1. operational functional and fleet management requirements, including, but not limited to, fleet size, yard capacity, fleet services, rail transportation, LRV storage and Maintenance of Way (MOW);
  - 2. scheduling, monitoring and management of operations and maintenance activities to achieve the Operability and Maintainability Parameters;
  - 3. routine and heavy maintenance of LRVs;
  - 4. delivery and offloading of LRVs and other On-track Vehicles;
  - 5. staging and marshalling of LRVs and other On-track Vehicles; and
  - 6. any other Project related functions specified to be located at, or performed from, the Maintenance and Storage Facilities.

#### **8-1.3 GENERAL REQUIREMENTS**

- A. Except as otherwise specified in this Part 8 [*Maintenance and Storage Facilities*], all equipment, components, materials, systems, and sub-systems forming part of the Maintenance and Storage Facilities shall comply with the applicable requirements specified in Part 5 [*Facilities*] of this Schedule, including the Valley Line West LRT Facilities Design and Construction Standards and:
  - 1. shall comply with Part 2 [*Sustainable Urban Integration*] of this Schedule;
  - 2. trackwork shall comply with the requirements as set out in Section 3-1 [*Track*] of this Schedule;
  - 3. sidewalks shall comply with the requirements as set out in Section 3-2.4.12 [*Sidewalks*] and Section 3-2.5.1K [*New Construction*] of this Schedule;

4. vehicle parking facilities shall comply with the applicable requirements as set out in Section 3-2.5.1 [*New Construction*] of this Schedule and with the Valley Line West LRT Roadways Design and Construction Standards;
  5. retaining walls shall comply with the requirements as set out in Section 2-11.5 [*Walls*] of this Schedule and with the retaining structure requirements as set out in Section 4-2.4 [*Retaining Walls*] of this Schedule;
  6. Utility Work shall be in accordance with Schedule 28 [*Project Approvals and Utility Matters*];
  7. Rail Systems shall comply with the requirements as set out in Section 6-1 [*Rail Systems*] of this Schedule;
  8. Traction Power System shall comply with the requirements as set out in Section 6-2 [*Traction Power System*] of this Schedule;
  9. Overhead Catenary System shall comply with the requirements as set out in Section 6-3 [*Overhead Catenary System*] of this Schedule;
  10. Structures shall comply with the requirements as set out in Part 4 [*Transportation and Building Structures*] of this Schedule;
  11. Stormwater Management System and building drainage shall comply with the requirements as set out in Section 3-5 [*Stormwater Management*], Section 8-2.6 [*Gerry Wright OMF Building B*] and Section 8-3.6 [*Lewis Farms Storage Facility Building*] of this Schedule; and
  12. water servicing and wastewater servicing shall comply with the requirements as set out in Section 3.6.1.5 [*Utility Service Connections*] of this Schedule.
- B. Design the Maintenance and Storage Facilities and their respective sites, including all required Shop Tracks and Yard Tracks, to accommodate the LRVs as defined in Section 1-2.1.8 [*LRV Accommodation*] of this Schedule.
- C. Design all Structures and any OCS within the Maintenance and Storage Facilities and their respective site to accommodate LRV heights in accordance with Section 1-2.1.8 [*LRV Accommodation*] of this Schedule.

#### **8-1.3.1 Applicable Standards**

- A. Without limiting Section 1-1.7 [*Reference Documents*] of this Schedule, and except as otherwise specified herein, the Design and Construction of Maintenance and Storage Facilities, and associated equipment, components, materials, systems, and sub-systems shall comply with:
1. NBCAE, unless otherwise specified in this Schedule;
  2. TCRP Report 155 - Track design handbook for Light Rail Transit LRT;
  3. CSA C22.2 No.41 - Grounding and Bonding Equipment;
  4. CSA C22.2 No.4 - Control of electrochemical corrosion of underground metallic structures;
  5. BS EN-50162 - Protection against corrosion by stray current from direct current systems;
  6. IEC 62128-2 Railway applications - Fixed installations - Electrical safety, earthing and the return circuit - Part 1: Provisions against the effects of stray currents caused by dc traction systems;
  7. BS EN-50122-1 Railway applications - Fixed installations - Electrical safety, 2016 earthing and the return circuit. Part 1: Protective provisions against electric shock;

8. BS EN-50122-2 Railway applications - Fixed installations - Electrical safety, earthing and the return circuit. Part 2: Provisions against the effects of stray currents caused by dc traction systems;
9. ASTM 6165 - Standard practice for determining rail-to-earth resistance;
10. NACE SP0169 - Standard Practice, Control of external corrosion on underground or submerged metallic piping systems;
11. ASTM C1202 - Standard test method for electrical Indication of concrete's ability to resist chloride ion penetration;
12. NFPA 130 - Standard for Fixed Guideway Transit and Passenger Rail System (NFPA 130);
13. FHWA-NHI-10-025 - Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes;
14. CSA T527-94 (ANSI/EIA/TIA 607), Grounding and Bonding for Telecommunications in Commercial Buildings;
15. CAN/CSA T528-93(R1997) (ANSI/EIA/TIA 606), Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings;
16. CSA T529-95 (ANSI/EIA/TIA 568D), Design Guidelines for Telecommunications Wiring Systems in Commercial Buildings;
17. CAN/CSA C22.2 No.182.4-M90(R1996), Plugs, Receptacles, and Connectors for Communication Systems;
18. CSA C22.2 No.214-94, Communication Cables;
19. ANSI/EIA/TIA TSB 67, Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems;
20. ANSI/EIA/TIA TSB 72, Centralized Optical Fiber Cabling Guidelines; and
21. Building Industry Consulting International (BICSI) TDM Manual.

### **8-1.3.2 LRV Service Access Levels**

- A. This Section 8-1.3.2 [*LRV Service Access Levels*] sets out the Design and Construction requirements to allow for the performance of the Maintenance activities at the Maintenance and Storage Facilities as described in Section 8-2.3 [*Functions*] and Section 8-3.3 [*Functions*] of this Schedule.
- B. Where required per Section 8-2.6 [*Gerry Wright OMF Building B*] and Section 8-3.6 [*Lewis Farms Storage Facility*] of this Schedule, provide below grade access to LRV undercarriage by means of:
  1. below grade pits that:
    - a. are sized to accommodate two uncoupled LRVs over the pit, provide access to the end faces and allow for unobstructed access when opening side access hatches of the two LRVs;
    - b. include 1070 mm high safety railings to enclose the perimeter of the top of the pit while there is no LRV over the pit, which can be removed by a single person;
    - c. include access platforms at grade to allow for the safe passage of shop personnel and equipment over the pits at every LRV door location;
      - i. Platforms shall be a solid surface and, at a minimum, the width of the LRV door.

- ii. Include 1070 mm high safety railings along the side edges of the access platforms, which can be removed by a single person.
  - d. provide a pit refuge space to allow personnel to safely walk between the edge of the pit wall and running rail;
  - e. provide a minimum pit depth of 1675 mm from top of rail to pit floor;
  - f. provide emergency egress at each end of the pits;
  - g. include grated trench drains in the pits that provide drainage to a separator; and
  - h. are constructed so that all mechanical/electrical pipes, conduits and conveyances are attached to the pit walls and do not encumber access within the pits; or
2. elevated tracks that provide equivalent access to that provided by the below grade pits described in Section 8-1.3.2B.1 [*LRV Service Access Levels*] of this Schedule, by application of an engineered solution that can be demonstrated to have been successfully used in a service proven low floor LRV operation and maintenance facility, acceptable to the City, acting reasonably.
- C. Where required per Section 8-2.6 [*Gerry Wright OMF Building B*] and Section 8-3.6 [*Lewis Farms Storage Facility*] of this Schedule, provide top of rail level access to the sides of the LRVs that accommodates:
- 1. convenient access to both sides of the LRV and to the end faces of the LRV at top of rail level; and
  - 2. the ability to open or remove LRV skirt covers.
- D. Where required per Section 8-2.6 [*Gerry Wright OMF Building B*] of this Schedule, provide roof level access to the top of the LRVs by means of catwalks that:
- 1. accommodate convenient access along side(s) of the Stage 2 LRV to the roof;
  - 2. include removable safety railings at the edges of the catwalks and provisions to connect fall arrest harnesses in accordance with the *Alberta Occupational Health and Safety Regulations, Part 9 Fall Protection*;
  - 3. are located above the top of the Stage 2 LRV rail at a height that allows access to the roof of the Stage 2 LRV with a vertical gap not exceeding 75 mm;
  - 4. have a minimum width of 1.5 m;
  - 5. are solid surfaces with toe board protection to prevent tools and materials from falling below;
  - 6. have a maximum horizontal gap not exceeding 75 mm from the edge of the catwalk to the closest point on the Stage 2 LRV at the catwalk elevation;
  - 7. accommodate OCS interlocking, in accordance with Section 6-2.3.4 [*Shop TPSS and Yard TPSS*] of this Schedule, to prevent energization while working on catwalks; and
  - 8. accommodate OCS interlocking with any cranes and other equipment that could cause a danger when not in a safe position:
    - a. provide a visual safety indicator at each OCS interlocking location; and
    - b. provide at least one (1) visual safety indicator at each end of every Shop Track that is visible from both inside and outside the building.

### 8-1.3.3 Yards and Yard Tracks

- A. This Section 8-1.3.3 [*Yards and Yard Tracks*] sets out the general Design and Construction requirements for all yards and Yard Tracks at the Maintenance and Storage Facilities.
- B. Design and Construct the Maintenance and Storage Facilities with:
1. all Yard Tracks adhering to the geometric design requirements as set out in Section 3-1 [*Track*] of this Schedule; and
  2. track crossing points as required by Emergency Services.
- C. Provide a Yard Track Traction Power System in each of the Maintenance and Storage Facilities in accordance with Section 6-2.3 [*Design Requirements*] of this Schedule to provide traction power energy for all Yard Tracks.
- D. Provide OCS in each of the Maintenance and Storage Facilities in accordance with Section 6-3 [*Overhead Catenary System*] for all Yard Tracks.
- E. Provide power operated switch machines for all Yard Track switches which shall:
1. be of Vital design;
  2. be compliant with AREMA C&S Manual Part 12.2.1, *Recommended Design Criteria and Functional Guidelines for Lockable Electric Motor Switch Operating Mechanism*, or the equivalent International Railway Industry Standard or CENELEC standard(s) applicable to the country of origin for yard switch machines;
  3. comply with the environmental requirements for all signal components as defined in AREMA C&S Manual Part 11.5.1, *Recommended Environmental Requirements for Electrical and Electronic Railroad Signal System Equipment, for Class B (Wayside Outdoors) equipment*;
  4. be a service proven model and version with a minimum of 100,000 hours of light rail revenue service in addition to the Edmonton climatic conditions in accordance with Section 1-2.1.10 [*Edmonton Climactic Requirements*] of this Schedule, with at least three months per year of ice and snow cover;
  5. be equipped with a snow clearing device suitable to prevent ice and snow from building up and immobilizing the switch points or switch rod;
  6. have electric detection of point or tongue positions;
  7. allow reversal of machine in mid-stroke or at any point between end positions;
  8. be provided with a plastic laminated or plastic encased internal-wiring diagram;
  9. be trailable, meaning that the construction allows for a planned run-through of the switch from the trailing end by a Train operating at Restricted Speed, without damage to the switch mechanism;
  10. not provide correspondence indication after having been trailed, until the switch is called for and moves to the originally requested position;
  11. have the internal movement of the locking and throw bars achieved hydraulically, or by an electric motor that is mechanically engaged to the bars;
  12. provide for manual cranking operation of the switches by a single person, using a crank handle in case of failure of power operation capability. Insertion of the hand crank shall automatically inhibit motor power and if applicable, switch correspondence;

13. be designed to IP65 Enclosure as a minimum and to prevent collection of water within housings;
  14. be provided with removable covers or other protection for the ends of lock rods and operating rods, where they extend beyond the switch mechanisms;
  15. be equipped with a Switch Position Indicator; and
  16. be provided with Detector Locking.
- F. Design and Construct a yard control system to control Train movements within each Maintenance and Storage Facility yard in accordance with Section 6-1.3.1 [*Yard Control System*] of this Schedule.
- G. Design designated smoking areas within the yards of each Maintenance and Storage Facility.
1. The designated smoking area at the Lewis Farms Storage Facility shall be within the outdoor amenity space and be located a minimum of 10 m from all windows and doors.
  2. The designated smoking area(s) at the Gerry Wright OMF Building B shall be along the west edge of the facility and be located a minimum of 10 m from all windows and doors.

