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SCHEDULE 15-2
DESIGN AND CONSTRUCTION - TRILLIUM LINE REQUIREMENTS

PART 5 – NEW WALKLEY YARD

ARTICLE 1 INTRODUCTION

1.1 General Requirements

(a) Project Co shall follow the guidelines and performance criteria outlined in this Article for the design and construction of the New Walkley Yard.

(i) The New Walkley Yard shall provide Revenue Vehicle storage, and facilities for Project Co to provide Maintenance and Rehabilitation Services of the System Infrastructure for the Expanded Trillium Line and the City for system operations.

(ii) The New Walkley Yard shall accommodate the functional programs and system operation and Maintenance requirements defined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements, Schedule 15-3 – Maintenance and Rehabilitation Requirements and elsewhere in the Project Agreement.

(iii) The New Walkley Yard configuration, including the yard and buildings, shall accommodate the following:

A. a fleet comprising 6 existing Revenue Vehicles plus new Revenue Vehicles, potentially of mixed type and manufacturer, as described in Schedule 15-2, Part 8 - Vehicles;

B. in addition to the existing and new fleet identified in "A" above, New Walkley Yard shall be built to accommodate one additional train with a length of approximately 80 metres, to accommodate future fleet expansion;

C. meet the Operational Requirements outlined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements;

(iv) The New Walkley Yard shall incorporate the relevant requirements, guidelines, standards, codes, bylaws and other legislation that relate to the Project.

(v) Emergency planning: Project Co shall be responsible for the preparation, submission and Maintenance (including revisions as necessary) of fire safety plan(s), for approval by Governmental Authorities, pursuant to Ontario Fire Code and OBC, where applicable.

(vi) The New Walkley Yard shall be designed in accordance with CPTED. For further clarity, the design of the New Walkley Yard shall be included in Project Co's independently contracted CPTED review and report, required under Schedule 15-2, Part 4, Clause 1.3(b).

(b) Site Summary

(i) The Lands designated for the development of the New Walkley Yard is located west of Albion Road, just west of the Existing Walkley Yard. Refer to Schedule 33 - Lands for further information.

(ii) Project Co shall develop the New Walkley Yard Site to include but not be limited to: roadways, Trackwork, retaining walls, Site Utilities and lighting, staff and visitor parking lots, City required spaces, landscaping and pedestrian pathways, shipping and receiving areas, vehicle storage and Maintenance facilities, fuel storage and dispensing facilities, vehicle service facilities sufficient to meet the needs of daily service, security fencing, SWM, and New Walkley Yard buildings.

(iii) Project Co shall provide on Site roadways for the circulation of first responders, and Non-Revenue Vehicles consisting of MOW vehicles, delivery vehicles (parts, fuel, sand, etc.) and personal vehicles. Parking shall be provided for Project Co and City staff with accommodation of shift changes; no fewer than 26 City parking spaces (inclusive of City shift change spaces) shall be provided; accessible spaces shall be provided in addition to this baseline number.

(iv) Project Co shall design and construct pathways for operators and service personnel to the Revenue Vehicles and they shall be paved and Maintained and shall be adequately lighted to provide safe passage on foot; provide Track crossings, paved to TOR, to access each Yard Track.

(v) Project Co shall design and construct the New Walkley Yard to accommodate vendor truck traffic, including 16m trailers to the receiving area of the main shop building.

(vi) Project Co shall design and construct the Site to have security fencing along its perimeter and gates provided to completely secure the property when necessary. Site access gates off Albion Road shall be motorized with access control and shall include two-way communications for visitors to the administration building for gate operation.

(vii) Project Co shall design and construct the Site lighting to industry standards and as specified elsewhere in this document, but shall at a minimum provide adequate levels of illumination to assure safe operations and provide for security. Site lighting shall be designed to align with the sustainability goals and specifically Dark Skies standards.

(viii) Project Co shall modify, install, and Maintain SWM and pollution prevention features.

(ix) Project Co shall design and construct the primary vehicle access to be from Albion Road North.

(x) Project Co shall work with the City and other stakeholders to address neighbourhood requirements (e.g. noise and lighting requirements/ standards).

(c) Project Co shall design and construct the New Walkley Yard facility to the following requirements:

(i) The New Walkley Yard storage yard and buildings shall provide Revenue Vehicle storage and Maintenance, transit operations, training facilities, conference rooms, the New Walkley Yard server room and MOW facility to meet the requirements outlined in Schedule 15-3 – Maintenance and Rehabilitation Requirements.

(ii) The Maintenance building shall be designed to accommodate no fewer than two service spots in the shop.

(iii) Trackwork shall be designed to assure: maximum yard capacity, operational flexibility with regard to service and Maintenance needs as well as facilitating efficient revenue service. Single points of failure shall not be permitted in the Vehicle storage yard. Track shall be designed to have at least two independent points of access to the yard. The City recognizes that reverse moves may be required when employing the secondary point of yard ingress/egress.

(iv) The New Walkley Yard and buildings shall also provide for daily service and inspection of Revenue Vehicles including at minimum a roll-over gage inspection pit, fixed fueling and sanding facilities—all under a lighted canopy. Project Co shall make provision for efficient daily interior cleaning of Revenue Vehicles.

(v) The New Walkley Yard and buildings shall also provide for exterior cleaning of Revenue Vehicles. Washing shall be by automatic, drive-thru wash equipment. Wash equipment shall provide spot-free cleaning and shall be configured to remove on-vehicle water prior to exiting the facility to assure unacceptable levels of wash facility water are not comingled with stormwater. Energy efficiency and water reclamation measures shall be incorporated to align with the sustainability goals of the Project.

(vi) The shop shall be designed with two Tracks for Maintenance of the Revenue Vehicles. Both Tracks shall be fitted with adjustable, dedicated exhaust extraction. One Track shall have a gage pit (full length preserving exiting when Revenue Vehicle is in place). Either side of the Track shall be fitted full-length with jacking pads to support mobile column lifts. A second Track shall be provided with a contiguous pit extending across the gage and far enough on either side to provide safe and efficient access to service lower chassis and body components. This pit shall have pedestal Track designed to maximize access to the inner and outer bays of the pit. Access to Revenue Vehicle roofs shall be provided along the entire length of one side of the Revenue Vehicle via a raised platform. Lighting and ventilation shall be provided in the pit to provide a safe work environment. Fall protection shall be provided in the shop where required. Crane coverage shall be provided as required for the safe and efficient movement of parts and subcomponents throughout the shop and storage areas. The shop shall be designed to, at minimum, provide for the removal and replacement of all Revenue Vehicle subassemblies including HVAC units, trucks, and prime mover power packs.

