

**Building Condition Report**  
**October 2015**

**Environment Canada**  
**Exeter Weather Radar Station**  
**Exeter, ON**



*Prepared by:*

Technical Services  
Professional and Technical Services  
Real Property Branch  
Ontario Region  
PWGSC

*Issue Date:*

2016-02-02



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# EXECUTIVE SUMMARY

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## EXECUTIVE SUMMARY

**INTRODUCTION** - In response to a request received from Environment Canada (EC) through Jeff Allard (Research, Analysis and Project Officer), PWGSC's Technical Services group has conducted a condition assessment of the Exeter Radar Station (Exeter, ON).

The completed report, with commentary on the need for a repair/replacement program, complete with related costs and priorities, was commissioned to assist with both short and long term facility planning.

**DESCRIPTION** - The Exeter Radar Station is a Crown-owned facility with Environment Canada (EC) as the 'Custodial Department', with day-to-day operation of the facility managed directly by EC. The facility was acquired by the Crown in the early 1980s and converted for use by Environment Canada as a weather radar station forming part of the Canadian weather radar network, to collect observational data. At present, the facility is not occupied on a full-time basis.

The only building present at this facility, and included within the scope of this report, is the Radar Building - a single-storey structure used to support the facility's weather radar function and equipment.

Separate assessments have been prepared for the site and the above-noted building.

Not included as part of this assessment are: the radar tower, storage containers and generator shed.

**RECOMMENDED EXPENDITURES** - A summary of the recommended expenditure costs as put forth throughout this report are presented as follows:

The total estimated Short Term Expenditure (1 to 5 years) cost for this facility is **\$554,161**, as outlined below:

Property / Site	\$15,698
Radar Building	\$538,463
<b>Short Term Total</b>	<b>\$554,161</b>

The total estimated Long Term Expenditure (6 to 25 years) cost for this facility is **\$287,694**, as outlined below:

Property / Site	\$14,950
Radar Building	\$272,744
<b>Long Term Total</b>	<b>\$287,694</b>

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## GENERAL INFORMATION

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## GENERAL INFORMATION

**PROJECT TEAM** - An on-site investigation of the facility was conducted on 16 October 2015, by the following team members:

- Architectural \_\_\_\_\_ Colin Erwin, PWGSC TS, Architectural
- Mechanical \_\_\_\_\_ Dan Burlac, PWGSC TS, Mechanical
- Electrical \_\_\_\_\_ Mark Beaulieu, PWGSC TS, Electrical

Present on-site with the inspection team was EC's Janna Cuk, Sr. Facility Technician, to whom thanks is given for her assistance and cooperation.

Additional 'in-house' assistance in the preparation of this report was provided by: Yvonne Rizzi, PWGSC, Compilation Review.

**DOCUMENTS** - The following documentation was available and has been used in the development of this report and the preparation of recommendations:

### REPORTS

- Condition Report – dated August 2010, prepared by 'PWGSC-RPB-PTS-Technical Services'

### DRAWINGS

- None.

### OTHER

- Treasury Board of Canada Secretariat, Directory of Federal Real Property (DFRP), Property Number 70917  
<http://www.tbs-sct.gc.ca/dfrp-rbif/pn-nb/70917-eng.aspx?qid=18631865>
- Treasury Board of Canada Secretariat, Directory of Federal Real Property (DFRP), Building Number 070917  
<http://www.tbs-sct.gc.ca/dfrp-rbif/sn-nb/070917-eng.aspx>

**SCOPE** - A multi-discipline team has been assembled to conduct an on-site inspection, interview building maintenance staff and client representatives, and review and analyze existing information in the form of reports, as-built drawings and manuals, in order to provide a comprehensive report on the building systems.

- The on-site inspection was visual only, no destructive testing was performed.
- The building envelope, with the exception of some of the roof areas, was visually observed from ground level. No test cuts were performed and as such, the construction details described in this report were obtained through a review of the available architectural and structural reports and drawings for the building.

**MANDATE** - To identify and describe existing building systems, assess their current condition and provide commentary on the need for a maintenance and repair/replacement program, with

related costs and priorities. It is not intended to 'upgrade' or 'modernize' the building to a higher level to match standards found in newer facilities, except that required system replacements will be to current standards.

- Provide recommendations to ensure that the building systems reach their maximum life expectancy and maintain the required levels of health and safety.
- Recommend further engineering studies where the cause, extent and/or remediation method required for identified deficiencies cannot be determined visually.
- Identify areas where the building does not comply with current code requirements or internal policies. Some of these items are a result of continuing changes to the codes, standards and policies since the original design/construction of the facility.

**ESTIMATE COSTING** - Costs indicated are Class "D" (preliminary) estimates, expressed in year 2015 constant dollars (escalation factors not included) and provide an indication (rough order of magnitude) of the project construction. Cost estimates in this report are based on information found within published estimating manuals (RS Means, Yardsticks for Costing), historical cost data for similar work in the geographic area, general cost information from material/equipment manufacturers and contractors, and past experiences involving similar work. All Class "D" estimates provided in this report should be verified prior to project implementation.

**PROJECT GROUPING (Strategic Planning)** - Priorities and time frames for recommendations put forward in this report have been determined on an individual (item by item) basis for preliminary planning purposes only. It is recommended that project work from this BCR and/or other sources be reviewed in order to identify potential items that can be consolidated for greater value (cost, scope, complexity). The intent is also to avoid repeat work as well as to achieve enhanced savings in time and cost, and to reduce inconvenience or disruptions to occupants.

**PRIORITY OF WORK** - The Priority of Work is time related, with consideration given to the life cycle of the component.

**MANDATORY (Man.):** Mandatory items should typically be done on an urgent basis or within a year, or with consideration given to the life cycle of the component (e.g., to meet life safety regulations, building codes or other applicable standards).

**CYCLICAL (Cyl.):** Cyclical items should typically be done within 1 to 5 years, again with consideration given to the life cycle of the component (e.g., component or system replacement) in order to extend the useful life of the building.

**OPTIONAL (Opt.):** Optional items should typically be done within 5 years or more, but also with consideration given to the life cycle of the component (e.g., component or system updating) in order to upgrade and add capital value to the building and/or to enhance or maintain design standard/market value. The replacement time frames normally do not have a direct effect on the operation of the building.

**PROJECT PRIORITY SYSTEM** - The Project Priority System, priority ratings are explained below:

PRIORITY A: (Emergency) a deficiency or condition which has already occurred and has already or will shortly result in the shutdown of a building/support system.

Examples:

- .1 Labour or Building Code requirements not being met.
- .2 Critical building system has become inoperative.

PRIORITY B: Priority B projects are priority A type emergencies that have not yet occurred but could at any time.

B1 - Health and Safety - A deficiency that poses an imminent risk to health and/or safety if left uncorrected.

B2 - Operational Efficiency - A condition which threatens operational objectives and results in for Real Property's tenants incurring productivity losses which outweigh the cost of the project.

B3 - System Integrity - A condition which will result in the shutdown of a critical support system of a building, if left uncorrected this fiscal year.

PRIORITY C: A condition/deficiency which is not yet a priority B but, if left uncorrected next fiscal year, may result in regulatory violations, operational inefficiencies and increased costs. Corrective action would demonstrate prudence and due diligence.

C1 - Health and Safety - A deficiency which poses a potential threat to health and safety if left uncorrected.

C2 - Operational Efficiency - A deficiency which hampers operational efficiency if left uncorrected.

C3 - System Integrity - A condition which will result in increasing costs if left uncorrected.

PRIORITY D: A deficiency which requires repair or replacement but does not threaten building systems, operations or health and safety. Action should be taken where funding can be made available.

D1 - Asset Maintenance - A condition/deficiency which could be improved/corrected by repair or replacement but does not threaten building systems, operations, human health, safety and/or the environment.

D2 - Appearance/Image - A condition for which work would improve the appearance or image of the building.

D3 - Other - Any other condition/deficiency which could be improved/corrected but does not threaten building systems, operations, human health, safety and/or the environment.

**PRIORITY X**: This priority is for projects for which the key factor is a significant financial benefit to Real Property.

**X1 - Return within one year**

**X2 - Return within two years**

**X3 - Return within three years or more**

**DEFINITIONS** - The following is an interpretation of common terms:

**REPAIR (R)**: An estimated dollar value applied to a building element or building system to perform normal regular scheduled superficial maintenance practices and repairs. The intent is to provide a minimum level of maintenance in order for the building or building system to operate and perform suitably through a typical effective life cycle. Also covers engaging the service of a consultant to conducting an engineering study/analysis of specific portion(s) of the building system(s) to troubleshoot and seek best method(s) for remedial actions, upgrades, refits and/or replacements to extend the life of the facility, or to increase tenant comfort

**CAPITAL (C)**: An estimated dollar value applied as an investment into a building or portion of the building system for upgrade, refit and/or replacement to extend the life of the facility, or to increase tenant comfort.

**GOOD**: Where the condition of the building requires little or no investment required to the structure, building envelope and related electrical/mechanical systems to life cycle the existing building for 20 years. Most Building Code requirements and Health and Safety issues have been addressed. Very low maintenance/repair costs usually reflect this condition.

**FAIR**: Where the condition of the building requires a limited cost investment applied to the structure, building envelope and related electrical/mechanical systems to life cycle the existing building for an additional 20 years. Investment may be offset beyond the 5 year time period and applied to the 6 - 10 or the 11 - 15 year time periods. Lower maintenance/repairs expenses also reflect this condition.

**POOR**: Where the condition of the building requires a substantial investment applied to the structure, building envelope and related electrical/mechanical systems in the immediate future (1 to 5 years) and to address Building Code requirements, replacement and/or upgrade of building systems to comply with current regulations, Health and Safety issues and deficiencies in the normal operations of the buildings to life cycle the existing building for an additional 20 years. Higher maintenance/repair expenses also reflect this condition.

**REFERENCES** - The following reference materials have been used in the development of this report and the preparation of recommendations:

## CODES

- Canada Labour Code, Part II (CLC), R.S., 1985, c. L-2.
- Canada Occupational Health and Safety Regulations (COHSR), SOR/86-304.
- National Building Code of Canada (NBC), Thirteenth Edition, 2010.
- National Plumbing Code of Canada (NPC), Ninth Edition, 2010.
- Canadian Electrical Code, Part 1 (CEC), Twenty Third Edition, 2015.
- National Fire Code of Canada (NFC), Ninth Edition, 2010.

## POLICES & GUIDELINES

Treasury Board of Canada Secretariat (TBS):

- Accessibility Standard for Real Property (ASRP), November 01 2006.
- Policy on Management of Real Property, November 01 2006.
- Federal Identity Program (FIP).
- Occupational Safety and Health Directive, 2006-01-01.
- Part IV - Boiler and Pressure Vessels.
- Part V - Elevating Devices.
- Fire Protection Services - General (Chapter 3-0).
- Standard for Fire Safety Planning and Fire Emergency Organization (Chapter 3-1).
- Fire Protection Standard for Design and Construction (Chapter 3-2).
- Fire Protection Standard for Electronic Data Processing Equipment
- Fire Alarm Systems Standard (Chapter 3-4).
- Standard for Fire Inspections (Chapter 3-5).