#### **8-1.3.4 Administrative Data Network**

##### **8-1.3.4.1 General Requirements**

- A. Provide an administrative data network for the Gerry Wright OMF Building B and the Lewis Farms Storage Facility that is compatible with, and, at a minimum, provides the same functionality and features as, the administrative data network used in the Valley Line LRT Stage 1.
1. The administrative data network shall be integrated with the administrative data network provided by the Valley Line LRT Stage 1.
    - a. Coordinate with the Operator to implement the integration of the networks.
    - b. Upgrade the administrative data network deployed in Gerry Wright OMF Building A as necessary to facilitate the integration of the administrative data network for the Valley Line LRT Stage 2.
  2. The administrative data network shall provide connectivity between the Gerry Wright OMF Building A, Gerry Wright OMF Building B, and the Lewis Farms Storage Facility.
- B. The administrative data network shall be fault tolerant, at a minimum, to the same degree as the administrative data network provided by the Valley Line LRT Stage 1.
- C. The administrative data network shall be connected to the CTS through secured firewalls to provide access to the CTS via user-restricted workstations.
- D. The administrative data network shall support gigabit connectivity.
- E. Provide the administrative data network with, at a minimum:
1. network equipment;
  2. active optical components;
  3. passive optical components;
  4. fibre cabling;



5. structured copper cabling; and
  6. associated patch panels, fibre optic distribution panels (FDP), splice enclosures, and trays.
- F. Provide network equipment consisting of:
1. redundant distribution network switches located in the Lewis Farms Storage Facility Building and Gerry Wright OMF Building B; and
  2. access network switches located in the Lewis Farms Storage Facility and Gerry Wright OMF Building B.
- G. Provide the administrative data network as an IP-based network, compliant with IEEE 802.3 standards and protocols, and utilizing commercially available equipment.
- H. Assign the administrative data network switch addresses in accordance with an address plan fully compatible with the existing Valley Line LRT Stage 1 administrative data network to allow for full integration of the Valley Line LRT Stage 1 and Valley Line LRT Stage 2 networks.
- I. Integrate the Valley Line LRT Stage 2 administrative data network with the administrative data network deployed in Valley Line LRT Stage 1 per Section 1-1.4 [*Integration with Valley Line LRT Stage 1*] of this Schedule, causing no disruptions to the operation of the Valley Line LRT Stage 1.
1. Not less than 90 Business Days before integration of the Valley Line LRT Stage 1 and Valley Line LRT Stage 2 administrative data networks, prepare and submit an integration plan (the "**Valley Line LRT Stage 1 and Valley Line LRT Stage 2 Administrative Data Network Integration Plan**") outlining each step taken to integrate the networks.
- J. Configure the administrative data network using the Valley Line LRT Stage 1 network time source.
- K. Verify the administrative data network connectivity from all access network switches to the existing Valley Line LRT Stage 1 network switches.
- L. All cabling, termination hardware, and patch cables shall be ISO 9001 certified and ensure end-to-end transmission requirements for 100 BaseT Category 6 operation, as well as 1000 Mbps Gigabit Ethernet, Twisted Pair Physical Media Dependent (TP-PMD), 155.5 Mbps ATM, 622 Mbps ATM, and video (both baseband and broadband) applications.
- M. Provide all wire and cable in accordance with Section 6-1.21 [*Wire and Cable*] of this Schedule.
- N. At the first Interim Design submission, submit, at a minimum:
1. a hardware description for the administrative data network; and
  2. a preliminary network design for the administrative data network.
- O. At the second Interim Design submission, submit, at a minimum:
1. a test plan describing all required steps, processes and schedules for verification, test, acceptance and commissioning of the administrative data network;
    - a. Execute the Accepted test plan and submit reports detailing all results and supporting evidence.
  2. an interface specification for each interface between products and systems;
  3. documentation for the operation and maintenance of the administrative data network;

4. a cable plan; and
  5. documentation proving the cabling system's compliance to the End to End Link Performance recommendations, as listed in Annex E of ANSI/EIA/TIA 568D.
- P. Submit updated drawings, specifications, designs and plans for the administrative data network in the Final Design submission.
- Q. Prior to Commissioning of the Valley Line LRT Stage 2, submit, at a minimum:
1. all shop drawings of the administrative data network, including the manufacturer's technical documentation of the administrative data network equipment used in the structured cabling system;
  2. Test Results ensuring compliance with the applicable standards;
  3. system certification documentation; and
  4. record drawings of all of the structured cable drops, all changes during construction, and other pertinent details. Indicate label name for each outlet, using numbering system employed on the project.

#### **8-1.3.4.2 Building Equipment**

- A. Provide telecom closet(s), as required, on each floor of the Gerry Wright OMF Building B and the Lewis Farms Storage Facility.
- B. All telecom closets shall be connected to a central telecom room located in the Gerry Wright OMF Building B and the Lewis Farms Storage Facility.
1. Telecom closets shall be connected by fibre or CAT-6 cabling as necessitated by distance limitations.
- C. Cabling between floors of a facility shall be run in a dedicated riser closet.
- D. Refer to the Accepted Gerry Wright OMF Building Parametric Programming Report and Accepted Lewis Farms Storage Facility Building Parametric Programming Report for the locations of electrical installations.

#### **8-1.3.4.3 Administrative Data Network Fibre Optic Cabling**

- A. Provide fibre optic cabling in accordance with Section 6-1.7.3 [*Fibre Optic Cable Requirements*] of this Schedule.
- B. Design, supply, install, and conduct PICO tests of all fibre cable.
- C. Submit a PICO test plan that includes, at a minimum:
1. cable tests including insulation, continuity and OTDR tests of terminated cables;
  2. cable termination and interconnection verifications; and
  3. verification of termination markings and labels.

#### **8-1.3.4.4 CAT-6 Cabling**

- A. Design, supply, install and conduct PICO tests of all CAT-6 cables.
- B. Do not exceed an end to end CAT-6 cable length of 90m.

- C. If the CAT-6 cable length would be greater than 90m, provide six (6)-strand SM fibre optic cable and optical networking equipment.
- D. Provide separate conduit for power and communication cables.
- E. Provide concealed conduits in office areas.

#### **8-1.3.4.5 Administrative Data Network Equipment**

- A. Design, supply, install, and conduct PICO tests of all equipment to verify equipment has not been damaged during the transportation and handling, and has been installed correctly.
- B. Submit a PICO test plan that includes, at a minimum:
  - 1. installation and securing of termination cabinets;
  - 2. functioning of all configured settings; and
  - 3. bandwidth verification.
- C. Design the administrative data network to be able to accommodate all Valley Line LRT Stage 2 data traffic in a redundant bi-directional ring topology.
- D. Provide a minimum one (1)-Gbps secondary ring from the distribution network switches in the Gerry Wright OMF Building B and Lewis Farms Storage Facility to PoE access network switches with sufficient bandwidth to support system needs.
- E. Provide administrative data network switches with the following characteristics:
  - 1. local switch management;
  - 2. support VLAN configuration;
  - 3. support security features including port security, dynamic host configuration protocol snooping, user authentication, access control lists, RADIUS authentication to prevent unauthorized users from altering the switch configuration;
  - 4. powered by sufficient UPS backup for an eight (8) hour run time; and
  - 5. provide a Manufacturer Warranty for the administrative data network switches for a minimum of five (5) years.
- F. Provide administrative data network access switches in each telecom closet with, at a minimum:
  - 1. layer two (2) switching capability;
  - 2. sufficient 10/100/1000 PoE copper ports to support all local IP end devices and an additional 20% spare quantity; and
  - 3. an authentication protocol to prevent unauthorized clients from connecting to the LAN.
- G. Provide administrative data network distribution switches in the Gerry Wight OMF Building B and the Lewis Farms Storage Facility Building with, at a minimum:
  - 1. functional characteristics described in Section 8-1.3.4.5E [*Administrative Data Network Equipment*] of this Schedule;
  - 2. layer three (3) switching capability;

3. sufficient 10/100/1000 PoE copper ports and SFP to support all access switches and an additional 20% spare quantity;
  4. the ability to be mounted to a standard 19-inch rack; and
  5. switch aggregation or switch stacking functionality.
- H. Perform integration and functionality tests of the administrative data network to prove the functionality as described in Section 8-1.3.4.5E [*Administrative Data Network Equipment*] and Section 8-1.3.4.5E [*Administrative Data Network Equipment*] of this Schedule.

**8-1.3.5 Public Address**

- A. Submit a comprehensive acoustic analysis study with the Final Designs of the Lewis Farms Storage Facility and the Gerry Wright OMF Building B to demonstrate that the PA subsystem complies with the acoustic coverage and intelligibility requirements of Section 6-1.20 [*Public Address/Variable Message Signs*] of this Schedule.

## SECTION 8-2– GERRY WRIGHT OMF

### 8-2.1 PURPOSE

- A. This Section 8-2 [*Gerry Wright OMF*] sets out the Design and Construction requirements for the Gerry Wright OMF Stage 2. These requirements generally apply to new Infrastructure that is separate and distinct from the Gerry Wright OMF Stage 1 infrastructure that will be constructed by Other Contractors for Valley Line LRT Stage 1, however a holistic approach for consolidating these requirements across all facilities within the Gerry Wright OMF may be considered by Project Co.
- B. Gerry Wright OMF Stage 1 infrastructure design data is provided in the Disclosed Data.
- C. In accordance with this Section 8-2 [*Gerry Wright OMF*], Design and Construct all Infrastructure required in order to provide the Gerry Wright OMF with the capabilities to meet the Operability and Maintainability Parameters.

### 8-2.2 FACILITIES

- A. The purpose of the Gerry Wright OMF is to serve as the primary operational base for the marshalling of Trains and the Maintenance of the LRV fleet for the Valley Line LRT, and shall be expanded to include the following Infrastructure to be constructed for Valley Line LRT Stage 2:
  - 1. Gerry Wright OMF Part B yard, as set out in Section 8-2.5 [*Gerry Wright OMF Part B Yard*] of this Schedule;
  - 2. Gerry Wright OMF Building B, as set out in Section 8-2.6 [*Gerry Wright OMF Building B*] of this Schedule;
  - 3. Gerry Wright OMF Part C yard, as set out in Section 8-2.7 [*Gerry Wright OMF Part C Yard*] of this Schedule;
  - 4. Stormwater Management System, as set out in Section 3.5 [*Stormwater Management*] of this Schedule;
  - 5. yard lead Track to Gerry Wright OMF Stage 1 Yard Tracks, as set out in Section 8-2.9 [*Yard Lead Track*] of this Schedule;
  - 6. Yard TPSS, as set out in Section 8-2.10 [*Yard TPSS*] of this Schedule;
  - 7. pipeline crossing between Gerry Wright OMF Stage 1 and Gerry Wright OMF Part B, as set out in Section 8-2.11 [*Pipeline Crossing*] of this Schedule;
  - 8. pipeline crossing between Gerry Wright OMF Part B and Gerry Wright OMF Part C, as set out in Section 8-2.11 [*Pipeline Crossing*] of this Schedule; and
  - 9. automatic vehicle inspection system, as set out in Section 8-2.12 [*Automatic Vehicle Inspection System*] of this Schedule.

### 8-2.3 FUNCTIONS

- A. The Gerry Wright OMF shall be designed and constructed to provide for the performance of LRT operations functions, including:
  - 1. LRV storage, maintenance and repair, including:
    - a. LRV exterior cleaning;
    - b. LRV interior cleaning;

- c. LRV daily servicing;
  - d. LRV sand filling;
  - e. LRV undercarriage cleaning;
  - f. LRV scheduled service and inspections;
  - g. LRV heavy repair and overhaul, including wheels, bogies, HVACs and pantographs;
  - h. LRV body structural repair;
  - i. LRV interior repair;
  - j. LRV exterior painting;
  - k. LRV vinyl wrapping;
  - l. LRV blow downs;
  - m. LRV mechanical/electrical/electronic components overhaul and repair;
  - n. movement of maintenance personnel, materials, and equipment between LRVs;
  - o. storage of LRV components, parts and materials;
  - p. storage of hazardous materials;
  - q. industrial and household waste disposal;
  - r. administrative support for LRV maintenance processes; and
  - s. provision of staff welfare and wellness spaces; and
2. transportation services including Train hostling and marshalling.
- B. The Gerry Wright OMF Part B shall not host the function of a central Operations Control Centre (OCC), as this function will be provided with the OCC host that will be provided by Other Contractors within the Gerry Wright OMF Building A.

#### **8-2.4 GENERAL REQUIREMENTS**

- A. Except as otherwise specified in this Section 8-2 [*Gerry Wright OMF*], specific equipment, components, materials, systems, and sub-systems forming part of the Gerry Wright OMF shall comply with the following:
- 1. Gerry Wright OMF Building B facility design shall comply with the SUI requirements in Section 2-13.1 [*Gerry Wright OMF Building B*] of this Schedule and the Valley Line West LRT Facilities Design and Construction Standards;
  - 2. materials, components, and equipment shall comply with Section 5-1.4 [*Materials, Components and Equipment*] of this Schedule;
  - 3. landscape architecture shall comply with Section 2-14.11 [*Gerry Wright OMF Landscaping*] of this Schedule; and
  - 4. Roadways shall comply with the applicable requirements as set out in Section 3-2.11.12 [*Gerry Wright OMF Site*] of this Schedule.

- B. Provide minimum illuminance levels meeting the criteria listed in Table 8-2.4 [*Illumination Levels for the Gerry Wright OMF*].

**Table 8-2.4: Illumination Levels for the Gerry Wright OMF**

<b>Location</b>	<b>Minimum Average (Lux)</b>
Perimeter Fence	5
Vehicle Entrances	100
Yards	25
LRV Storage Areas	25
Track Switch Areas	50
Shop Areas	550
Roof Access Platforms	550
Pits	1100
Shop Storage Areas	270
Office Areas (Ambient with Additional Task Lighting)	270
Maintenance Areas	1100

- C. Provide a minimum of one (1) hand sanitizer station at each entrance.

## **8-2.5 GERRY WRIGHT OMF PART B YARD**

### **8-2.5.1 Site Requirements**

- A. Design and Construct the Gerry Wright OMF Part B yard within the Gerry Wright OMF Parcel B, including:
1. MOW storage and maintenance as demonstrated to meet the Operability and Maintainability Parameters, including:
    - a. storage and maintenance of MOW equipment;
    - b. storage of MOW components, parts and materials; and
    - c. storage of spare parts which cannot be stored elsewhere;
  2. yard and Yard Tracks, in accordance with Section 8-2.5.2 [*Yard and Yard Tracks*] of this Schedule;
  3. site security in accordance with Section 8-2.5.3 [*Site Security*] of this Schedule;
  4. site access in accordance with Section 8-2.5.4 [*Site Access*] of this Schedule;
  5. parking facilities in accordance with Section 8-2.5.5 [*Parking Facilities*] of this Schedule;
  6. a sand silo for LRV sand filling in accordance with Section 8-2.5.6 [*Sand Silo*] of this Schedule; and
  7. all other facilities, equipment, systems and sub-systems as required in this Section 8-2.5 [*Gerry Wright OMF Part B Yard*].
- B. Notwithstanding the requirements in Section 8-2.5.1A [*Site Requirements*] of this Schedule, where insufficient space exists to fit all such required Infrastructure within Gerry Wright OMF Parcel B, it is permissible to design and construct the following Infrastructure within the Gerry Wright OMF Parcel C:

1. MOW storage and maintenance as demonstrated to meet the Operability and Maintainability Parameters, including:
    - a. storage and maintenance of MOW equipment;
    - b. storage of MOW components, parts and materials;
    - c. storage of spare parts which cannot be stored elsewhere; and
  2. parking facilities in accordance with Section 8-2.5.5 [*Parking Facilities*] of this Schedule.
- C. Design and Construct Gerry Wright OMF Stage 2 water servicing and wastewater servicing.
1. A minimum of thirty (30) days prior to the applicable first Interim Design submission, submit a water servicing design and Hydraulic Network Analysis (HNA) report (the “**Gerry Wright OMF B Yard Water Servicing Design and HNA Report**”) that reflects actual site design conditions. Refer to the *City of Edmonton Design and Construction Standards Volume: 4 Water* for more information.
  2. Make application and payment to EPCOR Water Services for the service connection and adhere to EPCOR Water Services Guidelines.
  3. A minimum of 30 days prior to the applicable first Interim Design submission, submit a wastewater servicing design report (the “**Gerry Wright OMF Part B Yard Wastewater Servicing Design Report**”) that reflects actual site design conditions.
  4. Make application and payment to EPCOR Water Services Inc. (Drainage) for the service connection and adhere to *EPCOR Drainage Services: Sewer Connections Guidelines*.