(vii) Secure parts and materials storage shall be provided to assure the Revenue Vehicle fleet is Maintained to meet prescribed service needs. Storage space shall

be conditioned as required for the materials stored therein. Storage space shall be designed for the efficient delivery, storage, distribution, and removal of parts. A digital inventory control system shall be provided.

(viii) Project Co shall provide durable building materials and systems meeting asset preservation and expiry date hand back requirements of Schedule 15-3 – Maintenance and Rehabilitation Requirements. Provide the minimum Design Life required in Schedule 15-2, Part 1, Article 4 – Design and Construction.

(d) LEED® and Sustainable Construction

(i) Project Co shall design and construct the New Walkley Yard Maintenance and administration buildings to be LEED® Certified.

(ii) Project Co shall register the New Walkley Yard with the CaGBC and provide administration and documentation for all credits necessary for "Certified" status.

(e) Accessibility:

(i) Where applicable, Project Co shall ensure the Site and facilities are designed to be universally accessible including satisfying the requirements of COADS, AODA, and applicable City Guidelines, OBC and CSA Standards.

(f) Project Co shall design and construct the New Walkley Yard to the following general Operations philosophy:

(i) New Walkley Yard shall be designed for maximum safety and operating flexibility with direct access routes for Revenue Vehicles between the New Walkley Yard and the main line in both the north and southbound directions.

(ii) The New Walkley Yard facility shall minimize operational interference between Revenue Vehicles and Non-Revenue Vehicles.

(iii) The New Walkley Yard shall be operated by Project Co and provide a fully functioning transportation/transit service facility for the City, including facilities for City personnel.

(iv) The New Walkley Yard shall be designed such that the City can access their respective areas of the facility, including any operator Revenue Vehicle access area, without the need to wear personal protective equipment other than a safety vest.

(v) Project Co shall provide, preserve, and Maintain an access roadway (including a turnaround for a tractor with 16m trailer) at the terminus of Albion Road.

(vi) Maximum yard speed shall be 10km/hr.

1.2 Operator City Dedicated Facilities

(a) Project Co shall design and build facilities complete with furniture, fixtures and equipment for occupancy by the City in accordance with the requirements of this Schedule and room data sheets in Appendix A of this Part 5. The City areas include but are not limited to:

(i) administration offices; two for Program Manager and Contract Supervisor

(ii) Superintendent's open office area, six 7.5m^2 cubicles

(iii) Office storage ;

(iv) Operator dispatch facilities that are:

A. separately controlled;

B. located proximate to and providing convenient access to Revenue Vehicle Storage Tracks; and;

C. available to the City at all times as required to support system operations;

D. shall be climate controlled with phones, vehicle assignment display monitors, PA and an EAS.

E. The dispatcher area shall be located close to the Operator break room area.

(v) Operator sign-up, waiting, locker, lunch and assembly rooms; and

(vi) washrooms with a minimum of two shower rooms. Shower rooms may be unisex and do not need to be accessed directly from washrooms;

(b) The City shall have dedicated and secure access to the City dedicated facilities.

1.3 Vehicle Storage

(a) The Revenue Vehicle Storage Tracks area shall be provided with storage area capacity of sufficient size to accommodate the requirements of Clause 1.1(a) (iii) of this Part 5 including protection on the Site for any future expansion identified.

(b) Stub ended Storage Tracks shall not be permitted.

(c) Track shall be designed to minimize switching under standard operations.

(d) Provide the number of paved cartways needed to support service requirements with respect to the Operations Service Plan.

(e) The paved cartways shall be located such as to minimize the distance within the yard that Revenue Vehicles are operated by the Operator and eliminate the need for crossing Tracks between Revenue Vehicles.

(f) Cartways shall be accessible at all times to the City and shall be Maintained free of ice and snow.

(g) Vehicles shall be stored on dedicated Storage Tracks. They shall not be stored on Tracks used for other Facilities.

1.4 Room Data Sheets

(a) Project Co shall include within the New Walkley Yard, the rooms identified in the Room Data Sheets provided in Appendix A of this Part 5. These sheets contain minimum requirements for the design and construction of specified required rooms within the New Walkley Yard.

1.5 Yard Operations

(a) The New Walkley Yard shall be considered to operate as a non-Cab signal territory with a separate S&TCS controlled by the YCC. All Train moves and routes within the New Walkley Yard limits shall be restricted to limited speed and governed by radio control authorization from the YCC. The YCC shall not control the wayside signals and powered switches that allows all Vehicles to enter or exit the mainline alignment. The entering and exiting of all Vehicles on to the mainline shall be controlled by the TOCC and BCC under the mainline S&TCS.

(b) The switches within the New Walkley Yard shall be of the same type (dual control with hand or powered operation available) as used elsewhere on the Expanded Trillium Line and as specified herein. The switches shall be provided with switch heaters as specified herein. Both the switches and switch heaters shall be controllable from the YCC and the maintainers local control panel.

(i) Project Co shall be allowed to use a maximum of two (2) double slip switches in the Yard, provided the switch machines and heaters for those slip switches are consistent with those used elsewhere on the Trillium Line.

(c) Project Co shall design and implement a solution for a S&TCS in the New Walkley Yard MSF that provides:

(i) Control and indication of all power switches within the New Walkley Yard limits from the YCC.

(ii) Train presence detection through means of Track circuits, axle/wheel counters, or any other approved devices capable of the prevention of any powered switch from being thrown with a train or other rail vehicle sitting over the switch.

(iii) Visual confirmation of the New Walkley Yard switch positions available to Trains and other rail vehicles via wayside indicators. The indicators shall be installed at a height of 1m above TOR and be highly visible under dark and poor weather conditions.

(iv) A YCC control panel capable of the following:

A. Control of the position of all power switches within the New Walkley Yard limits. Circuits shall prevent change of the switch position while a Train or other rail vehicle is over the switch;

B. Indication display of the position of all power switches within the New Walkley Yard limits;

C. Indication display of the Track occupancy of all Tracks within the New Walkley Yard;

D. Indication display only of the wayside signals, switch positions, and Track occupancy of the yard entrance/exit interlockings;

E. Control of the switch heaters for all power switches within the New Walkley Yard limits;

F. Indication display of the status of the switch heaters for all power switches within the New Walkley Yard limits; and,

G. Indication of which panel has control over the yard, the YCC panel or the maintainers panel.

(v) A maintainer local control panel located in the main signal equipment bungalow or room that can be used and accessed for maintenance and testing without accessing the YCC.

(vi) Switches that lead exclusively to a maintenance bay and will not be travelled on by the Operators need not be automatically controlled.

(d) Project Co shall design, provide, test, and determine the location and size of all signal equipment housings/bungalows and infrastructure required to hold all of the required signaling, switch control, and interface equipment. The equipment may be placed in a designated room within one of the buildings in the New Walkley Yard upon approval by the City.