## STANDARDS

Canadian Standards Association (CSA):

- ASME A17.1-2010 / CSA B44-10, Safety code for elevators and escalators (Bi-National standard, with ASME A17.1-2010).
- CSA B44.2-10, Maintenance requirements and intervals for elevators, dumbwaiters, escalators, and moving walks.
- CSA B51-14, Boiler, pressure vessel, and pressure piping code.
- CSA B52-13, Mechanical refrigeration code.
- CSA B651-12, Accessible design for the built environment
- CSA C22.1-15, Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.
- CSA C282-15, Emergency electrical power supply for buildings
- CSA CAN/CSA-Z94.4-11, Selection, use, and care of respirators
- CSA Z462-15, Workplace electrical safety
- CSA Z463-13 Guideline on maintenance of electrical systems

Underwriters Laboratories of Canada (ULC):

- CAN/ULC - S524-14, Installation of Fire Alarm Systems.
- CAN/ULC - S525-07, Audible Signal Appliances for Fire Alarm Systems, Including Accessories.
- CAN/ULC - S526-07, Visual Signal Devices for Fire Alarm Systems, Including Accessories.
- CAN/ULC - S527-11, Standard for Control Units for Fire Alarm Systems.
- CAN/ULC - S529-09, Smoke Detectors for Fire Alarm Systems.
- CAN/ULC - S530-M91 (R1999), Heat Actuated Fire Detectors for Fire Alarm Systems.

- CAN/ULC - S531-14, Standard for Smoke Alarms.
- CAN/ULC - S536-13, Inspection and Testing of Alarm Systems.
- CAN/ULC - S537-13, Verification of Fire Alarm Systems.

American National Standard Institute (ANSI):

- ANSI/ASHREA/IES Standard 90.1-2013, Energy Standard for Buildings Except Row-Rise Residential Buildings
- ANSI/NETA MTS-2011, Standard for Maintenance Testing Specifications
- ANSI/TIA/EIA-568-B.1-2001, Commercial Building Telecommunications Cabling Standard
- ANSI/TIA/EIA-569-B-2004, Commercial Building Standards for Telecommunications Pathways and Spaces

**AVERAGE USEFUL LIFE** - The following list of systems/components and average useful life years (extracted from PWGSC's 'Capital Asset Planning System' (CAPS)) is based on regular preventive maintenance, properly performed at prescribed frequencies. Many factors can affect the average useful life, however, this list serves as a basis for future planning.

**Site Improvements**

Area Lighting	20 Years
Area Posts/Bollards	40 Years
Concrete Wall	50 Years
Fence & Gates	20 Years
Flagpole	25 Years
Masonry Wall	35 Years
Monuments, Fountains & Artwork	25 Years
Stone Wall	40 Years
Planters	25 Years
Signage	15 Years
Site Furnishings	20 Years
Slope Protection	60 Years

**Site Related Stairs, Plazas & Decks**

Bleachers	15 Years
Handrails & Railings - Site Related	20 Years
Ramps - Site Related	25 Years
Stairs - Site Related	25 Years
Wood Deck	15 Years

**Retaining Walls**

Concrete Reinforced Retaining Wall	40 Years
Concrete Pavers Retaining Wall	20 Years
Gabion Retaining Wall	40 Years
Metal Retaining Wall	35 Years
Stone/Masonry Retaining Wall	30 Years
Wood Retaining Wall	25 Years

**Site Utilities**

Underground Utilities	50 Years
Aboveground Utilities	40 Years
Signage - Site Related	15 Years
Undeveloped Lands	150 Years
Landscaping	30 Years
Stormwater Management Systems	30 Years
Septic Systems	35 Years
Well Water Systems	40 Years

**Paved Surface Systems**

Vehicle Areas - Asphalt	20 Years
Vehicle Areas - Concrete, Insitu	20 Years
Vehicle Areas - Concrete, Precast	20 Years
Paved Playgrounds	25 Years
Paved Sports & Recreational Spaces	25 Years

**Interior Construction - Special Partitions**

Copper Lined Partition	75 Years
Lead Lined Partition	75 Years
Wood Panel Partitions	20 Years

**Interior Construction - Interior Doors & Screens**

Glass Doors	30 Years
Aluminum Doors	60 Years
Hollow Metal Doors	60 Years
Wood Doors	40 Years
Other Doors	45 Years
Plastic Doors	?? Years
Interior Door Hardware	20 Years
Interior Screens	20 Years

**Interior Construction - Interior Wall Finishes**

Acoustic Wall Treatment	20 Years
Ceramic Wall Tile	40 Years
Lath & Plaster Wall	40 Years
Paint	10 Years
Vinyl Wall covering	10 Years
Stucco Wall Finish	40 Years
Wood Paneled Wall Finish	30 Years
Other Wall Finishes	20 Years
Wall Waterproof Membrane	20 Years
Glazed Wall Coating	15 Years

**Interior Construction - Flooring**

Asphalt/Asbestos Tile Floor	15 Years
Carpeting (Sheet & Tile)	10 Years
Ceramic Tile Floor	30 Years
Granite Floor	50 Years
Wood Floor - Strip	25 Years
Linoleum Floor	15 Years
Marble Floor	50 Years
Painted Concrete Floor	10 Years
Wood Floor - Parquet	25 Years
Porcelain Tile Floor	25 Years
Quarry Tile Floor	30 Years
Rubber Floor	18 Years
Sealed-Epoxy Concrete Floor	15 Years
Vinyl Tile Floor	20 Years
Vinyl Sheet Floor	20 Years
Terrazzo Floor - Insitu	50 Years
Terrazzo Floor - Tile	50 Years

Pedestrian Areas - Asphalt	22 Years
Pedestrian Areas - Concrete, Insitu	25 Years
Pedestrian Areas - Concrete, Precast	25 Years
Pavement Marking	5 Years
Traffic Control Devices	15 Years

#### Other Surface Systems

Vehicle Areas - Other	10 Years
Playgrounds - Other	10 Years
Sports & Recreational Spaces - Other	10 Years
Pedestrian Areas - Other	10 Years

#### Foundations

Footings & Foundations	110 Years
Basement Walls	110 Years

#### Superstructure

Frame - Concrete	110 Years
Frame - Concrete & Steel	110 Years
Frame - Steel	110 Years
Frame - Steel (Prefab)	110 Years
Frame - Wood	65 Years
Frame - Wood (Post & Beams)	75 Years
Slab on Grade - Asphalt	25 Years
Slab on Grade - Concrete	110 Years
Slab on Grade - Wood	75 Years
Suspended Slab - Concrete Joist & Concrete Deck	110 Years
Suspended Slab - Concrete Joist & Steel Deck	110 Years
Suspended Slab - Steel Joist & Steel Deck	75 Years
Suspended Slab - Steel Joist & Concrete Deck	110 Years
Suspended Slab - Steel Joist & Wood Deck	110 Years
Suspended Slab - Wood Joist & Wood Deck	75 Years
Roof Str - Concrete Joist & Concrete Deck	110 Years
Roof Str - Concrete Joist & Steel Deck	70 Years
Roof Str - Steel Joist & Steel Deck	75 Years
Roof Str - Steel Joist & Concrete Deck	110 Years
Roof Str - Steel Joist & Wood Deck	110 Years
Roof Str - Timber Joist & Wood Deck	85 Years
Roof Str - Wood Joist & Wood Deck	85 Years

#### Miscellaneous Structures

Balconies	35 Years
Entrance/Canopies	40 Years
Exterior Ramps	25 Years
Exterior Stairs	30 Years
Parking Garage	50 Years
Vehicle Ramps	30 Years
Basement Garage	50 Years
Loading Docks	20 Years
Areaways	?? Years

#### External Walls/Closures - Concrete or Masonry Walls

Ext.W - Aggregate or Texture, Block back-up	40 Years
Ext.W - Brick, Block Back-up	75 Years
Ext.W - Brick, Solid	75 Years
Ext.W - Concrete Block	60 Years
Ext.W - Concrete, Precast Panels	50 Years
Ext.W - Concrete, Insitu	50 Years
Ext.W - Stone	75 Years
Ext.W -, Aluminum or Steel, Block Back-Up	35 Years
Ext.W - Fieldstone, In Mortar	85 Years
Ext.W - Fieldstone, Block Back-up	85 Years
Ext.W - Fieldstone, Solid	85 Years
Ext.W - Ornamented Concrete Block	85 Years
Ext.W - Panels, Brick or Tile	50 Years

#### External Walls/Closures - Curtain Walls

Ext.W - Concrete & Glass Panels, Precast	50 Years
Ext.W - Metal & Glass Panels	50 Years
Ext.W - Steel Studs & Stucco	40 Years
Ext.W - Stone Panels	50 Years

Special or Other Floor Finishes	40 Years
Raised Floor Systems	25 Years
Floor Toppings & Traffic Membranes	15 Years
Masonry & Stone Flooring	75 Years
Composition Flooring	20 Years
Waterproof Membrane on Floors	20 Years
Floor Control Joints	25 Years
Floor Expansion Joints	25 Years
Lead Lined Flooring	20 Years
Copper Lined Flooring	20 Years

#### Interior Construction - Ceiling Finishes

Acoustic Tile Ceiling	30 Years
Plaster & Gypsum Board Ceiling	40 Years
Metal Panel Ceiling	30 Years
Painted Ceiling Structures	15 Years
Plaster & Lath Ceiling	40 Years
Suspended Acoustic Panel Ceiling	25 Years
Wood Ceiling	40 Years
Ceiling Paint	10 Years
Other Ceiling Finishes	35 Years
Lead Lined Ceiling	30 Years
Copper Lined Ceiling	30 Years

#### Interior Construction - Interior Ramps & Stairs

Guards, Handrails & Railings - Interior	75 Years
Ramps - Interior	75 Years
Stairs - Interior	75 Years
Interior Ladders	75 Years

#### Interior Construction - Miscellaneous Items

Building Signage - Interior	10 Years
Catwalks	40 Years
Fixed Furnishing (Millwork)	20 Years
Fountain	20 Years
Kitchen Equipment	20 Years
Ice Rink & Equipment Accessories	20 Years
Squash Courts & Accessories	45 Years
Swimming Pools, Spas & Accessories	15 Years
Walk-in Freezer/Cold Storage	18 Years
Window Washing Device Anchors	30 Years
Solar Control Systems - Solar Shelves	?? Years
Bird Control Systems	?? Years

#### Conveying Systems – V & H Movement

Elevators	25 Years
Escalators	25 Years
Freight Elevators	25 Years
Wheelchair Platform Lifts	25 Years

#### Conveying Systems - Specialties

Bridge Cranes	25 Years
Chain Hoists	25 Years
Dumbwaiters	25 Years
Loading Dock Equipment	25 Years
Moveable Floors	25 Years
Moving Walkways	25 Years
Scissor Lifts	25 Years

#### HVAC

Building Heat Transfer System Exchangers	30 Years
Duct Systems	40 Years
Self-Contained AHU - Cool	25 Years
DX Split AHU - Cool	25 Years
Computer Cooling AHU	25 Years
Roof Top AHU - Heat&Cool	25 Years
Window Unit A/C - Heat&Cool	25 Years
Packaged Terminal AC AHU	25 Years
Heat Pumps	40 Years
Central Station AHU	35 Years
Ventilation Fans	25 Years
Humidifiers	25 Years