#### **8-2.5.2 Yard and Yard Tracks**

- A. Design of the Gerry Wright OMF Part B yard shall be based on the LRV fleet size and yard capacity requirements that demonstrate compliance with the Operability and Maintainability Parameters.
- B. Not less than 180 Business Days after the Effective Date, prepare and submit a yard circulation report for the Gerry Wright OMF Part B yard (the “**Gerry Wright OMF Yard Circulation Report**”), that demonstrates the ability to:
  1. launch Trains at required headways directly from storage without need of any reversing moves;
  2. receive Trains at end of service without queuing on the Mainline Track;
  3. perform daily, light, and heavy maintenance operations at required intervals;
  4. store twenty-eight (28) LRVs on-site on dedicated double ended Shop Tracks;
  5. transport LRVs directly to LRV storage Shop Tracks after passing through the AVIS, without having to travel on any maintenance Shop Track;
  6. provide track redundancy so that yard circulation is not impeded by a single point failure which could trap LRVs within any portion of Gerry Wright OMF Part B; and
  7. perform all movements between any storage, maintenance or wash track within Gerry Wright OMF Stage 1 and any storage, maintenance or wash track within Gerry Wright OMF Part B with a maximum of one reversing move.
- C. Construct at a minimum two (2) tie-ins to the existing tracks within Gerry Wright OMF Stage 1 without significant impact to ongoing operations in Gerry Wright OMF Stage 1.



1. Provide one (1) tie-in on the north side and one tie-in (1) on the south side between Gerry Wright OMF Stage 1 and Gerry Wright OMF Stage 2.
- D. Design and Construct the Gerry Wright OMF Part B yard, tie-ins, Lead Tracks, and Yard Tracks, in compliance with the Accepted Gerry Wright OMF Yard Circulation Report, and in accordance with Section 8-1.3.3 [*Yards and Yard Tracks*] of this Schedule.

### **8-2.5.3 Site Security**

- A. Design and Construct site security for the Gerry Wright OMF to provide:
1. protection of LRVs and the Building Structure against intruders and vandalism;
  2. continuous and permanent fencing enclosing the Gerry Wright OMF such that:
    - a. the fencing material and construction is in accordance with Section 2-4.5.3.2 [*Fences*] of this Schedule;
    - b. the fencing on the east side of the Gerry Wright OMF Stage 1 is removed per Section 1-1.4 [*Integration with Valley Line LRT Stage 1*] of this Schedule; and
    - c. the east boundary of the fencing encompasses:
      - i. Gerry Wright OMF Part B; and
      - ii. those sections of Gerry Wright OMF Parcel C that are used for the purposes described in Section 8-2.5.1.B [*Site Requirements*] of this Schedule.
  3. integrated card access protection at all the entrances/exits for pedestrians and vehicles in accordance with Section 6-1.15K [*Security and Alarm System*] of this Schedule; and
  4. integrated perimeter surveillance security, including full time and live perimeter intrusion detection system in accordance with Section 6-1.11.2.1 [*General Surveillance Requirements and Coverage*] of this Schedule.
- B. Provide card access security to control entry into the Gerry Wright OMF Building B Building Structure in accordance with Section 6-1.15M [*Security and Alarm System*] of this Schedule.

### **8-2.5.4 Site Access**

- A. Provide a Roadway including Emergency Services access within the Gerry Wright OMF Site connecting the existing Gerry Wright OMF Building A and the Gerry Wright OMF Building B, where duct banks may be located directly below the Roadway to minimize the number and impact of underground pipeline crossings.
- B. Provide a sidewalk within the Gerry Wright OMF Site connecting the existing Gerry Wright OMF Building A and the Gerry Wright OMF Building B, where duct banks may be located directly below the sidewalk to minimize the number and impact of underground pipeline crossings.
- C. If parking facilities are provided within Gerry Wright OMF Parcel C pursuant to Section 8-2.5.1B [*Site Requirements*] of this Schedule, provide a sidewalk within the Gerry Wright OMF Site to connect these parking facilities to the Gerry Wright OMF Building B.
- D. Provide two-way Roadway and pedestrian access from 51st Avenue to the Gerry Wright OMF Part B yard.
- E. Provide road access to the Gerry Wright OMF Part B yard to accommodate large delivery vehicles (WB-21 tractor-semitrailers), Emergency Services and waste disposal equipment.

- F. Provide access and turnaround capability for:
  - 1. WB-21 vehicles involved in delivery and waste disposal at loading docks and loading gates, refuse tanks and large garbage containers;
  - 2. large MOW road running vehicles at MOW storage and maintenance, if provided; and
  - 3. large maintenance and repair vehicles at TPSSs, as may be required to demonstrate compliance with the Operability and Maintainability Parameters.
- G. Provide sufficient clearances to ensure waste disposal operations do not interfere with normal activities anticipated by the Operability and Maintainability Parameters.
- H. Integrate the Roadways for the Valley Line Stage 2 with the Roadways constructed for the Valley Line Stage 1 within the Gerry Wright OMF Site per Section 1-1.4 [*Integration with Valley Line LRT Stage 1*] of this Schedule.

#### **8-2.5.5 Parking Facilities**

- A. Provide parking facilities as required to meet the overall parking requirements for the Gerry Wright OMF and required to meet the Operability and Maintainability Parameters, accounting for existing parking stalls in Gerry Wright OMF Stage 1.
- B. At a minimum, provide:
  - 1. fifty-eight (58) staff parking stalls for Gerry Wright OMF Building B;
  - 2. the number of barrier free employee/visitor parking stalls required by the NBCAE, to be located adjacent to the main entrance of the Gerry Wright OMF Building B;
  - 3. five (5) visitor parking stalls to be located near the Gerry Wright OMF Building B; and
  - 4. bicycle parking spaces, in the form of racks, for a number of bicycles equivalent to 10% of the vehicular spaces defined in 8-2.5.5A [*Parking Facilities*] of this Schedule with no less than five (5) to be located adjacent to Gerry Wright OMF Building B.

#### **8-2.5.6 Sand Silo**

- A. Provide a sand silo for the storage of sand to be used for LRV sand filling. The sand silo shall:
  - 1. comply with industry best practice for transit sand silos and receptacles;
  - 2. be fillable from the exterior of the building;
  - 3. keep sand in a dry uncontaminated condition;
  - 4. be gravity fed to fill a portable LRV sand filling vehicle; and
  - 5. be sized such that it can hold a minimum of two (2) months worth of sand to support operations of the Stage 2 LRVs.

#### **8-2.6 GERRY WRIGHT OMF BUILDING B**

- A. All rooms at the Gerry Wright OMF Building B shall comply with the *Room Data Sheets – Gerry Wright OMF Building B*, a copy of which is included in the Disclosed Data.

### 8-2.6.1 Gerry Wright OMF Sustainability Requirements

- A. Design and Construct the Gerry Wright OMF Building B within Gerry Wright OMF Parcel B to:
1. achieve LEED® Silver Certification using LEED® Building Design and Construction: New Construction in accordance with Section 4.5 [*LEED Silver Certification*] of Schedule 4 [*Design and Construction Protocols*];
  2. demonstrate the following performance improvements in accordance with *Part 8 – Building Energy Performance Compliance Path* of NECB 2011:
    - a. achieve 25% or greater energy efficiency than required by the NECB 2011 for the Gerry Wright OMF Building B Occupied Areas;
      - i. benefits from the rack mounted solar photovoltaic array system shall not be considered as part of this analysis;
    - b. achieve 20% or greater greenhouse gas reduction than required by the NECB 2011 for the Gerry Wright OMF Building B Occupied Areas;
      - i. calculate greenhouse gas emissions using the conversion factors located in Figure 2 (natural gas) and Figure 6 (electricity) of the *Energy Star Portfolio Manager Technical Reference Greenhouse Gas Emissions* document; and
      - ii. benefits from the rack mounted solar photovoltaic array system shall not be considered as part of this analysis;
    - c. achieve an Annual Heating Demand that is less than or equal to 220 kWh/m<sup>2</sup> for the Gerry Wright OMF Building B Occupied Areas; and
  3. incorporate a rack mounted solar photovoltaic array system that:
    - a. has a minimum power rating of 450 kW DC and is expected to generate 2000 Gigajoules per year;
      - i. should the power rating result in a system that is expected to generate more than the expected annual electrical consumption of the facility, Project Co shall explore aggregate sites as defined in the *Alberta Electric Utilities Act*;
      - ii. should the power rating result in a system that is expected to generate more than the expected annual consumption of the aggregate sites as defined in the *Alberta Electric Utilities Act*, Project Co may propose a reduced power rating that will comply with the *Alberta Electric Utilities Act* in accordance with Schedule 13 [*Changes*];
    - b. is arranged to allow convenient access for safe maintenance in accordance with CSA Z462 and the *Alberta Occupational Health and Safety Regulations, Part 9 Fall Protection*; and
    - c. is provided with the required electrical equipment and EPCOR SCADA communications equipment, in accordance with the *EPCOR Customer Connection Guide* and *Technical Guideline for the Interconnection of Distributed Energy Resources to EPCOR Distribution and Transmission Inc.'s Distribution System*, to safely and effectively transfer any surplus energy to the electrical power grid.
- B. Any proposed deviation from, or equivalent or substitute to, the renewable energy system requirements of Section 8-2.6.1A [*Gerry Wright OMF Sustainability Requirements*] of this Schedule shall be submitted to the City as an Innovation Proposal, pursuant to Schedule 13 [*Changes*].

1. Alternative renewable systems shall as a minimum achieve the expected annual energy generation as described in Section 8-2.6.1A.3 [*Gerry Wright OMF Sustainability Requirements*] of this Schedule.

### **8-2.6.2 Site Requirements**

- A. Design and Construct the Gerry Wright OMF Building B within Gerry Wright OMF Parcel B, including:
  1. Shop Tracks in accordance with Section 8-2.6.3 [*Shop Tracks*] of this Schedule;
  2. Shop Track Traction Power System, as set out in Section 6-2 [*Traction Power System*] of this Schedule;
  3. OCS as set out in Section 6-3 [*Overhead Catenary System*] of this Schedule;
  4. LRV storage and maintenance area in accordance with Section 8-2.6.4 [*LRV Storage and Maintenance Area*] of this Schedule;
  5. support shop areas in accordance with Section 8-2.6.5 [*Support Shop Areas*] of this Schedule;
  6. ancillary shop areas in accordance with Section 8-2.6.6 [*Ancillary Areas*] of this Schedule;
  7. utility rooms in accordance with Section 8-2.6.7 [*Utility Rooms*] of this Schedule;
  8. a permanent generator receptacle; and
  9. all other facilities, equipment, systems and sub-systems as required in this Section 8-2.6 [*Gerry Wright OMF Building B*].
- B. Design the Gerry Wright OMF Building B to be integrated with the existing Gerry Wright OMF Building A to function as a singular campus to meet the Operability and Maintainability Parameters.
- C. Not less than 120 Business Days after the Effective Date, or at an alternate date accepted by the City, Project Co shall prepare and submit a parametric programming report (the "**Gerry Wright OMF Building Parametric Programming Report**") that describes the design rationales, criteria, standards, and assumptions for the Design of the Gerry Wright OMF Building B, which includes the following:
  1. facility programming analysis, including assessment of the LRV storage and maintenance area and the support shop facility utilization on the basis of:
    - a. Stage 2 LRV fleet size, as demonstrated to meet the Operability and Maintainability Parameters;
    - b. optional allocation of some functions listed in Section 8-2.3A [*Functions*] of this Schedule which can be clearly demonstrated to be fully or partially performed in the Gerry Wright OMF Building A for all of the Stage 2 LRV fleet, as accepted by the City, for which a separate parametric programming report shall be submitted to demonstrate feasibility of this option;
      - i. for any optional allocation of a function(s) to Gerry Wright OMF Building A accepted by the City, the City may decide to re-allocate the applicable area within Gerry Wright OMF Building B to another function listed in Section 8-2.3A [*Functions*] of this Schedule;
    - c. operations, maintenance and support staff, as demonstrated to meet the Operability and Maintainability Parameters;
    - d. planned work shifts, as demonstrated to meet the Operability and Maintainability Parameters;

- e. maintenance activities and cycles, as set out by LRV Supplier operations and Maintenance recommendations, and as demonstrated to meet the Operability and Maintainability Parameters;
- f. LRV and Train testing and commissioning activities including;
  - i. static testing;
  - ii. functional testing;
  - iii. dynamic testing;
  - iv. load weight testing;
- g. calculation of demand (e.g. frequency and durations of body and paint shop use, blowdown and wash area, heavy maintenance cycling);
- h. analysis of individual spaces, including:
  - i. space and service requirements;
  - ii. access, including for cranes, delivery trucks and equipment as necessary;
  - iii. vertical and horizontal accessibility for maintenance personnel and equipment;
  - iv. circulation to adjacent or related spaces;
  - v. access control for safety and security;
  - vi. number, spacing, and type of electrical installations and receptacles;
  - vii. workplace health and safety equipment;
  - viii. clearances;
  - ix. HVAC requirements;
  - x. lighting requirements; and
  - xi. data requirements.
- i. adjacency analysis to minimize unnecessary moving or handling of personnel, parts, tools, equipment and machinery;
- j. crane analysis, including the maximum lift that each crane will perform and calculations of demand (e.g. frequency of use and demand to capacity ratios during maximum lifts), limits of reach, landing positions, sweep, and requirements for interlocking with catwalks, overhead line equipment, lifting jacks and any other cranes or equipment;
- k. tools, equipment and machinery analysis, as set out by LRV Supplier and operations and maintenance recommendations, and as demonstrated to meet the Operability and Maintainability Parameters, applying a RAM analysis process to specify reliability requirements for proposed tools and machinery, provided that:
  - i. where reliability data are not available for some tools they shall be minimally specified as industrial grade and provided as such consistent with Good Industry Practice.