(e) Project Co shall design, provide, and test the cables and cable routing required to provide power, control, and indications of all the signaling, switch control, and interface equipment within the New Walkley Yard.

ARTICLE 2 NEW WALKLEY YARD – CIVIL DESIGN CRITERIA

2.1 Geotechnical / Foundation

(a) Design and construction of all geotechnical and foundation work shall be in conformance with the requirements of Schedule 15-2, Part 2, Article 7 - Geotechnical Design Criteria and Requirements.

2.2 Site Work

(a) Project Co shall design and construct all civil Site work to be in conformance with the requirements of Schedule 15-2, Part 2, Article 4 – Design and Construction.

(b) Project Co shall design and construct pits, Tracks, and walkways at the fueling and service Facility to safely perform inspection of the Revenue Vehicle.

(c) Project Co shall design and construct access for Emergency vehicles with a perimeter access roadway around the yard and emergency access throughout the yard.

(d) Project Co shall design and construct pavement for Emergency access routes and exterior Operator walkways to be asphaltic concrete or Portland cement concrete to support the intended uses.

(e) Project Co shall prepare a TIA in conformance with the requirements of Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access. Project Co shall design New Walkley Yard parking areas per the City of Ottawa Road Corridor Planning & Design Guidelines.

(f) Grades

(i) Yard Storage Tracks shall either be level or shall create a sag condition so that parked rolling stock cannot drift out onto yard lead or Mainline Track.

(ii) The maximum grade on yard Storage Tracks shall be 0.3%.

(iii) Acceptable maximum grade through yard turnout is less than 1%. Where grade is equal to or greater than 1%, reduce speed through yard turnout by 2 kph. Absolute maximum grade through yard turnout is 2%.

(iv) Tracks shall drain away from buildings.

2.3 Ottawa Rideau Valley Conservation Authority

(a) PLAAs shall be obtained for all design and construction activities on the New Walkley Yard including but not limited to the RVCA.

2.4 Site Contamination

(a) Project Co shall manage any and all Contamination on Site and excavated materials in accordance with the Project Agreement and Schedule 17 – Environmental Obligations.

2.5 Drainage and Stormwater Management

(a) Design and construction of all Drainage work on Site shall be in conformance with the requirements of Schedule 15-2, Part 2, Article 5 - Drainage and Stormwater Management Design Criteria, Conservation Authority requirements and Ontario Ministry of Environment and Climate Change guidelines.

(b) Project Co shall provide appropriate SWM for the New Walkley Yard including water quantity and quality control to meet Ministry of Environment and Climate Change, and City of Ottawa requirements (Sewer Design Guidelines).

(c) The Site is adjacent to a tributary of Sawmill Creek and will require approvals from provincial and federal agencies

ARTICLE 3 ARCHITECTURAL DESIGN CRITERIA

3.1 General Requirements

(a) The architectural requirements of the New Walkley Yard shall comply with the criteria contained in this Article, and all relevant codes standards, regulations and guidelines below and those identified in this Part 5. In the event of conflicts between any codes, standards, regulations or guidelines, refer to Schedule 15-2, Part 1, Article 1 – Reference Documents and Submittals for order of precedence.

(b) Project Co shall design all facilities to meet acoustical requirements and maximum sound levels specified in Schedule 17 – Environmental Obligations.

3.2 Design

(a) The City's Urban Design and Planning requirements shall be reflected in the facility Site development and buildings in consideration of surrounding existing and future neighbourhood developments.

(b) Materials shall comply with the asset preservation and Expiry Date requirements of Schedule 15-3 – Maintenance and Rehabilitation Requirements.

(c) Provide the minimum Design Life required in Schedule 15-2, Part 1, Clause 4.3 – Design Requirements, Table 1-4.1 as determined per CSA S478-95 (R2007) Guidelines on Durability in Buildings.

(d) All buildings shall have a BAS that shall report locally and to one centralized monitoring location.

(e) Provide automated external defibrillators throughout the facility including the Operator's office area, the Operator's training area, City office areas and shop areas.

(f) Accessibility

(i) It is a City priority to provide a universally accessible MSF facility. Where Project Co can so demonstrate that, by virtue of their industrial nature, certain shop areas should not be accessible, requirements for access and use by persons with differing levels of mobility, sight, hearing and sensory abilities shall be waved. However all areas shall be accessible to movement of emergency stretchers with attendants.

(ii) Project Co shall design the facilities to satisfy the requirements of all applicable codes, standards and barrier free requirements where applicable.

(iii) Facility design shall support ease of access and use by persons with differing levels of mobility, sight, hearing and sensory abilities.

3.3 Signage

(a) General Requirements:

(i) Shall comply with Schedule 15-2, Part 4, Article 7 – Wayfinding and Signage and signage requirements of applicable AODA, OBC, CSA, NBCC, TSB, TSSA, WSIB, WHMIS, OHSA and MTO standards, ASME A17.1/CSA 44, NFPA 130.

(ii) Site identity signage shall include illuminated entry monument and reflective roadway and rail signage and wayfinding signage for visitors and delivery vehicles.

(iii) Project Co shall provide reflective Site identity signage identifying address and facility for each building and as required identifying both Track numbers and door numbers above each rail door. Provide emergency contact information and hours of operation (as relates to public access) at main entry doors.

(iv) Project Co shall provide interior signage identifying all departments and rooms: offices, workstations, break rooms, washrooms, shop functions etc. Provide holders for: meeting room agenda, staff directory, and daily events.

(v) Project Co shall provide regulatory signage for exiting, accessibility, safety, and hazardous material and handling.

(vi) Project Co shall provide a fire safety plan(s) for the facility as approved by AHJ.

(vii) Project Co shall provide yard signage according to industry and Project Co requirements

(viii) Project Co shall provide labeling of all exposed or accessible piping and ductwork

3.4 Building Code Analysis

(a) Project Co shall perform a code analysis for the New Walkley Yard with respect to the OBC and obtain all required permits and approvals.

(b) Provide a complete code analysis for the New Walkley Yard, in accordance with Schedule 10 – Review Procedure.

3.5 Landscape and Urban Design

(a) Project Co shall create an urban relationship between the New Walkley Yard and Albion Road through either of the options articulated in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements. In addition to the aforementioned requirement Project Co shall ensure that:

(i) Any Site perimeter fence along Albion Road shall be decorative, consistent with the building architecture and integrated into the landscape design New Walkley Yard.

(b) Project Co shall provide all landscaping as required through the Site Plan Approval process.

ARTICLE 4 STRUCTURAL DESIGN CRITERIA

4.1 General Structural Design Criteria

(a) Design and construction of all building structural work shall be in conformance with the requirements of Schedule 15-2, Part 4, Article 4 - Structural Design Criteria as applicable.