**External Walls/Closures - Pre-Engineered Walls**

Ext.W - Prefab Panels, Alum, Steel, Glass	50 Years
Ext.W - Prefab Panels, Stucco, Steel	50 Years
Ext.W - Prefab, Panels, Veneer, Block	50 Years
Ext.W - Sandwich Panels, Alum or Steel	50 Years
Ext.W - Sandwich Panels, Cement Fiber	50 Years
Ext.W - Sandwich Panels, Fiberglass	50 Years
Ext.W - Sandwich Panels, Glass & Metal	50 Years

**External Walls/Closures - Wood or Steel Stud Walls**

Ext.W - Aluminum or Steel, Siding	35 Years
Ext.W - Asphalt Siding	40 Years
Ext.W - Cement Fiber, Siding or Shingles	40 Years
Ext.W - Hardboard, Siding or Shingles	40 Years
Ext.W - Plywood textures	25 Years
Ext.W - Wood, Shingles or Shakes	40 Years
Ext.W - Stucco	40 Years
Ext.W - Synthetic Plaster on Rigid Insulation	30 Years
Ext.W - Veneer, Common Brick	75 Years
Ext.W - Veneer, Face Block or Concrete Brick	60 Years
Ext.W - Veneer, Stone	85 Years
Ext.W - Vinyl, Siding	40 Years
Ext.W - Wood, Siding	40 Years

**External Walls/Closures - Finishes**

Ext.W - Paint	15 Years
Ext.W - Sealer	20 Years
Exterior Insulation and Finishing Systems (EFIS)	?? Years

**External Walls/Closures - Exterior Doors**

Revolving Door	20 Years
Aluminum Doors	50 Years
Glass Doors	40 Years
Metal Doors	45 Years
Wood Doors	40 Years
Overhead Door	20 Years
Other Doors	45 Years
Exterior Door Hardware	15 Years

**External Walls/Closures - Windows**

Aluminum Windows	50 Years
PVC Windows	35 Years
Steel Windows	50 Years
Wood Windows	40 Years
Aluminum Skylights	50 Years
Plastic Skylights	35 Years
Steel Skylights	50 Years
Wood Skylights	40 Years
Other Windows	40 Years
Window Coverings	15 Years

**External Walls/Closures - Soffits**

Metal Soffits	50 Years
Gypsum Board Soffits	50 Years
Cement Plaster Soffits	50 Years
Wood Soffits	40 Years
Stone Soffits	75 Years
Other Soffits	?? Years

**External Walls/Closures Construction - Miscellaneous Items**

Louvres	50 Years
Ladders	50 Years
Grilles	50 Years

**External Walls/Closures - Roof Coverings**

Metal Roof	30 Years
Atrium type-Glass, frame and glazing	45 Years
Built-Up-Roof	25 Years
Asphalt Shingles Roof	22 Years
Copper Roof	50 Years
1-Ply Membrane Roofing - SBS (Mod.Bit.)	20 Years

Make-up Air AHU	25 Years
Heating & Cooling Piping Systems	30 Years
HVAC Pumps	25 Years
Chemical Feed System	25 Years
Boilers	30 Years
Boiler Oil Supply System	20 Years
Boiler Auxiliary System	30 Years

Terminal Units	35 Years
Chillers	20 Years
Cooling Towers	25 Years
Furnace/Forced Air	20 Years
Gas Fired Radiant Heater	30 Years
Gas Piping System	35 Years
Snow Melting System	12 Years

**Control Systems**

Controls, Electrical or Pneumatic	24 Years
Direct Digital Control	20 Years

**Plumbing**

Plumbing Piping	40 Years
Plumbing Fixtures and Accessories	30 Years
Plumbing Pumps	20 Years

**Tanks**

Domestic Hot Water Tanks	20 Years
Water Storage Tanks	35 Years
Water Treatment Systems	30 Years

**Special Systems**

Stacks & Breaching	25 Years
Compressed Air Systems	75 Years
Medical Air Systems	25 Years
Medical Vacuum Systems	40 Years
Water Distillation Units	40 Years
Sterilization System	15 Years
Vehicle Fuel Storage and Distribution	35 Years
Vacuum Systems	30 Years
Incinerators	20 Years
Compactors	15 Years
Diesel Generator Fuel Supply Systems	30 Years
Swimming Pool and Systems	40 Years
Methane Venting Systems	30 Years
Ice Rink Systems	40 Years

**Fire Protection**

Fire Pumps	25 Years
Specialty Fire Protection Systems	40 Years
Smoke Protection Fans	40 Years
Sprinkler Systems	35 Years
Standpipe Systems	26 Years
Portable Fire Extinguishers	30 Years
Fire Protection Water Storage Tanks	45 Years

**Main Service Electrical**

Primary Switch Gear	30 Years
Primary Transformer & Vault	30 Years

**Secondary Service Electrical**

Distribution	30 Years
MCC	45 Years
Secondary Transformer	30 Years
Electric Power Meter	50 Years
Inverters	45 Years
Rectifiers	45 Years
Cabling Raceways & Bus Ducts	40 Years
Capacitors	40 Years

**Lighting Fixtures**

General Lighting	30 Years
Exit Lighting	30 Years

<u>1-Ply Membrane Roofing - EPDM</u>	<u>25 Years</u>
<u>1-Ply Membrane Roofing - PVC</u>	<u>25 Years</u>
<u>Slate Roof</u>	<u>50 Years</u>
<u>Tile, Terracotta or Concrete Roof</u>	<u>42 Years</u>
<u>Wood, Shake or Shingle Roof</u>	<u>35 Years</u>

<u>Other Roof Coverings</u>	<u>50 Years</u>
<u>Green Roof</u>	<u>?? Years</u>

**External Walls/Closures - Roof Specialties**

<u>Gutter</u>	<u>30 Years</u>
<u>Ice/Snow Guard</u>	<u>?? Years</u>
<u>Chimneys</u>	<u>45 Years</u>
<u>Roof Hatch - Access</u>	<u>?? Years</u>
<u>Roof Hatch - Smoke</u>	<u>?? Years</u>

**Interior Construction - Masonry Partitions**

<u>Concrete Block Partition</u>	<u>75 Years</u>
<u>Concrete Partition</u>	<u>75 Years</u>
<u>Brick Partition</u>	<u>75 Years</u>
<u>Stone Partition</u>	<u>75 Years</u>
<u>Glazed Block (Facing Block) Partition</u>	<u>75 Years</u>
<u>Interior Glazed Opening</u>	<u>40 Years</u>
<u>Tile Partition</u>	<u>50 Years</u>
<u>Glass Block Partition</u>	<u>75 Years</u>

**Interior Construction - Frame Partitions**

<u>Plaster &amp; Gypsum Board Partition with Studs</u>	<u>40 Years</u>
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<u>Exterior Lighting</u>	<u>15 Years</u>
<u>Emergency Lighting</u>	<u>18 Years</u>

**Electrical Service Ground**

<u>Grounding Systems</u>	<u>40 Years</u>
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**Electrical Systems**

<u>Fire Alarm System</u>	<u>17 Years</u>
<u>Emergency Power System</u>	<u>35 Years</u>
<u>Communications Systems</u>	<u>25 Years</u>
<u>Security System</u>	<u>20 Years</u>

**Special Electrical Systems**

<u>Automatic Door Devices</u>	<u>20 Years</u>
<u>Clock Systems</u>	<u>25 Years</u>

**Electric Heating Systems**

<u>Electric Baseboard Heaters</u>	<u>10 Years</u>
<u>Underfloor Electric Cables</u>	<u>10 Years</u>
<u>In-Ceiling Electric Radiant Heating</u>	<u>10 Years</u>
<u>In-Wall Electric Radiant Heating</u>	<u>10 Years</u>
<u>Snow Melting Cables</u>	<u>10 Years</u>
<u>Electrical Radiant Unit Heaters</u>	<u>10 Years</u>
<u>Fan Powered Unit Electric Heaters</u>	<u>10 Years</u>
<u>Duct Electric Heaters</u>	<u>10 Years</u>

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**PROPERTY / SITE**



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## SITE SUMMARY

**HISTORY** - Prior to the Second World War, the site had been under longtime agricultural use. At the outbreak of hostilities, the Crown developed the site as a military radar station as part of the war effort. Post-war, the facility was no longer required by the Crown, and was subsequently conveyed to the private sector for industrial use (tire vulcanization). In the mid-1980's, the Crown reacquired the site and converted the facility for use as a weather radar station.

**DESCRIPTION** - The site is 198.81 hectares in size, located east of the town of Exeter on Thames Road (RR 83), between Heron Line (RR 11) and Sunshine Line. The site is bordered to the north by Thames Road, and to the east, south and west by privately owned agricultural land, all currently under cultivation.

*NOTE: Information was limited to visual observations. No destructive testing was carried out.*

**CONDITION** - The property/site elements are considered to range from good to fair overall condition, with life-cycle replacement/refurbishment projects forecast over the short and long terms.

## 0.00 PROPERTY / SITE SYSTEMS

**0.01 SITE FIXTURES** - The only site fixture identified is the chain-link fencing - 1880 mm height, galvanized with 3-strand barbed wire, located to create a secure area around the radar building and tower, with a powered horizontal-rolling access gate at the driveway.

On-site personnel indicated that snow fencing - 1220 mm height, wire-bound wood lath, with metal T-bar posts - is placed seasonally along the west property line between the road and the chain-link fencing.

**Condition** - The component is considered to be in fair overall condition, performing as intended and with no visible damage or deterioration outside of some light rust in localized areas.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The component dates from conversion of the facility to a weather radar station in the mid-1980's. Given its current condition, it can likely be expected to perform until the end of its effective service life, around 2045.

**Recommendations** - None identified.

**0.02 SITE SIGNAGE** - The site signage consists of a post and panel FIP site identification sign - wood posts and base, metal sign - located at the beginning of the access driveway (adjacent to Thames Road).

**Condition** - The component is considered to be in fair overall condition, performing as intended and with no visible signs of damage; however, the sign is moderately faded.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, there are no design problems/deficiencies with the component.

**Effective Remaining Life** - The age of the component is unknown; however, based on condition and appearance the metal and wood components are presumed to date from approximately 1985 and 2005, respectively. Given the current condition, it can likely be expected to perform until the end of its effective service life, around 2020.

**Recommendations -**

<i>Description:</i> Sign replacement	
<i>Action Year:</i> 5	<i>Estimated Cost</i>
It is recommended that an allowance be made for replacement of the FIP site identification sign at the end of its effective service life.	<i>Material &amp; Labour:</i> \$5,500
	<i>Contingency:</i> \$825
	<i>Project Soft Costs:</i> \$1,898
	<i>Total:</i> \$8,223

**0.03 SITE STAIR & RAMPS** - There are no freestanding stairs/ramps associated with this site.

**0.04 SITE STRUCTURES** - There are no other structures associated with this site (*the garden shed and the radar tower are outside the scope of this report*).

**0.05 UNDEVELOPED LANDS** - There are no undeveloped land areas associated with this site.

**0.06 LANDSCAPING** - The extent of the landscaping covers the entire site, exclusive of structures and pavements, and consists entirely of maintained lawn areas.

**Condition** - Landscaping is considered to be in good overall condition, free of infestation (weeds/insects) and dead material.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, there are no design problems/deficiencies with the component.

**Effective Remaining Life** - With normal maintenance, the landscaping can be expected to perform indefinitely.

**Recommendations** - None identified.

**0.07 PAVEMENTS** - The vehicle pavements for this facility consist of:

- Granular paved driveway (between Thames Road and the building compound).
  - Granular paved area for vehicle parking and loading (adjacent to the building).
- All granular paved areas rely on surface drainage onto adjacent landscaped areas.