- l. provision of access to facilitate installation and change-out of Fixed Tooling, special tools, equipment and machinery without the need to perform modifications to the building structure.
2. program space analysis forms for each space in the Gerry Wright OMF Building B, with a separate form provided for each space which lists:
  - a. goals and objectives of the space;
  - b. tools, equipment, and machinery that will be housed in the space;
  - c. furniture and storage required in the space;
  - d. desired adjacencies to other functions; and
  - e. special building and utility requirements that are to be provided;

and incorporating all design requirements specified in this Section 8-2.6 [*Gerry Wright OMF Building B*], and incorporating the prescriptive space requirements shown on the *Room Data Sheets – Gerry Wright OMF Building B*, a copy of which is included in the Disclosed Data;
3. diagrammatic floor plan sketches, for each space in the Gerry Wright OMF Building B, with a separate scaled diagram for each space which depicts:
  - a. the desired space configuration; and
  - b. the furniture, storage, equipment and utility services in the space.
4. modelling results depicting the overall circulation of maintenance personnel, equipment, machinery, and LRVs within Gerry Wright OMF Stage 2, access to all spaces within the Gerry Wright OMF Building B, and the LRV storage configuration;
5. overall scaled building layout drawings;
6. LEED checklist, demonstrating compliance with Section 8-2.6.1 [*Gerry Wright OMF Sustainability Requirements*] of this Schedule;
7. tabulated tool, equipment and machinery Bill of Materials;
8. confirmation of human factors considerations set out by the Human Factors Report requirements in accordance with Section 5.6.5 [*Human Factors Specialist*] of Schedule 4 [*Design and Construction Protocols*]; and
9. details of structural live loads used in the design of the Gerry Wright OMF Stage 2, including, at a minimum:
  - a. Gerry Wright OMF Building B floor plans showing locations, extents and magnitudes of all live loads due to use and occupancy;
  - b. a modified Trackway vehicle vertical live load model, if applicable, to use for the design of the LRV storage area;
  - c. a modified procedure to calculate dynamic load allowances for the Trackway vehicle loads, if applicable;
  - d. all applicable machinery and equipment load magnitudes, configurations, locations of application and corresponding impact factors, including, at a minimum, a forklift load model;
  - e. all locations, extents and magnitudes of blast loads; and

- f. all locations and magnitudes of concentrated loads resulting from maintenance and storage of LRV components.
- D. The Gerry Wright OMF Building Parametric Programming Report may include proposed amalgamations of some of the support shop areas, ancillary shop areas spaces, and utility rooms described in Section 8-2.6 [*Gerry Wright OMF Building B*] of this Schedule, however these shall be accompanied by risk/benefit analysis and proposed mitigations. Such proposed amalgamations shall not be implemented unless they are Accepted by the City pursuant to Schedule 2 [*Submittal Review Procedure*].
- E. Design the Gerry Wright OMF Building B to accommodate the number of operations, maintenance, transportation and support personnel required to meet the Operability and Maintainability Parameters.

### **8-2.6.3 Shop Tracks**

- A. Design and Construct the Gerry Wright OMF Building B Shop Tracks in accordance with Section 3-1 [*Track*] of this Schedule, and:
1. provide a sufficient number of individual bays to accommodate the LRV fleet as required to meet the Operability and Maintainability Parameters;
  2. space Shop Tracks to accommodate the functions required of each bay, accounting for any activity and machinery that may be required to perform the prescribed tasks;
  3. provide maintenance bays and storage tracks with a minimum length to accommodate the longest possible LRV configuration, where the maximum usable length of a track is defined by the clearance points calculated based on track spacing and supplied LRV clearance envelopes;
  4. have all Shop Tracks located on horizontal tangents;
  5. have all maintenance bays and storage tracks located at the same elevation and sag graded at 0.3% longitudinally to facilitate drainage to drain basins within the building;
  6. have all maintenance bays and storage tracks elevations match adjacent floor elevations;
  7. provide sufficient space between adjacent maintenance bays and storage tracks on the same track to allow passage of personnel and maintenance equipment between parked LRVs;
  8. provide sufficient space between the panel folding doors, when open, and the ends of parked LRVs to permit safe passage of personnel, cleaning equipment, and maintenance equipment;
  9. provide clearances to permit LRVs to enter and exit maintenance bays and storage tracks without being trapped by LRVs in adjacent bays;
  10. have a vertical profile that limits the risk of runaway LRVs from maintenance bays and storage tracks;
  11. provide OCS for each maintenance bay and storage track, with the exception of the paint shop area described in Section 8-2.6.4.7 [*Paint Shop*] of this Schedule;
  12. provide a visual safety indicator at each OCS interlocking location;
  13. provide at least one (1) visual safety indicator at each end of every Shop Track that is visible from both inside and outside the building;

14. clearly identify the extents of the worst-case LRV track clearance envelope, between the Stage 1 LRV and Stage 2 LRV, along the full length of all Shop Tracks by, for example, providing paint markings on the floor;
15. provide a minimum of one (1) Emergency Alarm Station per maintenance bay located mid-track; and
16. provide Embedded Track for the full length of each Shop Track that is not within the LRV Storage Area.

#### **8-2.6.4 LRV Storage and Maintenance Area**

- A. This Section 8-2.6.4 [*LRV Storage and Maintenance Area*] sets out the general requirements for LRV storage and maintenance areas within the Gerry Wright OMF Building B.
- B. Provide automatic or automated panel folding doors, with material and hardware matching the panel folding doors at the Gerry Wright OMF Building A, at all LRV entrances to the Gerry Wright OMF Building B as follows:
  1. if the door movement envelope infringes on a safe walking route, a pedestrian door shall be integrated with bi-directional visibility to provide safe passage and avoid unnecessary opening and closing of the panel folding door;
  2. the controller for doors must be placed in a location that does not restrict vehicle or pedestrian movements and allows visibility such that the doors open and close safely without obstruction;
  3. when the doors are moving, there shall be a visible and audible warning; and
  4. the movement of pedestrians shall not activate the panel folding doors.
- C. Provide heavy duty exterior person doors with a panel allowing bi-directional visibility along the length of the storage area spaced a maximum of 45 m apart.
- D. Provide a minimum of one permanent fixed eye wash facility at every maintenance bay.
- E. Provide a minimum of one permanent fixed eye wash facility at every second storage track.
- F. Provide clerestory windows to maximize natural light penetration in all maintenance areas.
- G. Provide a floor within all LRV maintenance areas that will support a portable jack system capable of lifting the mass of a Stage 1 LRV plus 20%.
- H. Provide clearance to lift a Stage 1 LRV a minimum height of 2 m from floor level.
- I. Provide a central vacuum system that services the LRV storage and maintenance area, support shop areas, and utility areas.

##### **8-2.6.4.1 LRV Storage Area**

- A. Provide LRV internal storage area to support:
  1. safety inspections of LRVs;
  2. the activities associated with interior cleaning;
  3. overnight LRV storage; and
  4. LRV sand filling using a portable LRV sand-filler vehicle.



- B. Design and Construct the LRV internal storage area to berth:
1. LRVs up to 44m long, with couplers retracted, and Trains up to 90m long, with end-couplers retracted, with space provided around the ends of single cars and Trains for movement of staff and equipment;
  2. a minimum twenty-eight (28) Stage 2 LRVs simultaneously; and
  3. one (1) service access level at every track:
    - a. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C.2C [*LRV Service Access Levels*] of this Schedule.
- C. The LRV internal storage area shall be rectangular in shape with all LRV storage track end points aligned.

#### **8-2.6.4.2 Light Maintenance/Inspection Area**

- A. Provide a light maintenance/inspection area to support the performing of LRV:
1. safety inspections;
  2. servicing;
  3. corrective maintenance; and
  4. light maintenance.
- B. Design and Construct the light maintenance/inspection area to include:
1. three (3) service access levels at every track including:
    - a. access to undercarriages of the LRVs in accordance with Section 8-1.3.2B [*LRV Service Access Levels*] of this Schedule;
    - b. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule; and
    - c. access to the LRV roof level at both sides of the Stage 2 LRV via catwalks as described in accordance with Section 8-1.3.2D [*LRV Service Access Levels*] of this Schedule.
  2. a service lift which can lift tools and equipment between all three (3) service levels. The lift shall be service rated to meet the Operability and Maintainability Parameters, and have a minimum lift capacity of 1800 kg;
  3. a monorail crane with a minimum capacity and rating of two (2) tonnes, if demonstrated as required by the Accepted Gerry Wright OMF Building Parametric Programming Report.
    - a. If demonstrated as not required by the Accepted Gerry Wright OMF Building Parametric Programming Report, provide structural and electrical provisions for the future installation of a monorail crane.

#### **8-2.6.4.3 Heavy Maintenance and Repair Area**

- A. Provide a heavy maintenance and repair area to support the performance of the following, at a minimum:
1. LRV major repairs;

2. removal of LRV bogies; and
  3. complete changeouts of:
    - a. LRV bogie assemblies;
    - b. drive units; and
    - c. any other undercar or side-mounted car component.
- B. Provide an overhead bridge crane with a minimum capacity and rating of fifteen (15) tonnes and as required by the Accepted Gerry Wright OMF Building Parametric Programming Report, with the ability to span the extents of the heavy maintenance and repair area and with the ability to lift loads from the loading dock area.
1. Provide access to the overhead bridge crane to perform inspection, service and maintenance of the bridge crane.
- C. Provide in-ground lifts that will have:
1. in-ground body lifts, aligned with the carbody lifting points, with the body lift system having the capacity and rating to lift the mass of a single Stage 2 LRV plus 20%; and
  2. in-ground bogie lifts, aligned with each bogie, with the bogie lift system having the capacity and rating to lift the mass of a single Stage 2 LRV plus 20%.
- D. Provide an in-track turntable with the capacity and rating to support the mass of a fully assembled LRV bogie plus 20%, to transfer bogies from the heavy maintenance and repair area to the bogie shop.
- E. Design and Construct the heavy maintenance and repair area to include:
1. two (2) service access levels including:
    - a. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule; and
    - b. access to the LRV roof level at one side of the Stage 2 LRV via catwalks in accordance with Section 8-1.3.2D [*LRV Service Access Levels*] of this Schedule, excluding where the in-ground lift is located.

#### **8-2.6.4.4 Heavy Cleaning Area**

- A. Provide a heavy cleaning area to support the activities associated with the thorough cleaning of the LRV floors, interior panels, ceilings, cloth seat backs, cushions, and windows.
- B. Design and Construct the heavy cleaning area to include:
1. one (1) service access level:
    - a. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule.

#### **8-2.6.4.5 General Maintenance Area**

- A. Provide a maintenance area to support general maintenance and service activities not specifically described elsewhere, including application of vehicle wraps for advertising.

- B. Design and Construct the general maintenance area to include:
  - 1. two (2) service access levels including:
    - a. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule; and
    - b. access to the LRV roof level at one side of the Stage 2 LRV via catwalks in accordance with Section 8-1.3.2D [*LRV Service Access Levels*] of this Schedule.

#### **8-2.6.4.6 Body Shop Area**

- A. Provide a body shop area with direct access to the paint shop, to support the activities associated with repairing an LRV as a result of accident or refurbishment campaign.
- B. Design and Construct the body shop to include:
  - 1. one (1) service access level:
    - a. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule.
  - 2. accommodations for metal cutting and welding and body/frame pulling equipment;
  - 3. sufficient ventilation for torch cutting and welding per regulatory codes; and
  - 4. a monorail crane with a minimum capacity and rating of two (2) tonnes and as required by the Accepted Gerry Wright OMF Building Parametric Programming Report.

#### **8-2.6.4.7 Paint Shop Area**

- A. Provide a paint shop area with direct access to the body shop, to support the activities associated with the painting of the exterior of the LRV and its components.
- B. The paint shop shall include a paint booth and direct access to the paint mixing and storage room.

#### **8-2.6.4.8 Paint Booth**

- A. Design and Construct the paint booth to include:
  - 1. one (1) service access level:
    - a. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule.
  - 2. paint application preparation area;
  - 3. robotic paint application equipment, on both sides of the paint shop;
    - a. The robotic paint application equipment shall be capable of movement along three planes.
    - b. The robotic paint application equipment shall be capable of painting the sides, ends, and roof of an LRV.
  - 4. panel folding doors, with material and hardware matching the panel folding doors at the Gerry Wright OMF Building A, to allow LRVs to be moved from/to adjacent body shop;
  - 5. exhaust ventilation for hazardous fumes per regulatory codes;

- 6. an independent HVAC system; and
  - 7. dust collection and exhaust system for sanding and buffing.
- B. OCS shall not be provided in the paint booth.
- C. The paint booth shall accommodate an LRV that is up to 44m long with couplers retracted and up to 46m long with couplers extended, with appropriate space provided for staff to move around and paint all surfaces of the vehicle.

#### **8-2.6.4.9 Paint Mixing and Storage Area**

- A. Provide a paint mixing and storage area for the handling and storage of paints and other body repair materials.
- B. Design and Construct the paint mixing and storage room to include, and provide the following:
- 1. storage area for paints and solvents;
  - 2. paint mixing station capable of mixing two (2) – one (1) gallon cans of paint simultaneously;
  - 3. permanent fixed eye wash facilities with drainage system;
  - 4. storage area for body repair materials; and
  - 5. environmental treatments to prevent the accumulation of harmful vapours.

#### **8-2.6.4.10 Blowdown and Wash Areas**

- A. Provide blowdown and exterior LRV wash areas to support the activities associated with removal of debris and hazardous materials from the undercarriage of LRVs and exterior washing of the LRVs.
- B. The blowdown area and LRV wash area are separate functions which shall be performed in separate spaces, unless Project Co can demonstrate to the City, acting reasonably, that there is inadequate room to accommodate these functions separately, in which case they may be performed in the same space. Design and Construct the blowdown area and LRV wash area to include:
- 1. two (2) service access levels at every track including:
    - a. access to undercarriages of the LRVs in accordance with Section 8-1.3.2B [*LRV Service Access Levels*] of this Schedule; and
    - b. access to top of rail level at both sides of the LRV in accordance with Section 8-1.3.2C [*LRV Service Access Levels*] of this Schedule.

#### **8-2.6.4.11 Blowdown Area**

- A. The blowdown area shall include:
- 1. an area to conveniently perform the blowdown;
  - 2. water heating and pressurizing equipment, pumps, drainage and waste water treatment facilities,
  - 3. ventilation system suitable for the hazardous particulate in a blowdown area;
  - 4. power and control equipment;

5. the supply of pressurized hot and cold water, compressed air and shop power at the applicable service access levels;
6. storage space for tools, accessories and material storage;
7. heating, and cooling, and exhaust stacks for cleaning equipment;
8. sufficient space to accommodate the length of an LRV; and
9. storage tanks to facilitate the blowdown of ten (10) LRVs before reaching capacity.