(b) Design and construction of all Site structural work including Bridges and retaining walls shall be in conformance with the requirements of Schedule 15-2, Part 2, Article 7 Geotechnical Design Criteria and Requirements, and Schedule 15-2, Part 2, Article 4 Structural Design Criteria and Requirements.

(c) Reference Documents

(i) Design and construction of structural work shall comply with the criteria contained in:

A. CISC-ICCA “Crane-Supporting Steel Structures: Design Guide”

B. ASME B30.2: "Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)"

C. ASME B30.17: "Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)"

D. ASME B30.11: "Monorails and Underhung Cranes"

(d) Structural Loads

(i) Live Loads

A. Any equipment loads such as bridge crane, jib crane, fork lift etc. shall be considered as live load.

B. Structures supporting Revenue Vehicle or road vehicle loads, including ground-supported slabs, shall meet CHBDC standards for fatigue.

C. Structures supporting crane loads shall be designed for fatigue.

(ii) Environmental Loads:

A. Snow, wind, ice and seismic loads shall be as described in the relevant Reference Documents, using the importance category of “normal” with the building code and “other” within CHBDC.

ARTICLE 5 MECHANICAL DESIGN CRITERIA

5.1 General

(a) Design of all mechanical systems shall incorporate energy efficiency and heat recovery initiatives for the New Walkley Yard buildings.

(b) Reference Documents

(i) The Works shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project.

(ii) Mechanical systems design shall apply, but not be limited to, all applicable Reference Documents as referenced in this Part 5. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, refer to Schedule 15-2, Part 1, Article 1 – Reference Documents and Submittals for order of precedence.

(iii) Project Co shall comply with all applicable codes, standards and regulations and with manufacturers' requirements and recommendations.

(c) Testing, Adjusting and Balancing

(i) TAB shall be performed for all mechanical systems and shall be performed by an agency certified by AABC or NEBB.

(ii) Project Co shall complete commissioning activities in compliance with LEED® such that warranties are not violated or adversely compromised.

(d) Vibration Requirements:

(i) All mechanical systems and equipment shall be designed and installed to eliminate the transmission of vibration and noise to any part of the building, including but not limited to offices, training rooms and conference rooms.

(ii) Project Co shall provide vibration isolators to mechanical equipment and components; and

(iii) Project Co shall provide seismic restraints for mechanical equipment or components including ductwork and piping.

(e) Project Co shall provide meters for potable water and irrigation water to monitor usage.

5.2 HVAC

(a) HVAC General

(i) Project Co shall design systems for the Maintenance Facility building(s) and associated office areas to meet personnel comfort conditions & provide personnel protection against operations which produce airborne particles and/or fumes.

(ii) Project Co shall design systems as applicable to satisfy the requirements for ventilation, supply, exhaust, make-up air and cooling of all areas and equipment, and that of the various Maintenance and repair operations to be undertaken within the Maintenance facility building(s).

(iii) Project Co shall design systems for the New Walkley Yard facility to facilitate personnel comfort conditions and the manufacturer's recommendations for room ambient conditions required for sensitive computer based equipment. Minimum and maximum air temperatures shall be provided as detailed below:

A. Offices, administration areas: 22OC to 24OC, min. 25% RH (winter), max 50% RH (summer).

B. Server and communications rooms (aka equipment Room): 22 OC to 24 OC at 50% RH all year around.

C. Main electrical room: max. 35 OC.

D. DC room: max. 35 OC at 50% RH (summer).

E. Room and areas not listed above shall be maintained in accordance with ASHRAE Standard 90.1-2010.

(iv) Systems serving the New Walkley Yard server room(s) shall incorporate 2N redundancy.

(v) Where applicable, Project Co shall design systems in accordance with internal room design conditions and requirements as identified in the "room data sheets" in Appendix A of this Part 5.

(vi) External ambient design conditions shall be based on OBC data for Ottawa, ON.

(vii) Filtration efficiencies of HVAC equipment shall be selected based on the facility or room the equipment is serving, rooms containing computer based equipment and occupied rooms requiring higher filtration efficiencies.

(viii) Mechanical equipment and systems shall be designed so that the maximum noise transmitted by the systems does not exceed OHSA & ASHRAE Standards. Selection of equipment and systems design shall be such that the noise generated by the equipment or system shall not contribute in exceeding the required general area or room noise criteria as outlined in Schedule 15-2, Part 4, Article 5 – Mechanical Design Criteria.

(b) HVAC Systems & Equipment

(i) HVAC Equipment

A. Project Co shall select equipment containing no CFC refrigerant.

B. Project Co shall select equipment utilizing refrigerant that meets applicable codes and standards and that will not contribute to ozone depletion and global climate change.

C. Project Co shall select equipment to provide the highest operating efficiencies available.

D. All equipment shall be isolated from the building and anchored for seismic restraint.

(ii) HVAC System:

A. Project Co shall design systems for high efficiency to meet or exceed ASHRAE's most stringent standards or requirements.

(c) HVAC Controls

(i) All building controllers, application controllers and all input/output devices shall use industry standard protocols.

(ii) HVAC controls plus the control and monitoring point settings shall be integrated within the overall New Walkley Yard BAS.

5.3 Plumbing and Drainage

(a) Project Co shall provide complete design and construction of plumbing and drainage systems including separators for all facilities as required by and in accordance with all referenced codes, standards and regulations. Project Co shall incorporate equipment monitoring into the BAS system.

(b) Plumbing Fixtures

(i) General Requirement

A. Urinal: waterless type urinals shall not be permitted.

5.4 Fire Protection

(a) Maintenance shops and associated offices:

(i) Project Co shall provide fire protection systems as required by the applicable codes, regulations and standards.

(b) Yard:

(i) Project Co shall provide accessible hydrants for fire protection of the open yard and Yard Track areas. Hydrants shall be located such that a fire in any area of the yard including Revenue Vehicle fires can be attacked using the hose length recommended by the AHJs.

5.5 Mechanical Systems for Shop and Yard

(a) Project Co shall provide all necessary mechanical services required to facilitate operation, cleaning, Maintenance & repair of the complete facility & facility inventory, including but not limited to the buildings, yard, equipment, systems, Non-Revenue Vehicles and Revenue Vehicles. Specific requirements for Revenue Vehicle service equipment are set out in Schedule 15-2, Part 8 – Vehicles.

(b) Project Co shall design systems to all applicable codes and standards.

ARTICLE 6 ELECTRICAL DESIGN CRITERIA

6.1 Introduction

(a) This article presents the basic electrical design guidelines, codes, and standards references that shall be followed throughout the electrical design process of the New Walkley Yard.