There are no pedestrian pavements.

**Condition** - The pavements were found to be in fair overall condition, performing as intended and with no visible damage or deterioration; however:

- Significant vegetation growth was noted throughout the granular paved areas.
- Standing water was noted at several locations.

*NOTE: Continued build-up of organic material will eventually render the granular paving ineffective.*

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - The only design problem/deficiency identified with the component is inadequate grading to facilitate drainage of surface water.

**Effective Remaining Life** - The component is presumed to date from the original construction of the facility, and with normal maintenance, including periodic refurbishment, can likely be expected to perform indefinitely.

**Recommendations** -

<i>Description:</i> Pavement refurbishment	
<i>Action Year:</i> 1, 11, 21	<i>Estimated Cost</i>
It is recommended that an allowance be made in each 10-year period for the refurbishment of granular paved surfaces (including scarifying surfaces, adding additional granular material as required, grading to facilitate drainage, and compaction) in order to continue their effective service lives.	<i>Material &amp; Labour:</i> \$5,000
	<i>Contingency:</i> \$750
	<i>Project Soft Costs:</i> \$1,725
	<i>Total:</i> \$7,475

**0.08 UTILITIES** - Underground utilities serving this facility include:

- Electrical power.
- Telephone/communication lines.

There are no above-ground utilities serving this facility.

**Condition** - There is no information available on the condition of the utilities serving this facility. No problems/concerns were identified by on-site personnel.

**NOTE:** *Refer to '4.01 Electrical Power', and '4.09 Telephone & Communications System' for detailed assessments.*

# RADAR BUILDING



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## BUILDING SUMMARY

**HISTORY** - No detailed history of the existing building is available outside of anecdotal information provided by on-site personnel. The Radar Building was originally constructed during development of the facility as a military radar station in the early 1940's. Post-war, the facility was no longer required by the Crown, and was subsequently conveyed to the private sector for industrial use (tire vulcanization). In the mid-1980's, the Crown reacquired the site and converted the facility for use as a weather radar station. The facility is no longer occupied on a full-time basis, with occasional usage primarily consisting of equipment maintenance and staff training. Despite the several changes in use/occupancy over, no significant alteration/renovation of the building has occurred.

**DESCRIPTION** - The building is a single-storey, concrete frame building with a partial basement. The basement level contains service rooms (mechanical and electrical), storage and workshop areas. The upper level contains a lunch room, washroom (including shower facilities), a service room, electronics lab area computer rooms, open office area, enclosed offices, and a classroom.

**CLASSIFICATION** - Based on its existing size, height and use, this facility falls under the design criteria outlined in Part 9 of the most recent edition of the National Building Code of Canada (NBC 2010). The following building code matrix information is applicable:

- Building area: ± 224 m<sup>2</sup>
- Building height: One (1).
- Storeys below grade: One (1)
- Sprinklered: No
- Major occupancy: Group D (offices)
- Subsidiary occupancy: Group F - Division 3 (workshop/storage)
- Number of streets: Three (3)
- Construction type: Non-combustible
- Required fire resistance ratings: Floor assemblies - ¾ hour; roof assemblies - n/a; load-bearing walls, columns and arches - not less than that of the supported assembly; service rooms - 1 hour
- Fire alarm: No

**FACILITY CONDITION** - Inspection has determined the buildings and their systems located at this facility to be in the following overall condition:

- **ARCHITECTURAL/STRUCTURAL** - Several key components of the building envelope, including the foundation, exterior walls, and roofing, are considered to be in poor condition and in need of corrective actions in the short-term in order to maintain their integrity and facilitate continued use of the asset. Most interior architectural/structural elements are considered to be in fair overall condition, and with minor repairs and ongoing maintenance, should continue to perform satisfactorily for the next 30 years, with only life cycle replacement of components anticipated.
- **MECHANICAL** - The mechanical systems within the facility are in various stages of their lives, and their condition is as follows: the electrical heating is in fair condition; the cooling

systems are in excellent condition; the storm water drainage is in average condition, the sump pump is in good condition. The sanitary sewer and the well are in fair condition, but need inspection. The domestic electric hot water tank, plumbing and sanitary fixtures are in average condition, the portable fire extinguishers are in good condition.

- **ELECTRICAL** - In general the electrical systems at this facility are in poor to fair condition and should be considered for replacement as stipulated within the attached report.

**COMPLIANCE ISSUES** - Inspection has identified various compliance issues throughout the facility, as follows:

**REGULATORY COMPLIANCE** - Several design/compliance issues were identified throughout the facility and are described within the report under their applicable divisions. It is recommended that these items (e.g. code violations, etc.) be addressed on an urgent basis. Due to the extensive nature of correcting some of the identified items, it is further recommended that the 'authority having jurisdiction' with respect to fire protection engineering, be consulted to determine what interim measures, if any, can be employed to ensure that occupant health and safety is not compromised.

**ENVIRONMENTAL** - Given the age of the building, there is a high probability that building materials may contain hazardous materials, several building materials observed on-site are suspected as possibly containing hazardous materials and suspect materials in concealed spaces may possibly contain hazardous materials. No information with respect to existing hazardous materials was available, and no record of any previous inspection/testing of hazardous material was available. It is recommended that all existing environmental information should be collected and reviewed to determine what actions, if any, are required.

**ACCESSIBILITY** - To date, no provision to incorporate barrier-free design has been undertaken at this building. A recently completed Accessibility Audit rates this building as only 46% compliant with both the 1995 and 2004 versions of CAN/CSA-B651. Deficiencies are identified with the existing walkways, parking, entrances, interior doors, washrooms, tactile signage, and public areas. Either corrective actions must be undertaken to ensure this building complies with current accessibility standards, or a formal exemption (either full, or partial with some corrective actions undertaken) must be obtained.

**SEISMIC ASSESSMENT** - It is unknown if the design/construction of the existing structure would meet current code requirements with respect to seismic loading. Since the Toronto/Barrie areas are in a zone of low seismicity, and there are no significant projects planned for this facility, no actions (e.g. completion of seismic screening or assessment) are recommended.

**HERITAGE** - As the maximum age for review is 40 years and the building is believed to be 40 - 50 years old, a request for a request for review and preparation of a "Heritage Character Statement" by the Federal Heritage Building Review Office (FHBRO) through Canadian Heritage is now overdue and should be made ASAP, with no interventions (e.g. alteration, demolition or disposal) exercised prior to FHBRO review.

**RECOMMENDED EXPENDITURES** - A summary of the recommended expenditure costs as put forth throughout this report are presented as follows:

The total estimated Short Term Expenditure (1 to 5 years) cost for this facility is **\$538,463**, as outlined below:

Architectural / Structural Systems	\$435,425
Vertical Transportation Systems	\$0
Mechanical Systems	\$39,500
Electrical Systems	\$63,538
<hr/>	
Short Term Total	<b>\$538,463</b>
<hr/>	

The total estimated Long Term Expenditure (6 to 25 years) cost for this facility is **\$272,744**, as outlined below:

Architectural / Structural Systems	\$84,469
Vertical Transportation Systems	\$0
Mechanical Systems	\$85,500
Electrical Systems	\$102,775
<hr/>	
Long Term Total	<b>\$272,744</b>
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## 1.00 ARCHITECTURAL / STRUCTURAL SYSTEMS

**1.01 SUBSTRUCTURE** - The substructure is reinforced concrete, consisting of cast-in-place perimeter foundation walls. A concrete slab-on-grade floor is provided throughout the basement. No access is provided to the unexcavated portion of the building. Integral with the substructure is:

- The basement access ramp - a cast-in-place concrete vehicle access ramp and retaining wall.
- The loading dock and main entrance stair - with 2 exterior and 2 interior cast-in-place concrete foundation walls (defining the basement electrical room) supporting a suspended slab with rigid insulation adhered to the underside.

No specific system details (i.e. footing types, damp-proofing, drainage, etc.) are available.

*NOTE: The loading dock/main entrance stair form part of both the required primary and secondary means of egress for this building, while the access ramp forms part of the required secondary means of egress from the basement.*

**Condition** - The component is considered to be in fair overall condition, with no obvious signs of settlement or failure, however:

- Several localized exterior areas of deteriorated concrete (cracking/spalling) were observed.
- Signs of minor leakage is evident below the main entrance stair (visible in the basement electrical room).
- Signs of flooding (staining) are evident throughout the basement.
- Standing water was present at the bottom of the access ramp during the site visit.
- Open joints throughout the main entrance stair tile nosings were observed.
- Severe deterioration of the wood dock bumper was observed.
- On-site personnel identified water issues in the basement as a long-standing issue.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - Several design deficiencies were identified, as follows:

- Inadequate subsurface drainage.
- Inadequate interior drainage.
- Existing guard/handrail at stair is not code compliant.
- No guards at loading dock.
- No moisture protection of horizontal concrete surfaces above basement (i.e. loading dock slab above basement electrical room).

**Effective Remaining Life** - The component dates from the original construction of the building in the early 1940's, and with corrective action, can likely be expected to perform indefinitely.

**Recommendations -**

<i>Description:</i> Foundation repairs	
<i>Action Year:</i> 1	<i>Estimated Cost</i>
<p>It is recommended that allowance be made for the remediation of deteriorated/deficient substructure components (including removal of unsound concrete, cleaning and treating of concrete and re-bar surfaces, and rebuilding of concrete surfaces to original profiles, cleaning of water damaged interior surfaces, pointing of open stair nosing tile joints, installation of guards/handrails around the loading dock and stair, replacement of the wood dock bumper, and application of a 'traffic topping' material to horizontal surfaces of the loading dock and stair) in order to maintain adequate levels of life safety, deter further/accelerated deterioration, reinstate the integrity of the substructure components, and maximize their effective service lives.</p> <p><i>NOTE: Loading dock guard design should allow for movable/removable components to maintain facilitate useage.</i></p>	<i>Material &amp; Labour:</i> \$7,500
	<i>Contingency:</i> \$1,125
	<i>Project Soft Costs:</i> \$2,588
	<i>Total:</i> \$11,213

<i>Description:</i> Foundation study	
<i>Action Year:</i> 1	<i>Estimated Cost</i>
<p>On-site personnel indicated that identified issues with respect to flooding are a seasonal concern, while minor drainage issues (i.e. standing water) are continual. It is suspected that some form of subsurface drainage system is in place, however unable to accommodate occasional high-demand requirements, either due to being under designed or from suffering reduced efficiency with age. Regardless, water ingress issues are detrimental to building systems and equipment and pose a potential health/safety concern for building users, particularly anyone required to access the basement level. Therefore, it is recommended that a detailed study (including localized excavations, visual assessment, moisture checks, and CCTV inspection) be completed to fully assess the substructure waterproofing and drainage components and their condition. This information will be invaluable in determining both the timing and the scope of work required for required corrective actions.</p>	<i>Material &amp; Labour:</i> \$10,000
	<i>Contingency:</i> \$1,500
	<i>Project Soft Costs:</i> \$3,450
	<i>Total:</i> \$14,950

<i>Description:</i> Drainage upgrades	
<i>Action Year:</i> 3	<i>Estimated Cost</i>
Pending findings of the above study, it is recommended that corrective actions be carried out in order to maintain adequate levels of life safety, deter further/accelerated deterioration, reinstate the integrity of the substructure components, and maximize their effective service lives.  ** Pending completion of the study and its determinations, the provided cost is purely speculative.	<i>Material &amp; Labour:</i> \$50,000
	<i>Contingency:</i> \$7,500
	<i>Project Soft Costs:</i> \$17,250
	<i>Total:</i> \$74,750

**1.02 SUPERSTRUCTURE** - The superstructure is predominantly reinforced concrete, consisting of cast-in-place columns, beams and joists, cast integrally with suspended floor and roof slabs. Foil-backed insulation was visible at the underside of the roof slab. A single steel column is used at the corner of the loading dock as support of the roof area above which serves to act as a canopy.