#### **8-2.6.4.12 Wash Area**

A. The wash area shall include:

1. areas to conveniently perform the wash as a first service function upon a Train's arrival from revenue service;
2. water heating and pressurizing equipment, pumps, drainage and waste water treatment facilities, ventilation, and power and control equipment;
3. the supply of pressurized hot and cold water, compressed air and shop power at two levels;
4. storage space for tools, accessories and material storage;
5. an automatic wash stand with water nozzles and brushes that clean the ends, sides, and undercarriages of both LRVs in a two-car Train within ten (10) minutes;
6. air strippers that clean the undercarriages of a two-car Train;
7. automatic mode operation, that selects single-car or two-car operation, and is activated by the incoming Train as it moves through the carwash on its own power;
8. heating, cooling, and exhaust stacks for cleaning equipment;
9. sufficient space to accommodate a coupled two-car Train, up to 90m long, to be washed in one movement without changing ends, and moved directly into the LRV Storage Area; and
10. storage tanks and a filtration system to accommodate the washing of at least 14 two-car Trains per day.

#### **8-2.6.5 Support Shop Areas**

A. This Section 8-2.6.5 [*Support Shop Areas*] sets out the general requirements for the support shop areas to be provided within the Gerry Wright OMF Building B.

B. Support shop areas:

1. shall each be designated for a particular support function;
2. may include separated enclosures as a result of human factor considerations set out by the Human Factors Report requirements in accordance with Section 5.6.5 [*Human Factors Specialist*] of Schedule 4 [*Design and Construction Protocols*];
3. shall include access for forklift, electric cart or delivery truck;
4. shall include access to loading dock for large volume deliveries and components shipping and receiving; and

5. shall include lighting, heating, cooling, ventilation, drainage and waste disposal in accordance with NBCAE and applicable standards.
- C. Provide a service lift which can lift maintenance personnel with tools and equipment to service any support shop areas that are not located on the ground level. The lift shall be service rated to meet the Operability and Maintainability Parameters and have a minimum lift capacity of 1800 kg.
- D. All upper level support shop areas and utility rooms shall be accessible from all ancillary areas on the same floor without necessitating the use of vertical circulation.

#### **8-2.6.5.1 Bogie Shop**

- A. Provide a bogie shop to support the activities associated with bogie maintenance and overhaul, including activities associated with the use of an axle press, a tire press, a bogie frame press, in-track turn tables, and lift tables.
- B. Provide a clean room for friction brake repair within the bogie shop.
- C. Design and Construct the bogie shop to include, and provide the following:
  1. a bogie wash station enclosure;
  2. direct access to move wheelsets from the heavy maintenance and repair area through an in-track turntable;
  3. ready access to the heavy maintenance and repair area overhead bridge crane;
  4. direct access to machine/sheet metal shop;
  5. compressed air;
  6. accommodation of a tire press;
  7. accommodation of a gearbox workstation;
  8. an in-ground lift table with the capacity and rating to lift the mass of a fully assembled LRV motor bogie plus 20%; and
  9. accommodation of an axle press and a bogie frame press with the capacity and rating to lift the mass of a fully assembled LRV motor bogie plus 20%.
- D. Cranes or lifts are not permitted in lieu of the track/turntable link.

#### **8-2.6.5.2 HVAC Shop**

- A. Provide an HVAC shop to support the equipment and activities associated with the maintenance and overhaul of Stage 2 LRV HVAC units.
- B. Design and Construct the HVAC shop to include, and provide the following:
  1. compressed air;
  2. a looped monorail crane with a minimum capacity and rating of two (2) tonnes and as required by the Accepted Gerry Wright OMF Building Parametric Programming Report;
  3. accommodation of an HVAC test stand;
  4. refrigerant reclamation system;

5. scale for weighing refrigerant; and
  6. a storage system for cylinders and staged components.
- C. Design and Construct the HVAC shop to provide ready access to a crane servicing the heavy maintenance and repair area.
- D. Supply power to operate all Stage 2 HVAC functions.

#### **8-2.6.5.3 Pantograph Shop**

- A. Provide a pantograph shop to support the equipment and activities associated with the maintenance and overhaul of Stage 2 LRV pantographs.
- B. Design and Construct the pantograph shop to include, and provide the following:
1. compressed air; and
  2. accommodation of a storage system for components and staged pantographs.
- C. Design and Construct the pantograph shop to provide ready access to a crane servicing the heavy maintenance and repair area.

#### **8-2.6.5.4 General Repair Shop**

- A. Provide a general repair shop to support the equipment and activities associated with general repair applications.
- B. Design and Construct the general repair shop to include, and provide the following:
1. compressed air;
  2. accommodation of a drill press;
  3. accommodation of a hydraulic press;
  4. accommodation of a buffer/grinder; and
  5. accommodation of a band saw.

#### **8-2.6.5.5 Brake Shop**

- A. Provide a brake shop to support the equipment and activities associated with the maintenance and overhaul of the LRV braking systems.
- B. Design and Construct the brake shop to include, and provide the following:
1. compressed air;
  2. accommodation of a brake test rack;
  3. accommodation of workstations; and
  4. accommodation of a storage system for component staging.

#### **8-2.6.5.6 Traction Power Bench Test/APU Shop**

- A. Provide a traction power bench test/APU shop to support the equipment and activities associated with the maintenance and overhaul of traction control and auxiliary power units.
- B. Design and Construct the traction power bench test/APU shop to include, and provide the following:
  - 1. compressed air;
  - 2. load banks for testing;
  - 3. high voltage electrical test and repair; and
  - 4. accommodation of a flip table for inspections and repairs.
- C. Design and Construct the traction power bench test/APU shop to provide ready access to a crane servicing the heavy maintenance and repair area.

#### **8-2.6.5.7 Machine/Sheet Metal Shop**

- A. Provide a machine/sheet metal shop to support the equipment and activities associated with general machining and metal work.
- B. Design and Construct the machine/sheet metal shop to include, and provide the following:
  - 1. compressed air;
  - 2. accommodation of workstations;
  - 3. a designated welding area;
  - 4. accommodation of a storage system for component staging;
  - 5. accommodation of various industrial machines, metal cutting, and bending equipment; and
  - 6. a secured lockable storage space for tools, accessories, and materials.
- C. Design and Construct the machine/sheet metal shop to include direct access to the bogie shop.

#### **8-2.6.5.8 Electronics/Electric Components Shop**

- A. Provide an electronics/electric components shop to support the equipment and activities associated with electronic and electrical components bench repairs.
- B. Design and Construct the electronics/electric components shop to include, and provide the following:
  - 1. accommodations for the repair of LRV wiring harnesses;
  - 2. compressed air;
  - 3. accommodation of repair workstations;
  - 4. accommodation of test equipment; and
  - 5. accommodation of test centres for repair of communication, surveillance, and control equipment.



#### **8-2.6.5.9 Battery Room**

- A. Provide a battery room to support the equipment and activities associated with the storage and servicing of batteries.
- B. Design and Construct the battery room to include, and provide the following:
  - 1. a floor drain with an acid neutralization basin;
  - 2. a self contained emergency shower and permanent fixed eye wash facilities with a drainage system;
  - 3. accommodation of a battery bench;
  - 4. accommodation of a charging station;
  - 5. accommodation for the capture of regenerated power; and
  - 6. hydrogen detection equipment in accordance with Section 6-1.10.5.3 [*Supply Air Exchange*] of this Schedule.

#### **8-2.6.5.10 Parts Storage Room**

- A. Provide a parts storage room to support the equipment and activities associated with loading, shipping, receiving, warranty recovery, parts issuing, warehousing, and component storage.
- B. Design and Construct the parts storage room to include, and provide the following:
  - 1. accommodation of equipment to aid the lifting of heavy objects / deliveries such as overhead crane access;
  - 2. a parts counter;
  - 3. a monorail crane with a minimum capacity and rating of five (5) tonnes, to transfer heavy loads between loading dock and overhead crane area;
  - 4. an overhead door for distribution;
  - 5. accommodation of an open workstation for inventory management processes; and
  - 6. accommodation of a secure tool storage area.
- C. Design and Construct the parts storage room to provide:
  - 1. direct access to the loading dock(s); and
  - 2. ready access to the heavy maintenance and repair area crane.
- D. The parts storage room shall have a minimum volume to house the spare part equipment specified by Section 5.6.6 [*Spare Parts*] of Schedule 4 [*Design & Construction Protocols*].

#### **8-2.6.5.11 Hazardous Material and Waste Oil Storage Room**

- A. Provide a hazardous material and waste oil storage room to support the equipment and activities associated with the handling, control and storage of hazardous materials.
- B. Design and Construct the hazardous material and waste oil storage room to include, and provide the following:

1. accommodation of containment pallets;
  2. accommodation of inflammables material storage cabinets;
  3. a self contained emergency shower and permanent fixed eye wash facilities with a drainage system; and
  4. accommodation for the handling and storage of drums of waste fluids, motor oil, transmission fluids and coolant.
- C. All electrical apparatus in the hazardous material and waste oil storage room shall be explosion proof.
- D. Provide a hazardous material and waste oil storage room with an oil tank with a minimum capacity of 2000 litres and appropriate environmental protection.

#### **8-2.6.5.12 Lube and Oil Storage Room**

- A. Provide a lube and oil storage room to support the equipment and activities associated with the housing compressor, lubrication and oil handling and storage.
- B. Design and Construct the lube and oil storage room to include, and provide the following:
1. accommodation of containment pallets;
  2. accommodation of inflammables material storage cabinets;
  3. permanent fixed eye wash facilities with a drainage system; and
  4. accommodation for the handling and storage of oils, lubricants, compressor and auxiliary equipment, lubrication pumps, and storage vessel equipment.
- C. Design and Construct the lube and oil storage room to provide ready access from/to the brake shop.
- D. All electrical apparatus in the lube and oil storage room shall be explosion proof.

#### **8-2.6.5.13 Tool and Miscellaneous Equipment Storage Room**

- A. Provide a tool and miscellaneous equipment storage room for the handling and storage of various tools and miscellaneous equipment.
- B. Design and Construct the tool and miscellaneous equipment storage room to include, and provide the following:
1. accommodation of containment pallets; and
  2. accommodation of inflammables material storage cabinets.
- C. The tool and miscellaneous equipment storage room shall be a closable and lockable room.

#### **8-2.6.5.14 Other Support Shop Areas**

- A. Provide a loading dock for large volume deliveries and components shipping and receiving, covered and protected from weather elements.
1. Provide a freight elevator in the loading dock with direct access to the second floor, with a minimum capacity of 9000 kg.
- B. Provide an area for handling waste and recycling materials.

- C. Provide a dedicated first aid room.
- D. Provide a safe walkway which shall be:
  - 1. an area designated as non-PPE (personal protective equipment) to allow employee access from the main entrance of the building to the main floor ancillary areas, including the washrooms, employee lockers, dispatch space, Driver reporting area/lunch room, and the LRV Storage Area; and
  - 2. walled off from open work areas where hazards exist that would warrant the use of PPE.

#### **8-2.6.6 Ancillary Areas**

- A. This Section 8-2.6.6 [*Ancillary Areas*] sets out the general requirements for ancillary areas to be provided within the Gerry Wright OMF Building B. These areas account for administrative, operations and support functions other than direct maintenance. Each required area shall be sized and configured in accordance with Good Industry Practice.
- B. Ancillary areas shall be on separate electrical circuits from areas specified in Section 8-2.6.4 [*LRV Storage and Maintenance Area*] and Section 8-2.6.5 [*Support Shop Areas*] of this Schedule.
- C. Provide a central vacuum system that services the ancillary areas, separate from the central vacuum system that services the LRV storage and maintenance area, support shop areas, and utility areas.
- D. Provide a passenger elevator to service any office spaces, administration spaces, and employee welfare and wellness spaces that are not located on the ground level.

##### **8-2.6.6.1 Office Spaces**

- A. Provide the following office spaces to meet the Operability and Maintainability Parameters:
  - 1. one (1) closed office space to be located at ground level designated as dispatch space;
  - 2. one (1) closed office space to be located at upper level designated as foreman space;
  - 3. one (1) closed office space to be located at ground or upper level designated as operations supervisor space;
  - 4. open office space to accommodate seven (7) staff;
  - 5. open office space on shop floor area designated as foreman space;
  - 6. closed training office and training room for maintenance personnel;
  - 7. closed training office and training room for operations personnel; and
  - 8. one (1) conference room.

##### **8-2.6.6.2 Administration Spaces**

- A. Provide the following administration spaces:
  - 1. administrative storage area;
  - 2. consolidated printer area to service the office spaces;
  - 3. consolidated printer area on the shop floor to service shop and maintenance areas;

4. file storage room; and
5. administrative supplies storage area.

#### **8-2.6.6.3 Employee Welfare and Wellness Spaces**

A. Provide the following employee welfare and wellness spaces:

1. kitchen and breakroom;
2. laundry room with space to accommodate enough industrial clothes washers and clothes dryers for the number of maintenance staff working at the Gerry Wright OMF Stage 2;
3. quiet room;
4. washrooms, where in addition to those required by NBCAE, a separate single user washroom designated as “universal” is provided;
5. Driver reporting area/lunchroom;
6. male and female change rooms with showers in accordance with the Operability and Maintainability Parameters;
7. space to accommodate thirty (30) future lockers, assuming a minimum locker footprint of 560 mm wide by 560 mm deep, located within, or adjacent to, the change rooms; and
8. green space / outdoor seating area, as may be beneficial for purposes of LEED calculations as set out in Section 8-2.6.1 [*Gerry Wright OMF Sustainability Requirements*] of this Schedule.

#### **8-2.6.6.4 Janitor Room**

A. Provide a janitor room on each level to support activities associated with cleanliness and hygiene of the ancillary and support areas of the Gerry Wright OMF Building B.

#### **8-2.6.7 Utility Rooms**

A. This Section 8-2.6.7 [*Utility Rooms*] sets out the general requirements for the utility rooms to be provided within the Gerry Wright OMF Building B which support operations of the facility, for which the associated equipment, components, materials, systems, and sub-systems and their distribution shall be designed in accordance with Section 5-1 [*General*] of this Schedule and the Valley Line West LRT Facilities Design and Construction Standards. Each required room shall be sized and configured in accordance with Good Industry Practice.