(b) Project Co shall design and construct all electrical work to be in conformance with the requirements of Schedule 15-2, Part 3 – Systems and Schedule 15-2, Part 4, Article 6 - Electrical Design Criteria as applicable.

(c) Project Co shall provide complete design and construction of electrical and communication systems for all facilities as required by and in accordance with all referenced codes and standards and where required in the Project Agreement.

6.2 Reference Documents

(a) Project Co shall ensure that the design and construction of the Works shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, refer to Schedule 15-2, Part 1, Article 1 – Reference Documents and Submittals for order of precedence.

(b) Refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria for design codes, standards and guidelines.

6.3 Basis for Design

(a) The intent of this section is to outline the Facility's requirements for the buildings' electrical systems that are not addressed by the applicable codes and standards.

(b) Project Co shall provide functional electrical systems that are adequately reliable, flexible, maintainable and expandable to suit the Facility's needs, while being economical to build, operate and Maintain over the term of the agreement.

(c) The additional requirements outlined in this section shall supplement those required by the applicable legislation, codes, standards and requirements and are not to be used to reduce any such requirements.

(d) The electrical systems shall be designed to be flexible and adaptable to support changes in the Facility with minimum disruption to the operations of the Facility.

(e) All electrical equipment shall operate reliably within industry standards for levels of sound, vibration, electric field and magnetic field.

(f) All electrical equipment shall be new, utilize proven technologies, and be of the most current design.

(g) All electrical equipment shall be suitably protected from discharge of fluids from the sprinkler system as well as leakage from the sprinkler piping, drain lines, water lines, etc.

(h) All electrical equipment shall be listed and approved for the specific purpose for which it is to be employed.

(i) All electrical equipment shall be installed with seismic restraints adequate to withstand the maximum forces anticipated during a seismic event. The restraints shall protect the equipment from damage during the seismic event.

(j) A comprehensive lightning protection system shall be provided to protect all elements of the Facility.

(k) Lighting-level calculations shall be completed for all interior and exterior spaces occupied by staff.

6.4 Functional Requirements

(a) Electrical Service

(i) The New Walkley Yard shall receive its service feeder from **[REDACTED]**. Project Co shall design an optimized distribution system capable to provide power throughout the area and facility at necessary voltages and in accordance with **[REDACTED]** specifications and distribution standards.

(ii) Project Co shall provide two incoming service feeders as required to support the facility. Project Co shall include fusible medium-voltage switch, transformers, 600/347 V low-voltage main-breaker switchgear, and tie-breaker.

(iii) Capacity of each of the service feeders shall be able to supply 100% of the demand plus 25% spare (future) loads. Project Co shall not route the two redundant feeders in a common trench or duct.

(iv) Project Co shall provide additional circuit breaker at 600-volt switchgear for emergency generator. Also include automatic transfer switch to prevent simultaneous closing of the emergency generator breaker and 600V main breakers.

(v) Project Co shall provide permanent emergency generator with a non-fused disconnect means prewired to 600-volt switchgear emergency generator breaker for quick generator connection as a backup power to critical UPS and selected emergency/standby loads. All power sources shall be as approved by the Governmental Authority and in conformance with the applicable code.

(vi) Project Co shall provide a redundant, three-phase, double-isolation UPS system. Project Co shall feed each UPS from a single circuit breaker from different busses on the 600-volt switchgear.

(vii) Project Co shall provide power distribution through 600-208/120 V three-phase transformers and 208/120 V switchboards.

(viii) The ratings of power distribution equipment shall be sufficient to support the power requirements of the areas being serviced by the equipment plus a 25% spare capacity for future growth.

(ix) Low voltage switchgears directly connected to the medium/low voltage power transformers shall be equipped with electrically operated draw out power circuit breakers with adjustable electronic trip units for main, event generator, and feeder circuits.

(x) The power distribution system shall be designed and adjusted to allow for selective coordination between protective devices connected in series.

(xi) Project Co shall design the distribution system to provide electric shock and arc flash protection to:

A. Meet the latest requirements and guidelines of CSA Z462 and IEEE 1584.

B. Safe working distances for calculated fault locations based upon calculated arc flash boundary considering incident energy of 1.2 cal/cm^2.

C. Achieve arc flash hazard no higher than Category 2

(xii) The status of critical distribution equipment such as medium voltage circuit breakers, power transformers, low voltage power circuit breakers, resistance grounding system, digital meters, automatic transfer switches, generators and UPS shall be integrated with the BAS.

(xiii) The power factor of the Facility shall be actively managed with a dynamic power factor correction system such that the minimum power factor of the Facility shall be 0.95 lagging at all times.

(xiv) Power factor correction system shall be equipped with anti-resonance harmonic filters where required.

(xv) Electrical service design shall meet all **[REDACTED]** Service Requirements.

(xvi) Harmonic mitigating transformers and transient voltage surge suppressors shall be provided on feeders or panel boards supplying data processing equipment or communications equipment.

(b) Project Co shall meter all Utility services to the Site.

(c) Duct banks, Maintenance Holes and Handholes

(i) Duct banks and maintenance holes shall be designed in accordance with the seismic criteria defined for this Project. Duct banks shall be designed to include 25% spare capacity after completion of installation to protect for future growth and expansion. Ducts shall be sloped to maintenance holes to provide adequate drainage. Concrete encasement shall be provided where required by applicable code. All ducts to be roped.

(ii) Maintenance holes and/or handholes shall be sufficiently sized and provided where access to or installation of cable is necessary.

(d) Electrical Rooms

(i) Electrical rooms shall have sufficient space to house all equipment. Adequate space shall consider minimum working clearances, conduit entry points and routing, equipment removal/replacement and ventilation requirements.

(ii) All electrical rooms shall be constructed to provide a 2-hr fire separation. The 2-hr fire rating shall be maintained for all services entering or leaving the electrical rooms.

(iii) Electrical rooms shall be provided with sufficient heating, ventilation and air conditioning to ensure that the environmental conditions of the electrical rooms are within the operating requirements of the equipment installed within these rooms at all times.

(iv) Design of the rooms that accommodate electrical equipment shall be the result of a Project Co analysis in terms of layout optimisation, equipment removal access, Maintenance clearances and equipment expansion to accommodate future equipment to accommodate the 25% load growth, equipment operation and trade access limitations.

(e) Emergency and Standby Power Sources

(i) Redundant back-up generators connections shall be able to assume the entire load of the Facility during critical events including 25% spare capacity for future growth. Generator shall be size to assure no interruption to revenue service or to normal Revenue Vehicle servicing and administrative operations. On Site fuel supply, independent of fuel supply for Revenue Vehicles, shall provide 72 hours of emergency power under full load. Emergency generators shall comply with local noise and emissions requirement and the required approvals shall be obtained by the Project Co from Governmental Authorities.

(ii) TVSS shall be provided for each generator output.