**Condition** - The component is considered to be in fair overall condition, performing as expected with no obvious signs of settlement or failure, and with no visible damage, however:

- Localized concrete deterioration was observed at the underside of the canopy.
- Localized concrete deterioration was observed at the underside of the penthouse roof overhang.
- Surface deterioration was observed at the canopy steel column (worn/flaking paint finish, rusting).

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The component dates from the original construction of the building in the early 1940's, and with corrective action, can likely be expected to perform indefinitely.

**Recommendations -**

<i>Description:</i> Structural repair	
<i>Action Year:</i> 1	<i>Estimated Cost</i>
It is recommended that allowance be made for the remediation of deteriorated concrete areas (including removal of unsound concrete, cleaning and treating of concrete and re-bar surfaces, and rebuilding of concrete	<i>Material &amp; Labour:</i> \$6,500
	<i>Contingency:</i> \$975
	<i>Project Soft Costs:</i> \$2,243
	<i>Total:</i> \$9,718

**1.03 ANCILLARY STRUCTURES** - There are no ancillary structures associated with this building:

- The loading dock is integral with the building foundation - refer to 1.01 Substructure.
- The canopy is integral with the roof structure - refer to 1.02 Superstructure.

**1.04 EXTERIOR WALLS** - A variety of exterior wall types are employed at this building, as follows:

- Masonry - non-loadbearing, consisting of facing brick with block back-up (either concrete block or clay tile), with an interior plaster finish (painted). Integral with the exterior walls are glass block openings, located throughout the building, and effectively serving as clerestory windows.
- Masonry (metal-clad) - located at the rooftop penthouse, consisting of prefinished metal (factory-formed profile) with lap seams, fastened over masonry.
- Metal (lap seam) - located on the basement access ramp enclosure, consisting of prefinished metal (factory-formed profile) with lap seams, fastened directly over a wood frame structure.

No specific wall assembly details (i.e. material thickness, presence of air space, presence of insulation, etc.) are available.

**Condition** - The component was found to be in fair to poor overall condition, with significant deterioration throughout, as follows:

- Damaged facing brick units (cracked, spalled).
- Damaged glass block units (cracked).
- Damaged precast concrete units.
- Deteriorated mortar joints.
- Surface deterioration of the steel lintels (worn/flaking paint finish, rusting) at most wall openings (glass block, window, and door) was observed.
- Deteriorated sealants (cracked, brittle, debonded, missing) were observed at most glass block openings.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - No control joints are provided in the masonry walls, which, despite the building's small size, is likely the cause of much of the cracking identified in the exterior masonry surfaces as a result of even minor movement of the structure.

*NOTE: Minimal heat in building during unoccupied periods, combined with minimal insulation is likely a contributing factor in the accelerated deterioration of the masonry walls.*

**Effective Remaining Life** - The component dates from original construction of the building in the early 1940's, and with corrective action and normal maintenance, they can likely be expected to perform indefinitely.

**Recommendations -**

<i>Description:</i> Exterior wall restoration	
<i>Action Year:</i> 1	<i>Estimated Cost</i>
It is recommended that allowance be made for the remediation of deteriorated exterior wall components (including replacement of damaged brick and glass block units, repair of damaged precast concrete units, cleaning and repointing of deteriorated mortar joints, cleaning and painting of rusting lintels, and replacement of deteriorated sealants) in order to deter further/accelerated deterioration, reinstate the integrity of the structure and maximize its effective service life.  As an integral part of the building envelope which separates dissimilar environments, the exterior walls are required to maintained resistance to heat transfer, air leakage, vapour diffusion, and precipitation (NBC 5.3, 5.4, 5.5 and 5.6).	<i>Material &amp; Labour:</i> \$30,000
	<i>Contingency:</i> \$4,500
	<i>Project Soft Costs:</i> \$10,350
	<i>Total:</i> \$44,850

<i>Description:</i> Exterior wall repairs	
<i>Action Year:</i> 6,11,16, 21, 26	<i>Estimated Cost</i>
It is recommended that allowance be made in each 5-year period for minor masonry repair work in order to maintain the integrity of the building envelope, and the maximize their effective service lives.	<i>Material &amp; Labour:</i> \$5,000
	<i>Contingency:</i> \$750
	<i>Project Soft Costs:</i> \$1,725
	<i>Total:</i> \$7,475

**1.05 EXTERIOR DOORS** - The doors employed throughout the exterior of this building are exclusively hollow metal (flush type, paint finished) with clear glazed lights, located at the main entrance/loading dock.

A variety of overhead doors are employed throughout the exterior of this building, as outlined in the following table:

- Storage Building : Exterior Overhead Door Schedule -				
<i>Name</i>	<i>Location</i>	<i>Type</i>	<i>Size (W x H)</i>	<i>Operation</i>
n/a	Ramp, top	Sectional <sup>i</sup>	1840 x 2145 mm	Powered <sup>ii</sup>
n/a	Ramp, bottom	Sectional <sup>i</sup>	1840 x 2440 mm	Powered <sup>iii</sup>

*Notes:*  
<sup>i</sup> Prefinished metal, insulated.  
<sup>ii</sup> Photo electric safety.  
<sup>iii</sup> No safety device.

**Condition** - The component is considered to be in fair overall condition, performing as expected and with no visible damage or deterioration.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The component dates from various times, as follows:

- Hollow metal doors are presumed to date from the original construction of the building in the early 1940's, and with normal maintenance they can likely be expected to perform indefinitely - with any required minor repairs/ replacements being effected on an 'as required' basis through normal O&M operations.
- Overhead doors at the bottom and top of the ramp is unknown, however, based on appearance and condition, are presumed to be approximately 25 and 15 years old, respectively, with the power operators presumed to be approximately 5 and 10 years old, respectively. With normal maintenance, the doors can likely be expected to perform over the next 5 and 15 years.

**Recommendations -**

<i>Description:</i> Overhead door replacement	
<i>Action Year:</i> 6	<i>Estimated Cost</i>
It is recommended that allowance be made for replacement of the inner ramp overhead door (reuse existing power operator) at the end of its effective service life.	<i>Material &amp; Labour:</i> \$4,500
	<i>Contingency:</i> \$675
	<i>Project Soft Costs:</i> \$1,553
	<i>Total:</i> \$6,728

<i>Description:</i> Overhead door replacement	
<i>Action Year:</i> 16	<i>Estimated Cost</i>
It is recommended that allowance be made for replacement of the inner ramp overhead door (reuse existing power operator) at the end of its effective service life.	<i>Material &amp; Labour:</i> \$4,500
	<i>Contingency:</i> \$675
	<i>Project Soft Costs:</i> \$1,553
	<i>Total:</i> \$6,728

**1.06 WINDOWS** - A variety of glazed opening types are employed throughout this building, as follows:

- Steel - fixed type with single glazing, paint finished - located in the basement service room.
- Wood - fixed type with insulating glass units (no date), paint finished interior, prefinished metal capped exterior - located in the basement access, washroom, kitchen and service room.

*NOTE: For glass block openings, refer to '1.04 Exterior Walls'.*

**Condition** - The component is considered to be in fair overall condition, performing as expected and with no visible damage or deterioration.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The window framing components date from the original construction of the building in the early 1940's, and with normal maintenance can likely be expected to perform indefinitely.

The age of the insulating glass units and sealants is unknown - the insulating glass units will fail randomly without warning and can be replaced on an 'as required' basis, while the sealants will continue to require replacement on a cyclical basis.

**Recommendations** - None identified.

**1.07 SUSPENDED FLOORS/SOFFITS** - A suspended cement plaster soffit is provided above the loading dock (below the lower main roof area which serves as a canopy). A painted plywood hatch provides access into the attic space between the soffit and the underside of the roof structure.

**Condition** - The component is considered to be in fair overall condition, performing as intended and with no visible damage or deterioration.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The component date from the original construction of the building in the early 1940's. Given the current condition, with normal maintenance they can likely be expected to perform indefinitely.

**Recommendations** - None identified.

**1.08 ROOFING** - A variety of roof coverings are employed throughout the multiple roof levels/areas at this building, as follows:

- Ethylene Propylene Diene Monomer (EPDM) rubber - located on the upper and lower main roof areas - an inverted assembly consisting of stone ballasted EPDM membranes and flashings over rigid insulation; counter/cap flashings are prefinished metal.
- Metal (standing seam) - located on the rooftop penthouse - prefinished metal (flat, formed to suit) with standing seams.
- Metal (lap seam) - located on the basement access ramp enclosure - prefinished metal (factory-formed profile) with lap seams, fastened directly over a wood frame structure.

Drainage for the upper and lower main roof areas is provided by area drains connected to the storm water system with internal piping. The penthouse roof drains directly onto the adjacent main roof areas. The sloped ramp enclosure roof drains directly onto the adjacent grade.

Roof access from grade requires the use of a portable ladder.

No specific roof assembly details (i.e. insulation type and thickness, presence of vapour barrier, etc.) are available.

**Condition** - The component is considered to be in fair, but approaching poor, overall condition, with no reported leakage, however:

- Unevenly distributed ballast, with several bare membrane areas was observed.
- Several fractured ballast stones were identified - high risk of membrane puncture.
- Perimeter tenting and wrinkling of the membrane was observed - result of membrane shrinkage with age.
- Deteriorated sealants were observed.
- Rusting metal counter flashings and penthouse roofing was observed.
- Deteriorated (melted?) insulation pads below rooftop equipment was noted.
- Signs of leakage were identified - stained ceiling tiles in workshop and office area, and around chimney in service room.

**Recent Repairs/Modifications** - To our knowledge, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - Several design deficiencies were identified, as follows:

- Inadequate surface drainage across the main roof areas is resulting in standing water.
- The sloped metal roofing is not flashed into the exterior masonry wall along its edge - only sealant is used (possible contributor of moisture into basement at ramp base).

**Effective Remaining Life** - The age of the EPDM roofing is unknown, however based on appearance and condition it is considered to be reaching the end of its effective service life.

**Recommendations -**

<i>Description:</i> Roof replacement	
<i>Action Year:</i> 2	<i>Estimated Cost</i>
Pending assessment and verification, the roofing will require replacement at the end of its effective service life in accordance with good life cycle maintenance practice in order to maintain the integrity of the building envelope and prevent damage/deterioration and/or known health issues associated with leakage.  As an integral part of the building envelope which separates dissimilar environments, the roofing is required to maintained resistance to heat transfer, air leakage, vapour diffusion, and precipitation (NBC 5.3, 5.4, 5.5 and 5.6).	<i>Material &amp; Labour:</i> \$75,000
	<i>Contingency:</i> \$11,250
	<i>Project Soft Costs:</i> \$25,875
	<i>Total:</i> \$112,125

**1.09 FLOORINGS** - A variety of flooring types are employed throughout this building, as follows:

- Terrazzo (in situ) - with copper insert strips - in the entrance, corridor, janitor closet, workshop and mechanical room.
- Vinyl Tile - in the vestibule, part office area (south portion), lunchroom and washroom.
- Carpet - in the classroom, office and part office area (north portion).
- Plywood - in parts of the basement (raised flooring).
- Paint - at concrete floors throughout the basement.