#### **8-2.6.7.1 Shop TPSS Room**

- A. Provide a shop TPSS room to house, and include the equipment required for, the TPSS for the Shop Track Traction Power System described in Section 6-2.3.4 [*Shop TPSS and Yard TPSS*] of this Schedule; where:
1. the TPSS Traction Power equipment is in accordance with Section 6-2.3 [*Design Requirements*] of this Schedule; and
  2. no portion of washroom water servicing is located directly above the shop TPSS room.
- B. If space permits, the Yard TPSS described in Section 8-2.10 [*Yard TPSS*] of this Schedule may be co-located in the shop TPSS room, subject to Acceptance by the City acting reasonably.

#### **8-2.6.7.2 Mechanical Room**

- A. Provide a mechanical room to house, and include the equipment required for, the building mechanical systems. This includes equipment such as central heating equipment, central cooling equipment, hydronic distribution equipment, and domestic hot water heating equipment.

#### **8-2.6.7.3 Electrical and PV Equipment Room**

- A. Provide an electrical room to house, and include all equipment required for, the building electrical system and PV panel equipment.
  - 1. This includes equipment such as the main electrical distribution gear, central distribution panels, transfer switches, inverters, motor control centers and solar power converters.
  - 2. Equipment required for the building electrical system and PV panel equipment shall not be located in LRV maintenance bays.

#### **8-2.6.7.4 Sprinkler Room**

- A. Provide a sprinkler room to house, and include the equipment required for, a sprinkler tree connected to the main water service entrance, and additional equipment to distribute water to the sprinkler zones within the building.

#### **8-2.6.7.5 Data Centre**

- A. Provide a Data Centre room, sized and configured to meet the requirements set out in Section 6-1.8 [*Data Centres*] of this Schedule.

#### **8-2.6.7.6 Communication Room**

- A. Provide a communication room to house the building premise communication equipment, designed, constructed and configured to:
  - 1. be in accordance with ANSI/BICSI 002-2014, Class F2;
  - 2. not be located directly underneath any portion of washroom water servicing;
  - 3. include all building premise wire and cabling termination equipment and materials in accordance with Section 6-1.21 [*Wire and Cable*] of this Schedule, where:
    - a. cables and associated conduits are extended to the Data Centre and to each room and area as set out in the Accepted [REDACTED] Parametric Programming Report;
  - 4. include communications cabinets which shall:
    - a. house fibre optic, copper, and communication infrastructure and equipment required for the full operation of the building and surrounding infrastructure as set out in the Accepted Gerry Wright OMF Building Parametric Programming Report;
    - b. have a nominal equipment mounting width of 19 in;
    - c. be a minimum 42 RU (height);
    - d. provide access to both front and back of equipment through vented, lockable doors keyed to the same key as those of Valley Line LRT Stage 1; and
    - e. provide access to both sides of equipment through removable side panels; and

5. include building communication infrastructure, consisting of:
  - a. radio system equipment in accordance with Section 6-1.12 [*Radio Systems*] of this Schedule;
  - b. telephone system equipment in accordance with Section 6-1.13 [*Telephone System*] of this Schedule;
  - c. Building SCADA System equipment in accordance with Section 6-1.14 [*Building SCADA System*] of this Schedule;
  - d. security and alarm equipment in accordance with Section 6-1.15 [*Security and Alarm System*] of this Schedule; and
  - e. network management equipment in accordance with Section 6-1.16 [*Network Management System*] of this Schedule.

### **8-2.7 GERRY WRIGHT OMF PART C YARD**

- A. If,
  1. in accordance with Section 8-2.5.1B [*Site Requirements*] of this Schedule, it is necessary to design and construct the Infrastructure described in that Section within Gerry Wright OMF Parcel C; or
  2. the Infrastructure required by Section 8-2.6 [*Gerry Wright OMF Building B*] of this Schedule would, if constructed on Gerry Wright OMF Parcel B, constrain Project Co's ability to provide the outcomes as demonstrated in the Accepted Gerry Wright OMF Building Parametric Programming Report,

Project Co shall design and construct such Infrastructure on Gerry Wright OMF Parcel C, and such Infrastructure shall be subject to the restrictions and conditions described in Section 8-2.7.1 [*Restrictions and Conditions*] below.

#### **8-2.7.1 Restrictions and Conditions**

- A. The Gerry Wright OMF Part C yard shall be designed and constructed subject to the following restrictions and conditions:
  1. no Tracks shall cross the Gerry Wright OMF East Utility ROW; and
  2. any Building Structures located within Gerry Wright OMF Parcel C shall be deemed to be located within Gerry Wright OMF Parcel B for purposes of LEED calculations as set out in Section 8-2.6.1 [*Gerry Wright OMF Sustainability Requirements*] of this Schedule.
- B. Project Co shall prepare and submit an alternative stormwater management mitigation plan describing how the objectives set out in Section 3.5 [*Stormwater Management*] of this Schedule will be achieved.
- C. Project Co shall perform all Utility coordination and bear the full cost of all Utility Conflict mitigations for crossings of Gerry Wright OMF East Utility ROW pursuant to Section 8-2.11 [*Pipeline Crossing*] of this Schedule.

### **8-2.8 NOT USED**

### **8-2.9 YARD LEAD TRACK**

- A. Design and Construct the Gerry Wright OMF Part B yard lead tracks:
  1. in accordance with Section 3-1 [*Track*] of this Schedule;

2. such that no additional tie-in to Mainline Track is required;
3. to tie into the Gerry Wright OMF Stage 1 lead tracks without requiring horizontal or vertical re-alignment of the existing tracks;
4. such that LRVs can be launched and received into Gerry Wright OMF Part B from either the Mainline Track northbound or southbound direction without reverse movements; and
5. to allow all tie ins to the Gerry Wright OMF Stage 1 tracks without impacting ongoing operation of the Gerry Wright OMF Stage 1 yard tracks.

#### **8-2.10 YARD TPSS**

- A. Provide a separate enclosure room to house, and include the equipment required for, the TPSS for the Yard Track Traction Power System described in Section 6-2.3.4 [*Shop TPSS and Yard TPSS*] of this Schedule. Design and Construct the TPSS, and all associated disconnects, in accordance with Section 6-2.3 [*Design Requirements*] of this Schedule.
- B. If the TPSS is built-in-place, design and construct the general electrical equipment in accordance with Section 5-1 [*General*] of this Schedule.

#### **8-2.11 PIPELINE CROSSING**

- A. This Section 8-2.11 [*Pipeline Crossing*] sets out the requirements for bridging Roadways, Track, sidewalks, drainage and duct banks across the Gerry Wright OMF West Utility ROW and for bridging Roadways and sidewalks across the Gerry Wright OMF East Utility ROW.
- B. Design and Construct the following utility crossings in accordance with the applicable pipeline agreements pursuant to Schedule 28 [*Part 2 – Utility Matters*]:
  1. combined Embedded Track and emergency vehicle road access crossing at the south side of the Gerry Wright OMF West Utility ROW;
    - a. catenary pole foundations shall not be driven; and
    - b. the emergency vehicle road access shall not utilize the Trackway;
  2. underground duct bank crossing extending from the southwest corner of Gerry Wright OMF Building B to Gerry Wright OMF Building A;
    - a. Access Vaults shall not be located within the Gerry Wright OMF West Utility ROW or the Gerry Wright OMF East Utility ROW;
  3. sidewalk extending from the southwest corner of the Gerry Wright OMF Building B to Gerry Wright OMF Building A;
  4. Track crossing at the north side of the Gerry Wright OMF West Utility ROW, which shall:
    - a. be constructed on a bridge structure in accordance with the requirements for Transportation Structures in Part 4 [*Transportation Structures and Building Structures*] of this Schedule such that no loads are imposed on the pipelines, and;
      - i. any catenary poles required throughout the Track crossing shall be integrated into the bridge structure such that they do not require separate foundations;
      - ii. the foundations for the bridge structure shall not be driven; and

- iii. the bridge structure shall be fully buried below the design grade, except for the Trackway slab edges and top of Trackway slab, which may be exposed; and
  - b. utilize Direct Fixation Track; and
- 5. drainage crossing at the north side of the Gerry Wright OMF West Utility ROW and Gerry Wright OMF East Utility ROW, where:
  - a. the drainage crossing at the Gerry Wright OMF West Utility ROW shall not be a swale.
- C. Roadways and Trackways shall cross the Gerry Wright East Utility ROW alignment and Gerry Wright West Utility ROW alignment at a minimum angle of 45°, in accordance with CSA Z662.
- D. The Design and Construction of all pipeline crossings shall allow for permanent maintenance access, acceptable to the pipeline companies, to their right of way at all times without encumbrance.
- E. Construction within the Gerry Wright OMF East Utility ROW and Gerry Wright OMF West Utility ROW shall comply with Section 1-3.2 [*Pipeline and Powerline Corridors*] of this Schedule.
- F. Project Co shall comply with the requirements of Schedule 28 [*Part 2 – Utility Matters*] for any utility crossings to be Designed and Constructed across the Gerry Wright OMF West Utility ROW.
- G. Project Co shall comply with the requirements of Schedule 28 [*Part 2 – Utility Matters*] for any utility crossings to be designed and constructed across the Gerry Wright OMF East Utility ROW.

#### **8-2.12 AUTOMATIC VEHICLE INSPECTION SYSTEM**

- A. Provide an Automatic Vehicle Inspection System (AVIS) facility on Parcel B to provide regular automated inspections of Trains and first screening inspections of Trains arriving from revenue service for Stage 1 LRVs and Stage 2 LRVs.
  - 1. Enclose and orient the AVIS facility to protect all components of all measurement modules from direct sunlight.
  - 2. Design the AVIS facility to operate bi-directionally.
  - 3. Design the AVIS facility to emit a maximum of 60 dBA when powered on in a standby mode, and 78 dBA when powered on and conducting measurements, measured at 1 m from the enclosure.
  - 4. Provide laser safety equipment, including, but not limited to, laser isolation switches, with a minimum Design Service Life of thirty (30) years.
  - 5. Provide sufficient UPS backup to power the AVIS facility for one (1) hour continuous measurement operation.
  - 6. Provide Train identification equipment capable of identifying Trains, Train components, and specific locations on Trains, to feed measurements and other data into TransEd's Maintenance Management System (MMS), with a minimum Design Service Life of thirty (30) years.
    - a. The Train identification shall be consistent with the Train identification method on the AVIS at the Gerry Wright OMF Part A.
- B. Design the AVIS facility to provide full functionality during operation in all environmental conditions present in the City of Edmonton per Section 1-2.1.10 [*Edmonton Climatic Requirements*] of this Schedule.



- C. Design the AVIS facility to include, and provide, at a minimum, the following subsystems that perform all required functions on Trains travelling up to 20 km/h and have a minimum Design Service Life of thirty (30) years:
1. an axle end temperature monitoring system that measures every axle end temperature to within  $\pm 2^{\circ}\text{C}$  and issues alerts to the Maintenance and Asset Management System when there is a variance from the side average;
  2. a brake pad monitoring system that measures every brake pad thickness to within  $\pm 0.75$  mm, calculates brake pad wear rates, predicts when brake pad replacement is due, and issues alerts to the Maintenance and Asset Management System if a brake pad is missing and when a brake pad measurement is outside of specified parameters;
  3. a brake disc monitoring system that measure every brake disc thickness, profile and maximum wear depth, and issues alerts to the Maintenance and Asset Management System when a measurement is outside of specified parameters;
  4. a wheel profile monitoring system that issues alerts to the Maintenance and Asset Management System when a measurement is outside of specified parameters and measures, at a minimum:
    - a. wheel diameters to within  $\pm 1.5$  mm;
    - b. wheel profiles to within  $\pm 0.3$  mm;
    - c. flange heights to within  $\pm 0.5$  mm;
    - d. flange thicknesses to within  $\pm 0.5$  mm;
    - e. tread hollowness to within  $\pm 0.5$  mm;
    - f. rim thicknesses to within  $\pm 0.5$  mm; and
    - g. back to back distances to within  $\pm 0.75$  mm;
  5. a wheel damage monitoring system that issues alerts to the Maintenance and Asset Management System when a measurement is outside of specified parameters, measures flat spots on wheels, reports the condition of wheels, and determines when wheels must be sent for re-profiling;
  6. a pantograph wear monitoring system that measures carbon strip profiles to within  $\pm 0.3$  mm, thicknesses to within  $\pm 0.5$  mm, pitch, roll, and yaw angles to within  $\pm 1$  degree, and localized chip sizes to within  $\pm 0.5$  mm, assesses maximum wear depth, and issues alerts to the Maintenance and Asset Management System when a measurement is outside of specified parameters;
  7. a visual inspection system that issues alerts to the Maintenance and Asset Management System when a defect is identified, and identifies, at a minimum:
    - a. all deviations from the vehicle profile or previous vehicle condition;
    - b. missing and displaced elements;
    - c. open equipment boxes;
    - d. foreign bodies;
    - e. damper leakage;
    - f. vehicle contamination;

- g. loose equipment covers;
  - h. disconnected cables;
  - i. graffiti; and
  - j. height of couplers;
8. a data communication link to the Gerry Wright OMF Building B communication room described in Section 8-2.6.8 [*Communication Room*] of this Schedule;
  9. data exporting capabilities for offline analysis; and
  10. automatic generation of work orders within the Maintenance and Asset Management System to complete required maintenance.

### **8-2.13 SHORE POWER SUPPLY CONNECTION**

- A. The Traction Power system for the Gerry Wright OMF Building B must include Auxiliary Power Stations (APS) that are employed for the electrification of the LRV by a power plug, and shall:
  1. provide shore power and related protection circuitry that allows for connection of 750V DC Power supply to the vehicle car via a vehicle power plug;
    - a. provide the same connector as deployed for this purpose on the Stage 1 LRVs and, at a minimum, the same interlock system as that deployed for this purpose in Gerry Wright OMF Building A; and
    - b. locate the connector on the LRV(s) with sufficient reach and suitably installed such that it is positioned in the same location relative to the Gerry Wright OMF Building B shore power connection points, regardless of the vehicle orientation;
  2. provide power to each vehicle at each bay in the light maintenance/inspection area, body shop area, and heavy maintenance and repair area;
  3. contain power terminals and control wiring that facilitate the safe operations of the system; and
  4. be furnished with illuminated trip and close pushbuttons, provision for a physical lock to be applied to prevent power from being inadvertently energized, and beacon lights visible from the bay to indicate APS supply is energized at the vehicle power plug.
- B. Provide LRV propulsion system safe interlock to prevent vehicle movement under APS power.
- C. Electrical interlocking shall be provided to ensure both the APS supply to the vehicle plug and the DC Power supply to the overhead contact wire cannot be energized simultaneously for a given bay.