(iii) Manual synchronization means beyond the automatic synchronization control for the two back-up generators shall be provided.

(iv) All UPS systems shall be of the online, double conversion type, and shall be equipped with automatic static bypass switches, as well as an external manual Maintenance bypass.

(v) Emergency power feeders shall be rated for two hours either through the use of fire-rated cables/wiring or embedment in concrete.

(vi) Non-life safety loads shall be shed automatically and instantaneously in the event of generator overload.

(vii) Generators, fire pumps and main life safety switchboards shall not be located below grade.

(viii) Emergency generators shall be diesel generators compliant with the requirements of CSA C282.

(ix) Standby fixed mounted engine generators shall be installed outdoors; a completely enclosed weatherproof/sound attenuated housing to protect the generator from adverse weather conditions and reduce sound levels for surrounding residential neighbourhoods shall be provided. Generators shall be mounted on spring isolators with a floating floor, or equivalent means, to minimize the transmission of vibration. Enclosure shall have critical grade silencing suitable for residential installation. Project Co design shall follow NEMA/IEC enclosure/environmental protection standards.

(x) Stand-by power generators shall be located in an area easily accessible for Maintenance and refuelling.

(xi) Project Co shall provide 120V/20A GFCI outlets around back-up diesel generators from UPS to provide power in the event of a concurrent generator and Utility failure.

(xii) Automatic transfer switches serving life safety loads shall be equipped with means of bypass to both sources

(xiii) When second Utility power source is selected, emergency lighting, fire alarm and other emergency equipment loads shall be connected to a UPS or battery system as required for loads classified as "emergency level 1".

(xiv) BAS – The BAS system within the New Walkley Yard shall provide supervisory control of the New Walkley Yard electrical and mechanical systems, and communications subsystems.

(f) Grounding and Bonding

(i) Project Co shall analyse and choose the most appropriate and OSCE/IEEE/TIA compliant grounding type.

(ii) An applicable OSCE/IEEE/TIA compliant grounding electrode system shall be provided. Test wells shall be provided to access the ground system for measurements.

(iii) The grounding system shall also be bonded to building columns and all major power distribution equipment. All non-current-carrying metal enclosures and all alternating current equipment shall be securely connected to the grounding system.

(iv) Project Co shall provide separate grounding system for New Walkley Yard equipment room's equipment and communication and data associated systems.

(v) Project Co shall avoid natural gas piping and pipe connected to an active cathodic protection system.

(vi) Lightning protection system analysis per NFPA 780/CSA B72 and design per IEEE 1100 shall be provided for the New Walkley Yard

6.5 Equipment and Materials

(a) General Requirements

(i) Project Co shall select equipment, components, and materials that have been listed and labeled by the CSA, ULC or other acceptable testing agency, and marked for its intended use. Comply with the Canadian Electrical Code Parts I and II, and OESC.

(ii) When not installed in conditioned spaces, equipment and materials shall operate as per Site conditions.

(iii) Systems interfaces shall be designed in accordance with the requirements of the systems as defined in Schedule 15-2, Part 3 – Systems.

(iv) Power supply design for the New Walkley Yard equipment room shall comply with, in addition to the codes and standards identified in this Part 5, the TIA-942 Standard.

(v) TVSS shall be installed at each level of the New Walkley Yard equipment room distribution system and be properly sized to suppress transient energy that is likely to occur.

(vi) UPS back-up time required for the systems shall be calculated, designed and adequately rated to provide required quality of uninterruptable power to all critical loads, including the City's office areas, in accordance with Schedule 15-3, Part 3 – Systems.

(b) Lighting

(i) Lighting Classification

A. Project Co shall provide lighting design per Schedule 15-2, Part 4 – Stations.

(ii) Emergency fixtures, exit lights and essential signs shall be independently wired from the emergency lighting panel. Emergency lighting shall be automatically energized upon failure of commercial power. Emergency lighting for stairs and passageways shall be designed to accommodate egress.

(iii) Minimum illumination levels shall comply with the values indicated for similar areas or application in the IES Lighting Handbook and NECB.

(iv) In addition to above requirements the average level of illumination shall be achieved for particular areas:

Area	Average Lux Level
Roof Access Platform	600
Shop Pits Area	1100
Shop Area	600

Warehouse & Parts Storage Area	600
New Walkley Yard Access Area	100
Track Switch Area	60
Vehicular Storage & Yard	50
Connecting Walkways	200
Yard	50
Warehouse and Parts Storage	600
Yard Service Area & Inspection Pit	600

(v) Project Co shall integrate the New Walkley Yard lighting in the architectural design and aesthetics, minimize glare and lighting pollution;

(vi) Project Co shall provide New Walkley Yard normal and emergency lighting from dedicated panels. Project Co shall comply with Governmental Authority requirements for egress and exit lighting.

(vii) Project Co shall coordinate placement of the equipment and lighting in the New Walkley Yard equipment room so that lighting fixtures are placed in aisles between cabinets and racks instead over equipment rows.

(viii) Project Co shall provide emergency lighting from UPS around back-up diesel generators to provide illumination in the event of a concurrent generator and Utility failure.

(ix) BAS system shall monitor and control New Walkley Yard lighting system.

(c) Fire Alarm

(i) Project Co shall apply latest standards governing the fire alarm design, Maintenance and Operation. Project Co shall coordinate the design with the requirements of the Schedule 15-2, Part 3 – Systems. In addition, Project Co shall comply with all the requirements of the Governmental Authority, City and AODA.

(ii) Project Co shall furnish, install, and connect an intelligent reporting, microprocessor controlled, addressable, fire alarm and detection system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciators, power supplies, and wiring as specified herein.

(iii) The fire detection system shall be connected to and monitored by the City TOCC. Design shall comply with CAN/ULC-S561.

(iv) The FACP shall contain a microprocessor based CPU. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, control circuits, and notification appliance circuits, local and remote operator terminals, printers, annunciators, and other system controlled devices.

(v) The FACP shall perform the following functions:

A. supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions;

B. supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules;

C. detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated NAC;

D. visually and audibly annunciate any trouble, supervisory, security or alarm condition on operator's terminals, panel display, and annunciators.

(vi) The system shall be an active/interrogative type system where each addressable device is repetitively scanned, causing a signal to be transmitted to the main FACP indicating that the device and its associated circuit wiring is functional. Loss of this signal at the main FACP shall result in a trouble indication for the particular input.

(vii) The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.

(viii) The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

(ix) Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

(x) Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 6 (Class A) Signaling Line Circuits (SLC).

(xi) Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.

(xii) NAC shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.