Raised wooden flooring (unfinished plywood on wood joists) has been provided throughout the south portion of the basement - presumably in response to ongoing water issues (see '1.01 Superstructure', above).

*NOTE: Use of copper for insert strips in terrazzo is unusual, on-site personnel indicate the rationale as improved grounding, it is possible that terrazzo may exist below flooring materials in other rooms.*

**Condition** - The component is considered to be in fair overall condition, performing as expected, with normal wear patterns based on age and traffic, however:

- Several vinyl floor tiles are damaged.

**Recent Repairs/Modifications** - Vinyl tile flooring in the lunchroom and washroom dates from approximately 2012.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The floor finishes date from various times over the life of the building, and will require cyclical partial replacements based on in-service times and usage:

- The terrazzo dates from the original construction of the building, and with normal maintenance, can likely be expected to perform indefinitely.
- The vinyl tile and carpet flooring dates from various times over the life of the facility, and will continue to require partial replacements on an ongoing basis.
- The painted floor finish will continue to require replacement on an ongoing basis.

**Recommendations -**

<i>Description:</i> Flooring replacement	
<i>Action Year:</i> 11	<i>Estimated Cost</i>
Pending future assessment and verification, it is recommended that allowance be made to replace the carpet and resilient floorings at their effective service life.	<i>Material &amp; Labour:</i> \$15,000
	<i>Contingency:</i> \$2,250
	<i>Project Soft Costs:</i> \$5,175
	<i>Total:</i> \$22,425

**1.10 INTERIOR PARTITIONS AND FINISHES** - A variety of interior walls types are employed throughout this building, as follows:

- Frame (fixed) - consisting of stud framing finished with gypsum board - at the office and classroom.

- **Brick** - at the basement mechanical room and northeast storage room, and for the chimney.
- **Concrete block** - covered with plaster in the entrance, corridor, washroom, and kitchen, and cement plaster in the janitor room - at all locations not otherwise noted.
- A variety of finishes are employed throughout this building, as follows:
- **Paint** - used on concrete (exposed substructure/superstructure at basement), brick, concrete block, plaster, cement plaster, and gypsum board.
- **Wood panels** - used in the workshop, with copper screening behind (to improve grounding for equipment).

**Condition** - The component is considered to be in fair overall condition, performing as expected, with normal wear based on age and traffic, however:

- Water damage of the paint and gypsum board finish at the exterior walls (see 1.04 Exterior Walls').

**Recent Repairs/Modifications** - To our knowledge, other than normal maintenance, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The masonry partitions date from the original construction of the building in the early 1940's, while the frame partitions date from conversion of the facility to a weather radar station in the mid-1980's. Given their current condition, and with normal maintenance, the interior partitions can likely be expected to perform indefinitely.

The finishes date from various times over the life of the building, and will require cyclical partial replacements based on in-service times and usage:

- The **paint** finishes date from various times over the life of the building, and will require ongoing cyclical partial replacements based on age and usage.
- The **wood panels** date from conversion of the building to a weather radar station in the mid-1980's, and with normal maintenance, will likely continue to perform indefinitely.

**Recommendations -**

<i>Description:</i> Wall repair/repainting	
<i>Action Year:</i> 11	<i>Estimated Cost</i>
It is recommended that allowance be made for repair and repainting (in conjunction with flooring replacement works)	<i>Material &amp; Labour:</i> \$7,500
	<i>Contingency:</i> \$1,125
	<i>Project Soft Costs:</i> \$2,588
	<i>Total:</i> \$11,213

**1.11 CEILINGS** - A variety of ceiling types are employed throughout this building, as follows:

- **Plaster** - with expanded metal lath on suspended metal framing, paint finished - in the entrance, corridor, washroom and kitchen.
- **Cement plaster** - with expanded metal lath on suspended metal framing, paint finished - in the basement northeast storage room and the janitor closet.

- Suspended metal T-bar - with lay-in acoustic unit tiles - throughout the workshop, office area, office, classroom, and loading dock lobby.

Any areas not otherwise mentioned are without ceilings, having exposed structure above (paint finished).

**Condition** - The component is considered to be in fair overall condition, performing as expected and with little damage/deterioration:

- Water damaged cement plaster ceiling at basement storage - below washroom, possible plumbing leak/repair (unconfirmed).
- Water damaged ceiling tiles in the work shop and office area - possible roof leak (unconfirmed).
- Warped ceiling tiles throughout classroom - suspected climate difference above and below ceiling - also coincides with deterioration at upper portion of north elevation exterior wall.

**Recent Repairs/Modifications** - To our knowledge, other than normal maintenance, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies exist with the component.

**Effective Remaining Life** - The plaster and cement-plaster ceilings date from the original construction of the building in the early 1940's, while the suspended metal T-bar ceiling dates from conversion of the facility to a weather radar station in the mid-1980's. Given their current condition, they can likely be expected to perform indefinitely.

**Recommendations** - None identified.

*NOTE: It is expected that pending determination of cause, that damaged/deteriorated areas of the ceilings will be corrected as part of normal O&M operations - repair and cleaning of damaged/deteriorated areas is essential towards monitoring the effectiveness of corrective actions.*

**1.12 INTERIOR DOORS** - A variety of door types are employed throughout the interior of this building, as follows:

- Hollow Metal - pressed metal, flush type, paint finish - located at the classroom, office and loading dock lobby.
- Wood, solid core - flush type, paint finish - located throughout the building except as noted otherwise.
- Wood, hollow core - flush type, paint finish - located at the basement electrical room. Frames are hollow metal (paint finish). Hardware (latchsets/locksets) is knob type.

**Condition** – The component is considered to be in fair overall condition, performing as expected, and with no visible damage or deterioration, however:

- Paint finish on several doors are deteriorated, being scratched and worn.
- The basement electrical room door is water damaged.

**Recent Repairs/Modifications** - To our knowledge, other than normal maintenance, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - (NBC 3.1.8.1. and 3.1.8.11) Doors in required fire separations (i.e. between the basement and ground floor, around service rooms, etc.): are not labeled as fire rated (including frames and hardware), and are not equipped with self-closing devices.

**Effective Remaining Life** - The solid core wood interior doors date from the original construction of the building in the early 1940's, the hollow metal doors date from conversion of the facility to a weather radar station in the mid-1980's, while the hollow core wood doors appear considerably newer. Given their current condition the solid core wood and hollow metal interior doors can likely be expected to perform indefinitely - with any required minor repairs/replacements being effected on an 'as required' basis through normal O&M operations.

**Recommendations -**

<i>Description:</i> Fire door upgrades	
<i>Action Year:</i> 2	<i>Estimated Cost</i>
It is recommended that allowance be made for the replacement of doors, frames and hardware in required fire separations to meet current code requirements in order to maintain the integrity of the fire separations and to maintain adequate levels of life safety.  NOTE: Prior to implementation, refer to results of the study recommended under '1.16 Design Issues'.	<i>Material &amp; Labour:</i> \$12,500
	<i>Contingency:</i> \$1,875
	<i>Project Soft Costs:</i> \$4,313
	<i>Total:</i> \$18,688

**1.13 WINDOW COVERINGS** - There are a variety window covering types employed throughout this building, including:

Metal horizontal louvre (venetian) blinds - at the glass block openings in the classroom.

Fabric curtains - at the glass block openings in the workshop.

No coverings are provided at the remaining windows/glass block openings.

**Condition** - The fabric curtains are considered to be in fair overall condition, performing as expected and with no visible damage or deterioration, however appearing generally aged. The metal blinds are considered to be in good overall condition, performing as intended and with no visible damage or deterioration.

**Recent Repairs/Modifications** - To our knowledge, other than normal maintenance, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, there are no design problems/deficiencies with the component.

**Effective Remaining Life** - The fabric curtains are presumed to date from conversion of the facility to a weather radar station in the mid 1980's, while the metal blinds appear considerably newer. Given their current condition and usage they can likely be expected to perform indefinitely.

**Recommendations** - None identified.

**1.14 INTERIOR STAIRS** - There is a ships ladder employed in this building, which provides access between both levels and forms part of a required exit from the basement: painted steel construction (stringers, treads, handrails), exits to exterior at the upper level via the corridor.

**Condition** - The component is considered to be in fair overall condition, performing as expected, with no obvious damage, and only age-appropriate minor wear/deterioration.

**Recent Repairs/Modifications** - To our knowledge, other than normal maintenance, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, there are no design problems/deficiencies with the component.

**Effective Remaining Life** - The component is presumed to date from the original construction of the building in the early 1940's. Given its current condition and usage it can likely be expected to perform indefinitely.

**Recommendations** - None identified.

**1.15 FIXED FURNISHINGS** - The only fixed furnishing in place at this building is the kitchen cabinet (wood base, paint finished, plastic laminate top).

**Condition** - The component is considered to be in fair overall condition, performing as expected, with no obvious damage, and only age-appropriate minor wear/deterioration.

**Recent Repairs/Modifications** - To our knowledge, other than normal maintenance, no recent repairs/modifications have been carried out on the component.

**Design Problems/Deficiencies** - To our knowledge, there are no design problems/deficiencies with the component.

**Effective Remaining Life** - The component is presumed to date from conversion of the facility to a weather radar station in the mid-1980s. Given its current condition and usage it can likely be expected to perform indefinitely.

**Recommendations** - Refer to '1.18 Accessibility' below.

**1.16 DESIGN ISSUES** - While compliance issues (with respect to codes, standards, etc. governing design, installation and maintenance/testing) are typically identified within the report

under their applicable components, this component addresses any 'general' design issues not otherwise covered.

**Condition** - In addition to identified design/compliance issues described within the report under their applicable components, several 'general' deficiencies (with respect to building design) have been identified in this building, as follows:

- NBC 9.9 - Neither of the existing means of egress from the basement level, being the ships ladder and the vehicle access ramp (with exterior and interior overhead doors) do not meet the requirements for exits, making the basement level more of a 'confined space'.
- NBC 9.9.8.2 - Both exterior exit doors at the ground floor converge at the loading dock and rely on the same stair to reach grade, essentially forming a single exit.

These identified issues may be a result of continual changes in applicable code requirements over time, and therefore may not apply retroactively. It may be enough to be aware of these conditions and risk manage them (implement corrective actions as/when practicable) as opposed to taking immediate corrective actions; however, this determination is solely at the discretion of the 'authority having jurisdiction'.

**Recommendations** - It is recommended that the 'authority having jurisdiction' with respect to fire protection engineering be requested to inspect the building, both as a matter of course, and also to determine the most prudent means of addressing the above noted issues.

*NOTE: Since 2013, each individual Federal department had been responsible for designating its own Departmental Fire Protection Coordinator as the 'authority having jurisdiction' with respect to fire protection engineering – a role which previously was provided for ALL Federal departments by the Fire Commissioner of Canada (later changed to HRSDC Labour Programmes (Fire Protection Engineering) under a Memorandum Of Understanding with the Treasury Board of Canada Secretariat.*

**1.17 ENVIRONMENTAL** - For the purpose of this inspection, "Hazardous Materials" are defined as designated substances (O. Reg. 213/91 as amended), Polychlorinated Biphenyls: PCB's (O. Reg. 11/82), or surface mould.