## SECTION 8-3 – LEWIS FARMS STORAGE FACILITY

### 8-3.1 PURPOSE

- A. This Section 8-3 [*Lewis Farms Storage Facility*] sets out the Design and Construction requirements for the Lewis Farms Storage Facility.

### 8-3.2 FACILITIES

- A. The purpose of the Lewis Farms Storage Facility is to serve as the secondary operational base for the marshalling of Trains and the overnight storage and light cleaning of a small number of LRVs for the Valley Line West LRT, and is made up of the following major facilities:
1. Lewis Farms Storage Facility yard as set out in Section 8-3.4C [*Lewis Farms Storage Facility Yard*] of this Schedule;
  2. Lewis Farms Storage Facility Building, as set out in Section 8-3.6 [*Lewis Farms Storage Facility Building*] of this Schedule; and
  3. yard lead track to and from Mainline Track, as set out in Section 8-3.7 [*Yard Lead Track*] of this Schedule.

### 8-3.3 FUNCTIONS

- A. The Lewis Farms Storage Facility shall be designed and constructed to provide for the performance of LRT operations functions, including:
1. LRV storage and light cleaning;
  2. storage of MOW equipment; and
  3. storage of spare parts;
- as required and demonstrated to meet the Operability and Maintainability Parameters.
- B. The Lewis Farms Storage Facility shall also serve as a backup host for the function of an emergency central Operations Control Centre (OCC), in the event of catastrophic failure of the existing OCC hosted within the Gerry Wright OMF Building A.
- C. Design and Construct the Lewis Farms Storage Facility site to preclude the need to cross any track or service roads by employee or visitor vehicles on any route from street access to the facility parking lot.

### 8-3.4 GENERAL REQUIREMENTS

- A. Except as otherwise specified in this Section 8-3 [*Lewis Farms Storage Facility*], specific equipment, components, materials, systems, and sub-systems forming part of the Lewis Farms Storage Facility shall comply with the following:
1. facility design shall comply with SU1 requirements in Section 2-13.2 [*Lewis Farms Storage Facility*] of this Schedule and the Valley Line West LRT Facilities Design and Construction Standards;
  2. materials, components, and equipment shall comply with Section 5-1.4 [*Materials, Components and Equipment*] of this Schedule;
  3. landscape architecture shall comply with Section 2-14.6.2 [*Lewis Farms Storage Facility*] of this Schedule; and

4. Roadways shall comply with the applicable requirements as set out in Section 3-2.11.13 [*Lewis Farms Storage Facility*] of this Schedule.
- B. Provide minimum illuminance levels meeting the criteria listed in Table 8-3.4 [*Illumination Levels for the Lewis Farms Storage Facility*].

**Table 8-3.4: Illumination Levels for the Lewis Farms Storage Facility**

Location	Minimum Average (Lux)
Perimeter Fence	5
Vehicle Entrances	100
Yards	25
LRV Storage Areas	25
Track Switch Areas	50
Shop Areas	550
Roof Access Platforms	550
Shop Pits	1100
Shop Storage Areas	270
Office Areas (Ambient with Additional Task Lighting)	270
Maintenance Areas	1100

- C. Provide a minimum of one (1) hand sanitizer station at each entrance.

### **8-3.5 LEWIS FARMS STORAGE FACILITY YARD**

#### **8-3.5.1 Site Requirements**

- A. Design and Construct the Lewis Farms Storage Facility yard within the Lewis Farms Storage Facility Site, including:
1. marshalling and staging areas for LRVs required to meet the Operability and Maintainability Parameters;
  2. Yard and Yard Tracks, in accordance with Section 8-3.5.2 [*Yard and Yard Tracks*] of this Schedule;
  3. site security in accordance with Section 8-3.5.3 [*Site Security*] of this Schedule; and
  4. all other facilities, equipment, systems and sub-systems as required in this Section 8-3.4C [*Lewis Farms Storage Yard*].
- B. Design and Construct Lewis Farms Site water servicing and wastewater servicing.
1. Design and construct the water servicing systems for the Lewis Farms Site with reference to the Lewis Farms Park and Ride Hydraulic Network Analysis (HNA) Report, prepared by ConnectEd Transit Partnership on September 11, 2018, which was prepared to support the Potter Greens Neighbourhood Structure Plan Amendment, which was approved by City Council on November 5, 2018.
  2. A minimum of thirty (30) days prior to the applicable first Interim Design submission, submit a water servicing design and Hydraulic Network Analysis (HNA) report (the "**Lewis Farms Storage Facility Yard Water Servicing Design and HNA Report**") that reflects actual site design conditions. Refer to the *City of Edmonton Design and Construction Standards Volume: 4 Water* for more information.

3. Make application and payment to EPCOR Water Services for the service connection and adhere to EPCOR Water Services Guidelines.
4. Design and construct the wastewater servicing systems for the Lewis Farms Site in conformance with the Lewis Farms Park and Ride Stormwater, Wastewater and Water Servicing Report, prepared by ConnectEd Transit Partnership on June 1, 2018, which was prepared to support the Potter Greens Neighbourhood Structure Plan Amendment, which was approved by City Council on November 5, 2018.
5. A minimum of thirty (30) days prior to the applicable first Interim Design submission, submit a wastewater servicing design report (the "**Lewis Farms Storage Facility Yard Wastewater Servicing Design Report**") that reflects actual site design conditions.
6. Make application and payment to EPCOR Water Services Inc. (Drainage) for the service connection and adhere to *EPCOR Drainage Services: Sewer Connections Guidelines*.

#### **8-3.5.2 Yard and Yard Tracks**

- A. Design of the Lewis Farms Storage Facility yard and Yard Tracks shall be based on the storage capacity of the Lewis Farms Storage Facility, with Train marshalling capacity that demonstrates compliance with the Operability and Maintainability Parameters.
- B. Prepare and submit a yard circulation report for the Lewis Farms Storage Facility yard, (the "**Lewis Farms Yard Circulation Report**"), that demonstrates the ability to:
  1. launch Trains at required headways directly from storage;
  2. receive Trains at end of service without queuing on the Mainline Track;
  3. perform interior cleaning of LRVs at required intervals;
  4. store all required LRVs on-site on dedicated LRV storage tracks;
  5. store MOW equipment indoors on a flex storage track; and
  6. provide track redundancy so that yard circulation is not impeded by a single point failure which could trap LRVs within any portion of the Lewis Farms Storage Facility.
- C. Design and Construct the Lewis Farms Storage Facility yard and Yard Tracks, in compliance with the Accepted Lewis Farms Yard Circulation Report, and in accordance with Section 8-1.3.3 [*Yards and Yard Tracks*] of this Schedule.

#### **8-3.5.3 Site Security**

- A. Design and Construct site security to provide:
  1. protection of LRVs and the Building Structure against intruders and vandalism;
  2. permanent fencing along the Yard Tracks between the Building Structure and the adjacent Grade Crossing;
    - a. The fencing material and construction shall be in accordance with Section 2-4.5.3.2 [*Fences*] of this Schedule.
  3. intrusion detection from the adjacent Grade Crossing onto the Yard Tracks, and in accordance with Section 6-1.11.2.1 [*General Surveillance Requirements and Coverage*] of this Schedule; and

4. integrated perimeter surveillance security, including full time and live perimeter intrusion detection system in accordance with Section 6-1.11.2.1 [*General Surveillance Requirements and Coverage*] of this Schedule.
- B. Provide card access security to control entry into the City Communication Room to allow 24/7 exclusive access by City personnel in accordance with 6-1.15 [*Security and Alarm System*] of this Schedule and:
1. if restricted card access is provided to enter the Lewis Farms Storage Facility, provide fifty (50) access cards to the City programmed to allow 24/7 entry by City personnel.

#### **8-3.5.4 Site Access**

- A. Provide all administrative areas of the Lewis Farms Storage Facility Building with access via road, sidewalk, and SUP from the Lewis Farms Park and Ride.
- B. Road access to the Lewis Farms Storage Facility Building shall accommodate Medium Single Unit Truck (MSU) vehicles, Emergency Services and waste disposal equipment.
- C. Provide access and turnaround capability for:
1. large vehicles (MSU) involved in delivery and waste disposal where destination points for such vehicles may be loading docks and loading gates, refuse tanks and large garbage containers;
  2. large MOW road running vehicles where destination points for such vehicles may be the MOW storage or designated parking; and
  3. large maintenance and repair vehicles at TPSSs, as may be required to demonstrate compliance with the Operability and Maintainability Parameters.
- D. Provide sufficient clearances to ensure waste disposal operations do not interfere with normal activities anticipated by the Operability and Maintainability Parameters.
- E. Provide signage designating the road access as restricted for authorized vehicles only.

#### **8-3.5.5 Parking Facilities**

- A. Provide parking facilities as required to meet the parking requirements of the Operability and Maintainability Parameters.
- B. At a minimum, provide:
1. thirty-four (34) staff parking stalls;
  2. the number of barrier free employee/visitor parking stalls required by the NBCAE, to be located adjacent to the main entrance of the Lewis Farms Storage Facility Building;
  3. one (1) visitor parking stall;
  4. one (1) assigned parking stall, within 30m of the main entrance, designated for City Persons;
  5. bicycle parking spaces, in the form of racks, for a number of bicycles equivalent to 10% of the vehicular spaces defined in 8-3.5.5B [*Parking Facilities*] of this Schedule with no less than five (5) to be located adjacent to the Lewis Farms Storage Facility Building; and
  6. signage designating it as restricted parking for authorized personnel.

### **8-3.6 LEWIS FARMS STORAGE FACILITY BUILDING**

A. All rooms at the Lewis Farms Storage Facility Building shall comply with the *Room Data Sheets – Lewis Farms Storage Facility Building*, a copy of which is included in the Disclosed Data.

#### **8-3.6.1 NOT USED**

#### **8-3.6.2 Lewis Farms Storage Facility Building Sustainability Requirements**

A. Design and Construct the Lewis Farms Storage Facility Building within the Lewis Farms Storage Facility Site to:

1. achieve LEED® Silver Certification using LEED® Building Design and Construction: New Construction in accordance with Section 4.5 [*LEED Silver Certification*] of Schedule 4 [*Design and Construction Protocols*];
2. demonstrate the following performance improvements in accordance with *Part 8 – Building Energy Performance Compliance Path* of NECB 2011:
  - a. achieve 30% or greater energy efficiency than required by the NECB 2011 for the Lewis Farms Storage Facility Occupied Areas;
    - i. benefits from the flush mounted solar photovoltaic array system shall not be considered as part of this analysis;
  - b. achieve 40% or greater greenhouse gas reduction than required by the NECB 2011 for the Lewis Farms Storage Facility Occupied Areas.
    - i. Calculate greenhouse gas emissions using the conversion factors located in Figure 2 (natural gas) and Figure 6 (electricity) of the *Energy Star Portfolio Manager Technical Reference Greenhouse Gas Emissions* document; and
    - ii. benefits from the flush mounted solar photovoltaic array system shall not be considered as part of this analysis
  - c. achieve an Annual Heating Demand that is less than or equal to 220 kWh/m<sup>2</sup> for the Lewis Farms Storage Facility Occupied Areas; and
3. incorporate a flush mounted solar photovoltaic array system that:
  - a. has a minimum power rating of 165 kW DC and is expected to generate 800 Gigajoules per year;
    - i. should the power rating result in a system that is expected to generate more than the expected annual electrical consumption of the facility, Project Co shall explore aggregate sites as defined in the *Alberta Electric Utilities Act*;
    - ii. should the power rating result in a system that is expected to generate more than the expected annual consumption of the aggregate sites as defined in the *Alberta Electric Utilities Act*, Project Co may propose a reduced power rating that will comply with the *Alberta Electric Utilities Act* in accordance with Schedule 13 [*Changes*];
  - b. is arranged to achieve optimal performance based on building geometry and annual insolation and shading conditions;
  - c. is arranged to allow convenient access for safe maintenance in accordance with CSA Z462 and the *Alberta Occupational Health and Safety Regulations, Part 9 Fall Protection*; and

- d. is provided with the required electrical equipment and EPCOR SCADA communications equipment, in accordance with the 'EPCOR Customer Connection Guide' and 'Technical Guideline for the Interconnection of Distributed Energy Resources to EPCOR Distribution and Transmission Inc.'s Distribution System', to safely and effectively transfer surplus energy to the electrical power grid.
- B. Any proposed deviation from, or equivalent or substitute to, the renewable energy system requirements of this Section 8-3.6.1 [*Lewis Farms Storage Facility Building Sustainability Requirements*] of this Schedule shall be submitted to the City as an Innovation Proposal, pursuant to Schedule 13 [*Changes*].
- 1. Alternative renewable systems shall as a minimum achieve the expected annual energy generation as described in Section 8-3.6.1 [*Lewis Farms Storage Facility Building Sustainability Requirements*] of this Schedule.