(xiii) On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

(xiv) When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

A. Indication of alarm condition at the FACP and annunciator(s).

B. Identification of the device or zone that is the source of the alarm at the FACP.

C. Operation of audible and visible notification devices throughout the building until silenced at FACP.

D. Shutting down supply and return fans serving zone where alarm is initiated.

E. Closing smoke dampers on system serving zone where alarm is initiated.

F. Initiation of smoke control sequence through the HVAC system.

G. Notifying the local fire department.

(xv) Upon activation of a supervisory device such as fire pump power failure or tamper switch, the system shall operate as follows:

A. Activate the system supervisory service audible signal and identify the source at the FACP and annunciator(s).

B. Pressing the “Supervisory Acknowledge Key” shall silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.

C. If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.

D. The "System Reset" button shall be used to return the system to its normal state.

(xvi) A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.

(xvii) The FACP shall comply with ULC-S527, "Control Units for Fire Alarm Systems".

(xviii) Fire alarm system shall be completed with addressable devices, manual pull stations, smoke detectors, heat detectors, multi-criteria detectors, horns, strobes or combination of notification appliances. In addition, the Fire alarm system shall be capable to monitor non addressable modules such as water flow, valve tamper and fire pump that are not otherwise equipped for addressable communication.

(xix) Project Co shall install system components and all associated devices in accordance with applicable building code requirements, OESC, NFPA 72, CAN/ULC S524 and manufacturer's recommendations. Installation shall be done by factory-trained, CFAA fire alarm certified personnel or by personnel licensed or certified by the local authority

(d) Conduits and Raceways

(i) Shall comply with OESC, NFPA-70 and NFPA-130

(ii) Conduits installed in finished areas of new construction shall be concealed in walls, below or in slabs, or above suspended ceilings. Exposed conduits shall not be run on the exterior surface of buildings. Conduits shall not be run through structural members across pipe shafts or ventilation duct openings.

(iii) Conduits in concrete slabs shall be placed between the bottom and top reinforcing steel. Separate conduits to ensure proper concrete bond.

(iv) Conduits shall not be embedded in waterproofed or water bearing walls.

(v) Conduits penetrating exterior walls of any Structure (other than handholes, manholes, or pullboxes) below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration.

(vi) Grounding-type expansion fittings shall be installed in raceways every 60m or less of linear run or wherever structural joints are crossed to allow for expansion and contraction.

(vii) Project Co shall provide the raceway system and cable pulling for equipment described and identified by facility/systems and the City. Raceways shall be designed to include at least 25% spare capacity to protect for future growth and expansion. Provide power or conduit complete with pull wire as required.

(viii) Open raceways shall not be installed underneath sprinkler system.

(e) Wiring and Cables

(i) In addition to the requirements highlighted in Schedule 15-2, Part 4 – Stations, Project Co shall comply with NFPA-70 and NFPA-130

(ii) Design shall be compliant with CSA 22.2 No.75 and No.38 depending of the system served and Site condition.

(iii) Copper wires shall be used for servicing of the systems rated below 1000V.

(f) Boxes and enclosures shall comply with NEMA 250, CSA 22.2 No.18 and No.40 and shall be rated NEMA 1 for conditioned Spaces and NEMA 4X for outdoor and unconditioned spaces.

(g) Electrical Identification

(i) Identification and tagging system shall follow approved City system proposed by Project Co.

ARTICLE 7 TRACKWORK

7.1 General Requirements

(a) Project Co shall design and construct the Trackwork within the New Walkley Yard to comply with the criteria contained in this Article, Schedule 15-2, Part 2, Article 2 – Geometric Design Criteria for Track Alignment, and Schedule 15-2, Part 2, Article 3 – Trackwork.

(b) The scope of the Trackwork within the New Walkley Yard shall include all work to provide a complete rail yard as specified herein. This shall include, but is not limited to, the design, supply, installation, and testing of New Walkley Yard Track including Yard Tracks, shop Tracks, Connecting Tracks, test Track, Spur Tracks and any and all related incidentals.

(c) The limits of the Connecting Tracks shall begin at the point equivalent to the last long tie of the Mainline Track turnouts and end at the switches for the yard Track.

(d) The Yard Track shall begin at the points of switches for the yard Storage Tracks and the yard shop Tracks.

7.2 Operational Requirements

(a) Project Co shall design and construct the yard Storage Tracks to hold or store Trains in configuration for service with clearances as follows:

(i) clear of other Tracks and structures between clear points, defined as the location where Revenue Vehicle dynamic envelopes between two diverging Tracks from a given turnout are a minimum of 305mm apart;

(ii) clear of adjacent switches, roadway vehicular crossings and pedestrian crossings; and

(iii) clear of other parked Trains by a minimum of 1m.

(b) Project Co shall design and construct the Track layout to:

(i) facilitate efficient, direct and rapid vehicle moves between Mainline Tracks, Storage Tracks, and Maintenance facilities; and

(ii) avoid the potential for single point failures to cripple yard operations.

(iii) provide all required functionality.

7.3 New Walkley Yard Track Structure Types

(a) General

(i) Track structure types shall be consistent with the descriptions identified herein and Schedule 15-2, Part 2, Article 3 – Trackwork.

(ii) Embedded, direct fixation or ballasted Track shall be generally used at the New Walkley Yard, exterior to buildings, for the Revenue Vehicle storage yard, Connecting Track and other Site required Track.

(iii) Paved or embedded Track shall be used in roadways and crossings with Site roadways, service aisles, cart paths and walkways.

(iv) Embedded Track shall be utilized in the shop buildings and aprons immediately outside of buildings.

(v) Post Track shall be utilized in pit areas of the shop building and inspection pit where under-vehicle access is required.

(vi) Direct fixation Track shall be utilized in wash Tracks.

(vii) Selection of Track segment types for areas identified in (i) and (ii), above, shall be driven by function, operational criticality, construction and life-cycle cost per the recommendations within AREMA Chapter 16 Economics of Railway Engineering & Operations.

(viii) Provide heated road/rail crossings within yard limits

(b) New Walkley Yard Embedded Track

(i) For the New Walkley Yard, Project Co may consider alternate forms of embedded Track from that described in Schedule 15-2, Part 2, Article 3 – Trackwork.

(c) Paved Track shall have:

(i) infill material placed to embed the rails to top-of-rail elevation;

(ii) gaps on the gauge side of the running rails for wheel flange ways; and,

(iii) ballasted Track structure type.

(d) Post Track

(i) Post Track shall include a rigid rail fastener system anchored to structural beams and/or columns.

7.4 New Walkley Yard Rail Configurations

(a) General

(i) Rail configurations shall be consistent with the descriptions identified in Schedule 15-2, Part 2, Article 3 - Trackwork.

7.5 Track Materials

(a) General

(i) Materials identified in Schedule 15-2, Part 2, Article 3 – Trackwork and in the following sections shall be used for all Track construction.