**Condition** - Given the age of the building, there is a high probability that building materials may contain hazardous materials.

- Several building materials observed on-site are suspected as possibly containing hazardous materials (i.e. board and joint compound, flooring, paint, older electrical equipment).
- Suspect materials in concealed spaces (i.e. insulation, roofing materials, adhesives) may possibly contain hazardous materials.
- No information with respect to existing hazardous materials was available.
- No record of any previous inspection/testing of hazardous materials was available.

**Recommendations** - It is recommended that all existing environmental information should be collected and reviewed to determine what actions, if any, are required.

**1.18 ACCESSIBILITY** - As a Federal Crown property, this building is required to comply with the Treasury Board of Canada Secretariat's 'Accessibility Standard for Real Property' (ASRP) and its designated technical standard (CAN/CSA-B651 Accessible Design for the Built Environment).

**Condition** - A recently completed Accessibility Audit rates this building as only 46% compliant with both the 2004 and 2012 versions of CAN/CSA-B651. Deficiencies are identified with the existing walkways, parking, entrances, interior doors, washrooms, tactile signage, and public areas.

**Recommendations -**

<i>Description:</i> Accessibility upgrades	
<i>Action Year:</i> 2	<i>Estimated Cost</i>
It is recommended that allowance be made to carry out corrective actions required to address the identified deficiencies and ensure the building meets current Treasury Board requirements for accommodation of both Crown staff and the public.	<i>Material &amp; Labour:</i> \$99,753
	<i>Contingency:</i> \$14,963
	<i>Project Soft Costs:</i> \$34,415
	<i>Total:</i> \$149,131

*NOTE: Within the ASRP, Treasury Board allows certain elements to be exempted from the full accessibility requirements "unless the intended use requires public access or the job requirements are such that a person with a disability could meet these requirements". The 'custodial department' is required to establish internal procedures for identifying and seeking the deputy head's approval of full or partial exemptions from accessibility requirements, including: documentation of the rationale for exemptions, maintaining records of all real property that is partially or fully exempted, and reassessment of the real property if the criteria that justified the exemptions change.*

**1.19 SEISMIC ASSESSMENT** - As the seismic (earthquake) resistance of older existing buildings may not meet the stricter requirements of current building codes for seismic loading and design, a risk management approach is often taken, such as completion of seismic assessment for buildings located in zones of moderate to high seismicity, or that are being considered for major renovation or rehabilitation.

**Condition** - It is unknown if the design/construction of the existing structure would meet current code requirements with respect to seismic loading.

**Recommendations** - None identified (*being located in a zone of low seismicity (Ze = 0), a seismic evaluation of this building is not recommended*).

**1.20 HERITAGE** - As the "Custodial Department" for this building, EC is responsible for arranging a review and preparation of a "Heritage Character Statement" by the Federal Heritage Building Review Office (FHBRO) through Canadian Heritage, to identify any elements which may have heritage value, and thereafter be responsible for submitting concept proposals and detailed design proposals for and interventions (defined as alteration, demolition or disposal) to FHBRO for review and comment.

**Condition** - This building has not been reviewed by the Federal Heritage Building Review Board (FHBRO) through Canadian Heritage.

**Recommendations** - As the maximum age for review is 40 years and the building is believed to be approximately 60 - 70 years old, a request for review should be made ASAP. No interventions should be exercised prior to FHBRO review.

*NOTE: The maximum 40 year age for FHBRO review is based on the buildings original construction year - not the year it entered into the Federal inventory.*

## 2.00 VERTICAL TRANSPORTATION SYSTEMS

Not applicable to this report.

## 3.00 MECHANICAL SYSTEMS

**3.01 PRIMARY HEATING** - The heat generating elements for this building are the perimeter electric baseboard heaters. There are also redundant heating coils associated with the two fan coil units installed at this location; the 1996 Veil-McLain furnace on propane located at the basement level is decommissioned.

The electric baseboard heaters are located as follows: five in conference/training room, one in the hallway, one in the office, one in the kitchen, five in the basement and three in the emergency generator module located outside the building. A forced air electric wall-mounted heater is located in the middle section near equipment room entrance. All electric heaters have local controls.

**Condition** - The electric forced flow heater and electrical baseboard heaters are considered to be in fair condition, based on their age. There is an electric heating element which is not connected with the main fan coil ventilation unit located in the UPS room. The condition of the 1996 Weil Mc-Lain hot water boiler system is unknown.

**Recent Repairs/Modifications** - The decommissioning of the hot water boiler system before 2007.

**Design Problems/Deficiencies** - It appears that the decommissioning of the hot water boiler system affects the load that the electric heaters have to take.

**Effective Remaining Life** - It is estimated that half of the electric heaters may present a risk of failure within 5 years and the others within 6 - 10 years.

**Recommendations** - The replacement of some of the electric heaters is recommended in 1 - 5 and 6 - 10 year periods; coordinate this action with space upgrades. Based on the hot water heating phase-out scenario, the connection or installation of the electric

duct heaters for the two existing fan coil units with or without the removal of the hot water heating coils is recommended as the upgrades to the electric supply are completed in the near future.

<i>Description:</i> Partial replacement of electric heaters	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Potential replacement of approx. 7 old electric heaters (baseboard heaters, wall mounted electric fan heater).	<i>Material &amp; Labour:</i> \$7,024
	<i>Contingency:</i> \$1,054
	<i>Project Soft Costs:</i> \$2,423
	<i>Total:</i> \$10,500

<i>Description:</i> Partial replacement of electric heaters	
<i>Action Year:</i> 6 - 10	<i>Estimated Cost</i>
Potential replacement of approx. 7 electric heaters.	<i>Material &amp; Labour:</i> \$7,024
	<i>Contingency:</i> \$1,054
	<i>Project Soft Costs:</i> \$2,423
	<i>Total:</i> \$10,500

<i>Description:</i> Installation of electric heating elements for 2 fan coil units.	
<i>Action Year:</i> 2	<i>Estimated Cost</i>
As applicable with the electric power supply upgrades, electric heating elements are recommended to be installed as a substitute for the decommissioned hot water coils.	<i>Material &amp; Labour:</i> \$6,020
	<i>Contingency:</i> \$903
	<i>Project Soft Costs:</i> \$2,077
	<i>Total:</i> \$9,000

**3.02 PRIMARY COOLING** - Three cooling split systems were identified in the building. One units is serving the equipment room and two units are dedicated for the two fan coil units.

- 1 Mitsubishi system at 2.5 ton cooling capacity with 6 lb. and 10 oz. of refrigerant R-410A:
  - 1 condenser on the roof mod: PUY-A30NHA3, ser: 9XU00433 and
  - 1 one wall mounted evaporator in equipment room mod: PKA-A30KA, ser: 04M00200
- 2 Keep-Rite systems each with a 2.5 ton cooling capacity and 4.10 lb. of refrigerant R-410A:
  - 2 condensers on the roof, two evaporators inside the fan coil units – Mod: C4A330GKD300, ser: E144310020 and 142606469.

**Condition** - The three split AC systems are considered to be in excellent condition.

**Recent Repairs/Modifications** - The units were installed in 2014.

**Design Problems/Deficiencies** - None identified.

**Effective Remaining Life** - The 2014 cooling equipment is estimated to perform for the next 21 - 25 years.

**Recommendations -**

<i>Description:</i> Replacement of 3 split cooling systems.	
<i>Action Year:</i> 21 - 25	<i>Estimated Cost</i>
Replacement of 3 split cooling systems at the end of their useful life.	<i>Material &amp; Labour:</i> \$24,749
	<i>Contingency:</i> \$3,712
	<i>Project Soft Costs:</i> \$8,538
	<i>Total:</i> \$37,000

**3.03 PRIMARY AIR SUPPLY** - Two new air handling units (AHUs) and one heat recovery ventilator (HRV) were identified on site.

- 1 AHU in UPS section make: "ADP" mod: BCRMB6136S001, ser: 77114G46931, yr. 2014
- 1 AHU ceiling mounted make: "ADP" mod: BCRMB6136S001, ser: 77114G46933, yr. 2014
- 1 HRV model vanEE 2000 plus series, ser: 960500007, year 1996.

**Condition** - The two air handlers are new and in excellent condition. The HRV was disconnected for at least 5 years and the condition is unknown. It is believed that the HVR was disconnected to reduce the electric load, to minimize the maintenance and to eliminate the insect infiltration in the ventilation system.

**Recent Repairs/Modifications** - Two new air handling units were installed in 2014.

**Design Problems/Deficiencies** - It is assumed that the HRV was installed to ensure a certain amount of fresh air in the building and to recuperate some of the heat loss from the exhaust ventilation. The HRV being disconnected, it is believed that the fresh air in the building is introduced only by infiltration.

**Effective Remaining Life** - The AHUs installed in 2014 are expected to perform for the next 21 - 25 year period. The replacement of the AHU should be coordinated with the replacement of the two Keep-Rite split AC systems. The HRV installed in 1996 is expected to be repaired or replaced in the second year.

**Recommendations** - The HRV installed in 1996 is expected to be repaired or replaced in the second year after the electrical upgrade is completed and the ventilation system is reevaluated or confirmed from the design perspective.

<i>Description:</i> Replacement/repair of one HRV system.	
<i>Action Year:</i> 2	<i>Estimated Cost</i>
Replacement or repair of one Heat Recovery Ventilator, installation of an insect screen protection at the fresh air intake, after electrical upgrades.	<i>Material &amp; Labour:</i> \$8,027
	<i>Contingency:</i> \$1,204
	<i>Project Soft Costs:</i> \$2,769
	<i>Total:</i> \$12,000

<i>Description:</i> Replacement of 2 air handling units.	
<i>Action Year:</i> 21 - 25	<i>Estimated Cost</i>
Replacement of 2 air handling units.	<i>Material &amp; Labour:</i> \$16,054
	<i>Contingency:</i> \$2,408
	<i>Project Soft Costs:</i> \$5,538
	<i>Total:</i> \$24,000

**3.04 HYDRONIC HEATING SYSTEM** - It is believed that the hot water heating system has been decommissioned since 2007. The system consists of one 1996 Weil-McLain hot water boiler with expansion tank, hot water piping system and heating coils for the two AHUs.

**Condition** - The physical condition of the boiler/hot water system is unknown. For the purpose of this report the condition is rated as poor.

**Recent Repairs/Modifications** - The hot water system was decommissioned in 2007.

**Design Problems/Deficiencies** - The decommissioning of the boiler system did increase the demand of heat produced by the electric heaters (see electrical section for more details).

**Effective Remaining Life** - None identified.

**Recommendations** - Potential physical removal of the boiler/hot water lines and coils (to be confirmed at the design level).

<i>Description:</i> Removal of boiler system	
<i>Action Year:</i> 2	<i>Estimated Cost</i>
Removal of hot water boiler, expansion tank, hot water lines and hot water coils.	<i>Material &amp; Labour:</i> \$4,014
	<i>Contingency:</i> \$602
	<i>Project Soft Costs:</i> \$1,385
	<i>Total:</i> \$6,000

**3.05 SUPPLEMENTAL HEATING UNITS** - See section 3.01 "Primary Heating".

**3.06 SUPPLEMENTAL AIR CONDITIONING** - See section 3.02 "Primary Cooling"

**3.07 CONTROL SYSTEM** - Thermostats and local controls were identified for the cooling, ventilation and heating equipment.