### **8-3.6.3 Site Requirements**

- A. Design and Construct the Lewis Farms Storage Facility Building within the Lewis Farms Storage Facility Site, including:
- 1. Shop Tracks in accordance with Section 8-3.6.4 [*Shop Tracks*] of this Schedule;
  - 2. LRV storage area in accordance with Section 8-3.6.5 [*LRV Storage Area*] of this Schedule;
  - 3. flex track in accordance with Section 8-3.6.6 [*Flex Track Area*] of this Schedule;
  - 4. ancillary areas in accordance with Section 8-3.6.7 [*Ancillary Areas*] of this Schedule;
  - 5. utility rooms in accordance with Section 8-3.6.8 [*Utility Rooms*] of this Schedule;
  - 6. site access in accordance with Section 8-3.5.4 [*Site Access*] of this Schedule;
  - 7. parking facilities in accordance with 8-3.5.5 [*Parking Facilities*] of this Schedule;
  - 8. Shop Track Traction Power System, as set out in Section 6-2 [*Traction Power System*] of this Schedule;
  - 9. OCS as set out in Section 6-3 [*Overhead Catenary System*] of this Schedule;
  - 10. a gravel surface extending the full length of the Lewis Farms Storage Facility Building and the full width of the site between the Lewis Farms Storage Facility Building and any adjacent open fields, for fire safety;
  - 11. a permanent generator; and
  - 12. all other facilities, equipment, systems and sub-systems as required in this Section 8-3.6 [*Lewis Farms Storage Facility Building*].
- B. Design the Lewis Farms Storage Facility Building to accommodate the number of operations, maintenance, transportation and support personnel required to meet the Operability and Maintainability Parameters.
- C. Not less than 120 Business Days after the Effective Date, or at an alternate date accepted by the City, Project Co shall prepare and submit a parametric programming report (the "**Lewis Farms Storage Facility Building Parametric Programming Report**") that describes the design rationales, criteria, standards, and assumptions for the Design of the Lewis Farms Storage Facility Building, and include the following:



1. facility programming analysis, including assessment of the LRV and MOW vehicle storage and cleaning area utilization on the basis of:
  - a. LRV and MOW vehicle fleet size, as demonstrated to meet the Operability and Maintainability Parameters;
  - b. maintenance staff, as demonstrated to meet the Operability and Maintainability Parameters;
  - c. planned work shifts, as demonstrated to meet the Operability and Maintainability Parameters;
  - d. maintenance activities and cycles, as demonstrated to meet the Operability and Maintainability Parameters;
  - e. calculation of demand;
  - f. analysis of individual spaces, including:
    - i. space and service requirements;
    - ii. access, including for cranes, delivery trucks and equipment as necessary;
    - iii. vertical and horizontal accessibility for maintenance personnel and equipment;
    - iv. circulation to adjacent or related spaces;
    - v. access control for safety and security;
    - vi. number, spacing, and type of electrical installations and receptacles;
    - vii. workplace health and safety equipment;
    - viii. clearances; and
    - ix. HVAC requirements;
  - g. adjacency analysis (to minimize unnecessary moving or handling of parts and tools); and
  - h. tools analysis, as demonstrated to meet the Operability and Maintainability Parameters;
2. program space analysis forms for each space in the Lewis Farms Storage Facility Building, with a separate form provided for each space which lists:
  - a. goals and objectives of the space;
  - b. equipment and tools that will be housed in the space;
  - c. furniture and storage required in the space;
  - d. desired adjacencies to other functions; and
  - e. special building and utility requirements that are to be provided.

and incorporating all design requirements specified in this Section 8-3.6 [*Lewis Farms Storage Facility Building*] of this Schedule, and incorporating the prescriptive space requirements shown on the *Room Data Sheets – Lewis Farms Storage Facility*, a copy of which is included in the Disclosed Data;

3. diagrammatic floor plan sketches for each space in the Lewis Farms Storage Facility Building, with a separate scaled diagram for each space which depicts:
  - a. the desired space configuration; and
  - b. the furniture, storage, equipment and utility services in the space;
4. modelling results depicting the overall circulation, access and LRV storage incorporating all spaces in the Lewis Farms Storage Facility Building;
5. overall scaled building layout drawings;
6. LEED checklist, demonstrating compliance with Section 8-3.6.1 [*Lewis Farms Storage Facility Building Sustainability Requirements*] of this Schedule;
7. tabulated tool and equipment Bill of Materials; and
8. details of structural live loads used in the design of the Lewis Farms Storage Facility, including, at a minimum:
  - a. Lewis Farms Storage Facility floor plans showing locations, extents and magnitudes of all live loads due to use and occupancy;
  - b. a modified Trackway vehicle vertical live load model, if applicable, to use for the design of the LRV storage area;
  - c. a modified procedure to calculate dynamic load allowances for the Trackway vehicle loads, if applicable;
  - d. all applicable machinery and equipment load magnitudes, configurations, locations of application and corresponding impact factors; and
  - e. all applicable locations and magnitudes of concentrated loads resulting from maintenance and storage of LRV components.

#### **8-3.6.4 Shop Tracks**

- A. Design and Construct the Lewis Farms Storage Facility Building Shop Tracks in accordance with Section 3-1 [*Track*] of this Schedule, and:
  1. provide a sufficient number of individual bays to accommodate the storage and interior cleaning of twelve (12) LRVs in a coupled or uncoupled configuration, with storage on a minimum of six (6) dedicated LRV Tracks;
  2. provide a flexible track area to accommodate both the storage and interior cleaning of two (2) LRVs in a coupled or uncoupled configuration and the storage and cleaning of MOW equipment to meet the Operability and Maintainability Parameters;
  3. space Shop Tracks to accommodate the functions required of each bay, accounting for any activity and machinery that may be required to perform the prescribed tasks;
  4. provide bays with a minimum length to accommodate the longest possible two-car Train configuration, where the maximum usable length of a track is defined by the clearance points calculated based on track spacing and supplied LRV clearance envelopes;
  5. have all Shop Tracks located on horizontal tangents;

6. have all bays located at the same elevation and sag graded at 0.3% longitudinally to facilitate drainage to drain basins within the building;
7. have all bay elevations that match adjacent floor elevations;
8. provide sufficient space between adjacent tracks such that there is a minimum of 3.0m between individually parked LRVs;
9. provide sufficient space between the panel folding doors, when open, and the ends of parked LRVs to permit passage of personnel, cleaning equipment, and maintenance equipment;
10. provide clearances to permit LRVs to enter and exit bays without being trapped by LRVs in adjacent bays;
11. clearly identify the extents of the LRV Dynamic Envelope along the full length of all Shop Tracks by, for example, providing paint markings on the floor;
12. provide permanently secured wheel stops to prevent runaway LRVs or MOW equipment from hitting the Building Structure; and
13. accommodate OCS interlocking, in accordance with Section 6-2.3.4 [*Shop TPSS and Yard TPSS*] of this Schedule.

#### **8-3.6.5 LRV Storage Area**

- A. This Section 8-3.6.5 [*LRV Storage Area*] sets out the general requirements for LRV storage areas within the Lewis Farms Storage Facility.
- B. Provide LRV vehicle storage areas to berth LRVs up to 44m long, with couplers retracted, and Trains up to 90m long, with end-couplers retracted, with space provided around the ends of single cars for movement of staff and equipment, and to support:
  1. safety inspections of the LRV;
  2. the activities associated with interior cleaning;
  3. light exterior cleaning; and
  4. overnight LRV storage.
- C. Design and Construct the LRV storage area to include access to top of rail level at both sides of each LRV in accordance with Section 8-1.3.2C.2C [*LRV Service Access Levels*] of this Schedule.
- D. Provide a minimum of one permanent fixed eye wash facility at every second storage track.
- E. Provide automatic or automated panel folding doors at all LRV entrances to the Lewis Farms Storage Facility.
  1. If the door movement envelope infringes on a safe walking route, a pedestrian door shall be integrated with bi-directional visibility to provide safe passage and avoid unnecessary opening and closing of the panel folding door;
  2. the controller for doors must be placed in a location that does not restrict vehicle or pedestrian movements and allows visibility that the doors open and close safely without obstruction;
  3. when the doors are moving there shall be a visible and audible warning; and
  4. the movement of pedestrians shall not activate the panel folding doors.

- F. Provide heavy duty person exterior doors with a panel allowing bi-directional visibility along the length of the storage area spaced a maximum of 45 m apart.
- G. Design and Construct an emergency repair area within the LRV storage area to also include fall arrest in accordance with the *Alberta Occupational Health and Safety Regulations, Part 9 Fall Protection*; to accommodate safe work LRV roof access.
- H. Provide a central vacuum system that services the entire Lewis Farms Storage Facility Building.
- I. The LRV internal storage area shall be rectangular in shape with all LRV storage track end points aligned.

#### **8-3.6.6 Flexible Track Area**

- A. Provide a flexible track area of minimum width 7.5 m to store either two (2) LRVs or large road running MOW equipment such as tampers, rubber-tired, light duty locomotives, ballast regulators, snow blowers, ballast dump cars, and flat cars.
- B. Design and Construct the flexible track area to include access to top of rail level at both sides of the track in accordance with Section 8-1.3.2C.2C [*LRV Service Access Levels*] of this Schedule.

#### **8-3.6.7 Ancillary Areas**

- A. This Section 8-3.6.7 [*Ancillary Areas*] sets out the general requirements for ancillary areas within the Lewis Farms Storage Facility Building. These areas account for administrative, operations and support functions other than direct maintenance. Each required area shall be sized and configured in accordance with Good Industry Practice.

##### **8-3.6.7.1 Office Spaces**

- A. Provide the following office spaces to meet the Operability and Maintainability Parameters:
  1. one (1) open office space to accommodate five (5) staff; and
  2. one (1) closed conference room.

##### **8-3.6.7.2 Administration Spaces**

- A. Provide an administrative storage area.

##### **8-3.6.7.3 Employee Welfare and Wellness Spaces**

- A. Provide the following employee welfare and wellness spaces:
  1. kitchen and breakroom;
  2. washrooms, where in addition to those required by NBCAE, a separate single user washroom designated as "universal" is provided;
  3. male and female change rooms with showers; and
  4. space to accommodate twenty (20) lockers, assuming a minimum locker footprint of 560 mm wide by 560 mm deep, located within or adjacent to the change/shower rooms.

##### **8-3.6.7.4 Reception**

- A. Provide a staff check-in/reception area located near the main building entrance.

#### **8-3.6.7.5 Janitor Room**

- A. Provide a janitor room to support activities associated with cleanliness and hygiene of the ancillary and support areas of the Lewis Farms Storage Facility Building.

#### **8-3.6.7.6 Operations Control Room**

- A. Provide an operations control room, sized to accommodate four (4) workstations, to support backup mission critical operations.

#### **8-3.6.7.7 Other Ancillary Spaces**

- A. Provide an area for spare parts and handling of waste and recycling materials.
- B. Provide a dedicated first aid room.

#### **8-3.6.8 Utility Rooms**

- A. This Section 8-3.6.8 [*Utility Rooms*] sets out the general requirements for the utility rooms within the Lewis Farms Storage Facility Building which support operations of the facility, for which the associated equipment, components, materials, systems, and sub-systems and their distribution shall be designed in accordance with Section 5-1 [*General*] of this Schedule and the Valley Line West LRT Facilities Design and Construction Standards. Each required room shall be sized and configured in accordance with Good Industry Practice.

##### **8-3.6.8.1 TPSS Room**

- A. Provide a TPSS room to house, and include the equipment required for, the TPSS for the Shop Track Traction Power System and the TPSS for the Yard Track Traction Power System as described in Section 6-2.3.4 [*Shop TPSS and Yard TPSS*] of this Schedule, where:
  - 1. the TPSS room shall also house the equipment required for the Lewis Estates TPSS required in accordance with Section 6-2.3.2 [*TPSS*] of this Schedule;
  - 2. no portion of washroom water servicing is located directly above the shop TPSS room; and
  - 3. the structure enclosing the shop TPSS room is designed for appropriate blast loading as set out in the Accepted Lewis Farms Storage Facility Building Parametric Programming Report.
- B. Design and Construct the TPSS Traction Power equipment in accordance with Section 6-2.3 [*Design Requirements*] of this Schedule.

##### **8-3.6.8.2 Mechanical Room**

- A. Provide a mechanical room to house, and include the equipment required for, the building mechanical systems. This includes equipment such as central heating equipment, central cooling equipment, hydronic distribution equipment, and domestic hot water heating equipment.

##### **8-3.6.8.3 Electrical and PV Equipment Room**

- A. Provide an electrical room to house, and include the equipment required for, the building electrical system and PV panel equipment. This includes equipment such as the main electrical distribution gear, central distribution panels, transfer switches, inverters, motor control centers and solar power converters.

#### **8-3.6.8.4 Sprinkler Room**

- A. Provide a sprinkler room to house, and include the equipment required for, a sprinkler tree connected to the main water service entrance, and additional equipment to distribute water to the sprinkler zones within the building.

#### **8-3.6.8.5 Data Centre**

- A. Provide a Data Centre room, sized and configured to meet the requirements set out in Section 6-1.8 [*Data Centres*] of this Schedule.

#### **8-3.6.8.6 Communication Room**

- A. Provide a communication room to house the building premise communication equipment, designed, constructed and configured to:
  - 1. be in accordance with ANSI/BICSI 002-2014, Class F2;
  - 2. not be located directly underneath any portion of washroom water servicing;
  - 3. include all building premise wire and cabling termination equipment and materials in accordance with Section 6-1.21 [*Wire and Cable*] of this Schedule, where:
    - a. cables and associated conduits are extended to the Data Centre and to each room and area as set out in the Accepted [REDACTED] Building Parametric Programming Report;
  - 4. include communications cabinets which shall:
    - a. house fibre optic, copper, and communication infrastructure and equipment required for the full operation of the building and surrounding infrastructure as set out in the Accepted [REDACTED] Facility Building Parametric Programming Report;
    - b. have a nominal equipment mounting width of 19 in;
    - c. be a minimum 42 RU (height);
    - d. provide access to both front and back of equipment through vented, lockable doors keyed to the same key as those of Valley Line LRT Stage 1; and
    - e. provide access to both sides of equipment through removable side panels.
  - 5. include building communication infrastructure, consisting of:
    - a. radio system equipment in accordance with Section 6-1.12 [*Radio Systems*] of this Schedule;
    - b. telephone system equipment in accordance with Section 6-1.13 [*Telephone System*] of this Schedule;
    - c. Building SCADA System equipment in accordance with Section 6-1.14 [*Building SCADA System*] of this Schedule;
    - d. security and alarm equipment in accordance with Section 6-1.15 [*Security and Alarm System*] of this Schedule; and
    - e. network management equipment in accordance with Section 6-1.16 [*Network Management System*] of this Schedule.

#### **8-3.6.8.7 City Communication Room**

- A. Provide a communication room for exclusive use of the City (the “City Communication Room”) to house City communication equipment, designed, constructed and configured to:
1. be in accordance with ANSI/BICSI 002-2014, Class F2;
  2. not be located directly underneath any portion of washroom water servicing;
  3. include all City Fibre cabling termination equipment and materials in accordance with Section 6-1.7.2 [*City Fibre*] of this Schedule, where;
    - a. cables and associated conduits are extended to the City Communication Room in accordance with Section 6-1.5 [*Systems Duct Bank and Associated Infrastructure*] of this Schedule; and
  4. restrict access to authorized City personnel only in accordance with Section 8-3.5.3 [*Site Security*] of this Schedule.

#### **8-3.7 YARD LEAD TRACK**

- A. Design and Construct the Lewis Farms Storage Facility yard lead tracks:
1. in accordance with Section 3-1 [*Track*] of this Schedule; and
  2. such that LRVs can be launched and received into the Lewis Farms Storage Facility from either the Mainline Track northbound or southbound direction without reverse movements.

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