(b) End-of-Track Devices

(i) Rail-mounted wheels stops shall be used at the stub-ends of shop Tracks to impede the travel of any rail bound Revenue Vehicle beyond the end of the Track(s).

7.6 Special Trackwork

(a) General

(i) Special Trackwork shall comply with requirements identified herein and Schedule 15-2, Part 2, Article 3 – Trackwork.

(b) Turnouts

(i) Acceptable minimum turnout radius within the yard Track shall be 30m. The absolute minimum turnout radius shall be 25m and shall be used only where absolutely necessary.

(c) Trap Switches

(i) Trap switches shall be used to prevent non-registered Trains and Maintenance Vehicles from entering the mainline. The switch shall be normally pointed to the yard and set to allow entry to the mainline only if the movement authority is granted by the S&TCS.

ARTICLE 8 COMMUNICATION, CONTROL AND SECURITY SYSTEMS

8.1 General Requirements

(a) Design and construction of all communication, control and security work shall be in conformance with the requirements of Schedule 15-2, Part 3 – Systems as applicable.

(b) The communication systems for the New Walkley Yard shall provide support to Project Co operations and interface with the City.

8.2 Operational Description

(a) CTS TOCC Interface – Project Co shall provide an interface including all cable, conduit and cable trays for the CTS as detailed in Schedule 15-2, Part 3 – Systems.

(b) New Walkley Yard PA System – The New Walkley Yard shall be equipped with a PA system that shall allow personnel to make announcements throughout the MSF facilities, yard areas, and selected areas of the facilities or yard. The system shall operate within local regulations and applicable laws with respect to ambient noise.

(c) CCTV – CCTV cameras shall be provided as detailed in Schedule 15-2, Part 3 – Systems. Cameras shall be deployed strategically throughout the New Walkley Yard to provide visual images of the New Walkley Yard to be viewed at the TOCC and BCC. The CCTV system shall use video analytics and/or intrusion detection systems to detect if people or objects have made unauthorized entry into the New Walkley Yard Tracks including the yard wye and road crossings into the facility. The CCTV system shall be capable of monitoring Train movements throughout the yard and within the Facility.

(d) Telephone System – Project Co shall provide telephones as detailed in Schedule 15-2, Part 3 – Systems.

(e) SCADA – The SCADA systems shall be as detailed in Schedule 15-2, Part 3 – Systems.

(f) Voice and Data Radio Communications – The voice and data radio systems shall be as detailed in Schedule 15-2, Part 3 – Systems.

(g) IAC – The IAC system shall control access and provide for detection of intrusion into entrance points of the New Walkley Yard including entrances along the perimeter fence as detailed in Clause 8.3(c) of this Part 5.

8.3 Performance Requirements

(a) Revenue Vehicle Management

(i) Project Co shall be responsible for the monitoring and coordination of all Revenue Vehicle movements within the New Walkley Yard facility and from/to the yard and the mainline.

A. This includes monitoring of all Yard Track switch movements, monitoring of Revenue Vehicles in yard, and up to the yard lead demark for turn over to mainline operations.

(b) CCTV

(i) Camera locations within the New Walkley Yard shall be located

A. to provide complete camera coverage of the New Walkley Yard exterior and perimeter;

B. at entrances and exits to New Walkley Yard buildings and access controlled locations;

C. at entrances to yard wye, access roads and pedestrian access through perimeter fence;

D. in areas where Maintenance activities require safety and security; and,

E. At the hand off areas where Operators will hand-off and hand-back the Vehicles.

(ii) CCTV coverage shall be provided at each switch or groups of switches to allow the yard controller to observe switch / interlocking areas and entrances.

(iii) The CCTV system shall have video analytics and/or intrusion detection systems to detect if there has been unauthorized entry into the New Walkley Yard Track areas within the perimeter fence.

(iv) The CCTV system shall document the condition of Revenue Vehicles at the inspection area upon entering and exiting the yard.

(c) Intrusion Access Control System

(i) The system shall provide controlled access and detect intrusion as follows:

A. External doors, entrances and exits of the New Walkley Yard;

B. Yard perimeter and access gates including the yard wye;

C. All rail Operations spaces; and,

D. All entrances to communications rooms, electrical/mechanical room, IT rooms.

(d) Train-to-Wayside Wireless System

(i) The Train-to-wayside wireless system shall provide all Revenue Vehicles with a wireless data connection at the New Walkley Yard for the data transfer of Train diagnostics, CCTV video review from the TOCC, CCTV video downloads from the TOCC, and Passenger counts.

(ii) A LAN connection shall be provided between the wireless access points and the nearest communications room in order to connect to the CTS.

ARTICLE 9 VEHICLE SERVICE EQUIPMENT

9.1 Overview

(a) Project Co shall provide all equipment, accessories, materials, etc., and building systems to meet the Maintenance and Rehabilitation Services requirements of the Project Agreement.

9.2 Baseline Requirements for Industrial Equipment

(a) This section sets forth baseline requirements that apply to all Revenue Vehicle service equipment defined herein.

(b) General Requirements

(i) Equipment shall be manufactured, installed and operated in accordance with all industrial and safety standards that apply to the Works, including but not limited to:

A. CCOHS;

i. OHSA

B. CSA;

i. CSA Standard C22.2 No 94

ii. CSA Standard C390-10

iii. CSA W47.1

iv. CSA W59

C. CEAA;

D. CGSB;

E. CISC;

F. CWB;

G. NBCC;

H. NFCC;

I. NPCC;

J. OBC; and,

K. OESC (Ontario Regulation 164/99).

(ii) Labeling

A. Manufacturer shall securely attach in a prominent location, Lamacoid black text on white background labels, on each major item of equipment a noncorrosive, indelible nameplate showing manufacturer's name, address, model number, serial number, and pertinent Utility or operating data using industry standard size and font

B. All electrical equipment and materials shall be new and shall have attached labels attesting to CSA or ESA approval, in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

(c) Project Co shall determine which equipment, accessories, materials, etc. are needed to meet the Maintenance requirements of the Project Agreement and in what quantities. At a minimum, the following equipment shall be provided within the New Walkley Yard:

(i) sand dispenser system;

(ii) diesel fuel storage, of not less than 37,584 L, and dispensing system;

(iii) pressure washing equipment for both vehicle cleaning and as required for parts cleaning in the shop;

(iv) mobile column lifts in sufficient number and configuration to service all vehicle types;

(v) DMU exhaust extraction;

(vi) fall protection (overhead and pit);

(vii) battery charger system;

(viii) cranes;

(ix) hoists;

(x) forklift trucks;

(xi) fluids distribution system;

(xii) compressed air system;

(xiii) parts storage; and,

(xiv) Diesel exhaust fluid storage.