**Condition** - The controls are considered to be in average to excellent condition.

**Recent Repairs/Modifications** - New digital thermostats and controls installed in 2014.

**Design Problems/Deficiencies** - None identified.

**Effective Remaining Life** - The controls are assumed to perform for the life of HVAC equipment they serve.

**Recommendations** - The replacement of the controls is recommended to be completed with the HVAC equipment replacement as applicable. The cost of the controls is included with the HVAC equipment replacement cost.

**3.08 STORM SEWER** - The roof drains and the basement ramp drain are dispersing in the field. A pumping system is located in the basement boiler room.

**Condition** - The roof drains are suspected to operate as intended. The pump is in good working condition

**Recent Repairs/Modifications** - To our knowledge, no modifications have been conducted on the storm piping systems and sump pump system. The sump pump was installed in 2012.

**Design Problems/Deficiencies** - Based on the original intent and design criteria, no problems were noted or reported.

**Effective Remaining Life** - The roof drains and sump pump should perform as intended. The replacement of roof drains should be correlated with future roof repairs. The sump pump should perform for the next 16 - 20 years.

**Recommendations** - Periodic monitoring of drainage piping is recommended. The replacement of sump pump is recommended in the 16 - 20 year period.

<i>Description:</i> Sump pump replacement	
<i>Action Year:</i> 16 - 20	<i>Estimated Cost</i>
Replacement of the sump pump located at the basement level.	<i>Material &amp; Labour:</i> \$1,338
	<i>Contingency:</i> \$201
	<i>Project Soft Costs:</i> \$462
	<i>Total:</i> \$2,000

**3.09 SANITARY SEWER** - The building sanitary sewer system is connected to an outside underground tank with a septic bed and is considered to be working as intended.

**Condition** - Visual inspection of the existing piping indicated no major problems. The integrity of the piping appeared fine, with no indications of leaks. All sanitary discharge piping available for visual inspection was noted as being cast iron.

**Recent Repairs/Modifications** - It is suspected that minor repairs have been conducted as required and modifications to the system have been completed over the life of the facility.

**Design Problems/Deficiencies** - There were no apparent design problems or deficiencies existing with the system.

**Effective Remaining Life** - Under normal conditions, a sanitary sewer system should perform for approximately 50 years.

**Recommendations** - Periodic cleaning of the septic tank is recommended.

**3.10 WATER SUPPLY & TREATMENT** - The building is supplied with water from a local well. The water is not potable and is used only for washrooms and kitchen sink.

**Condition** - The building water supply system is considered to be in fair overall condition, operating as intended and with no visible damage. Inside the building the piping is copper. A water cushion tank “Well-Rite” model WR120R is located at the basement level.

**Recent Repairs/Modifications** - The water cushion tank was installed in 2011.

**Design Problems/Deficiencies** - There were no apparent design problems or deficiencies existing with the system.

**Effective Remaining Life** - The water pump is estimated to perform for the next 1 - 5 years. The water cushion tank is estimated to perform for the next 16 - 20 years.

**Recommendations** - Monitor the condition of the well and the water pump. Replacement of water pump is recommended in the 1 - 5 year period.

<i>Description:</i> Replacement of water pump.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Potential replacement of water pump in 1 - 5 year period.	<i>Material &amp; Labour:</i> \$1,338
	<i>Contingency:</i> \$201
	<i>Project Soft Costs:</i> \$461
	<i>Total:</i> \$2,000

<i>Description:</i> Replacement of water cushion tank	
<i>Action Year:</i> 16 - 20	<i>Estimated Cost</i>
Potential replacement of water cushion tank in 16 - 20 year period.	<i>Material &amp; Labour:</i> \$1,338
	<i>Contingency:</i> \$201
	<i>Project Soft Costs:</i> \$461
	<i>Total:</i> \$2,000

**3.11 DOMESTIC HOT WATER** - The domestic hot water is generated by a 3 kW electric hot water tank, make “Rheem” at 170 litre capacity, model PRO415TM.

**Condition** - The existing hot water heater is considered to be in average condition and operating as intended. The hot water piping system is considered to be in fair overall condition, with no problems reported or indicated.

**Recent Repairs/Modifications** - The domestic hot water electric tank was installed in 2006.

**Design Problems/Deficiencies** - To our knowledge, no design problems/deficiencies are associated with the domestic hot water system.

**Effective Remaining Life** - The effective remaining life of the domestic hot water heater and associated components is anticipated to be approximately 6 - 10 years if proper maintenance practices and procedures are applied.

**Recommendations** - The existing domestic hot water heater will be replaced at the end of its effective service life in the 6 - 10 year period.

<i>Description:</i> Replacement of domestic hot water tank	
<i>Action Year:</i> 6 - 10	<i>Estimated Cost</i>
Potential replacement of the electric domestic hot water heater tank.	<i>Material &amp; Labour:</i> \$1,338
	<i>Contingency:</i> \$201
	<i>Project Soft Costs:</i> \$461
	<i>Total:</i> \$2,000

**3.12 PLUMBING DISTRIBUTION AND FIXTURES** - The plumbing distribution system in this facility provides water and drainage to the fixtures in the washroom (sink, toilet and shower), lunch room (stainless steel sink), and janitor's closet (plastic laundry sink).

**Condition** - The building plumbing distribution and fixtures are considered to be in fair overall condition.

**Recent Repairs/Modifications** - None identified.

**Design Problems/Deficiencies** - To our knowledge, there are no major design problems/deficiencies associated with the plumbing distribution and fixtures.

**Effective Remaining Life** - The effective remaining life of the plumbing distribution system and fixtures is anticipated to be approximately in the 6 - 10 year range if proper maintenance practices and procedures are applied.

**Recommendations** - Other than normal maintenance practices applied, no other major repairs are anticipated over the remaining life of the units.

<i>Description:</i> Replacement of plumbing fixtures	
<i>Action Year:</i> 6 - 10	<i>Estimated Cost</i>
Replacement of toilet, sinks, shower, janitor sink in 6 - 10 year period. Coordinate this work with space renovation as applicable.	<i>Material &amp; Labour:</i> \$5,351
	<i>Contingency:</i> \$803
	<i>Project Soft Costs:</i> \$1,846
	<i>Total:</i> \$8,000

**3.13 FIRE PROTECTION: STANDPIPE SYSTEM** - No standpipe system is installed in this facility.

**3.14 FIRE PROTECTION: SPRINKLER SYSTEM** - No sprinkler system is installed in this facility.

**3.15 FIRE PROTECTION: SPECIALTY SYSTEMS** - No specialty systems are installed in this facility.

**3.16 FIRE PROTECTION: PORTABLE EXTINGUISHERS** - The building has portable fire extinguishers installed as stand-alone units. The existing ABC type are provided according to anticipated hazards, based on the normal occupancy type.

**Condition** - The portable extinguishers are considered to be in good overall condition.

**Recent Repairs/Modifications** - None identified.

**Design Problems/Deficiencies** - None identified.

**Effective Remaining Life** - Existing extinguishers are to be replaced on an "as and when needed" basis, based on the monthly inspection reports.

**Recommendations** - Replacement of these units is considered to be a maintenance item and not a capital expenditure.

**3.17 OZONE DEPLETING SUBSTANCES (ODS) MANAGEMENT** - No ozone depleting substances (ODS) have been identified on site. The R-410A refrigerant contained in the AC units has no ozone depletion potential.

Logs and records of maintenance should be kept on site for a minimum period of 5 years (or accessible on site through EC network) and work should be executed as indicated by "Federal Halocarbon Regulations, 2003".

## 4.00 ELECTRICAL SYSTEMS

**4.01 ELECTRICAL POWER** - The main power to this facility is supplied via a pole line installation and overhead transformer at 120/240 volts, 400 amps. The main disconnect is installed in the basement area, which in turn feeds a 400 A splitter trough. Various small secondary distribution panels located in the basement and main workshop area are fed from this trough which supplies circuits to lighting, receptacle, mechanical and tenant equipment loads. A 5 kVA, 120/240 volt UPS battery back-up system is also incorporated into two of the secondary power panels which feed critical tenant equipment.

**Condition** - In general, the main electrical power to this facility is in poor condition, with reported overloading of the emergency power panel due to electric heating demand loads.

**Recent Repairs/Modifications** - No major recent repairs or modifications were noted; however, secondary panels, UPS system and the diesel generator system were of varying ages, installed when needed based on operational demand.

**Design Problems/Deficiencies** - Deficiencies noted were the following:

A/ Most of the older secondary panels are at the end of anticipated service life and will be due for replacement. See recommendations for further details and pricing.

B/ The main disconnect, secondary panels both in the basement and on the first floor, and service conduits for the facility have exceeded anticipated service life and are due for replacement. See recommendations for further details and pricing.

C/ Grounding conductors for the main service were in poor condition and should be replaced as soon as possible. See recommendations for further details and pricing.

D/ Cable trays/troughs feeding main electrical equipment were in poor condition and require numerous knockout fillers to cover old holes. Rust-out was also noted during the site visit. See recommendations for further details and pricing.

E/ Storage of all types of material and equipment was noted in several instances to be within 1 m of electrical equipment. As per the Canadian Electrical Code 2015 (section 2-003), a 1 m clearance is required at all times. Cost involved is general housekeeping. Additionally, wood cabinets are installed around electrical equipment in the shop area on the first floor; this should be removed when the equipment is relocated.

F/ The UPS system containing batteries and the old battery storage compartment were installed in a room without ventilation and within 1 m of the HVAC furnace. As per the Canadian Electrical Code 2015 (section 26-546), rooms where batteries are stored shall be adequately ventilated. A manufacturer's sticker attached to the UPS equipment and old battery rack also stipulates not to be installed in close proximity to sources of heat. The UPS should be relocated and the old batteries in storage removed from this area. See recommendations for further details and pricing.

G/ Grounding conductors and electrodes for the radar tower appear to be in fair condition; however, areas where they are installed along the concrete base and wall by the tower are subject to damage and shall be mechanically protected to ensure ground continuity. The mechanical protection should be in some form of rigid material. If made of metal, this protection is also subject to bonding to ground as per the Canadian Electrical Code 2015 and the CSA Standard CAN/CSA-B72-M87. It is highly recommended that the entire lightning protection system be inspected and repaired as required to ensure conformance to the above noted standard.

H/ It is recommended that the incoming hydro pole line belonging to the customer be inspected and evaluated for anticipated remaining service life. This should be

considered as part of the full electrical system upgrade project. It is possible that poles, conductors and insulators may require replacement.

I/ Provide single line diagrams to clearly indicate where each panel (shops, corridor and office area lighting and receptacle panels), emergency power panels, outbuilding panels/electrical services, fuel supply pumps, etc. are all fed from. The Canadian Electrical Code (CEC) 2015 - Section 36-006 (4b) requires an accurate single line diagram to be posted at all switching locations, clearly identifying each point of connection. PWGSC, Technical Services recommends that an updated detailed single line diagram be developed and posted in the main electrical room, the diesel generator room, and a copy kept within the facility maintenance office at all times. It is also recommended that the following guidelines be utilized in the development of SLD's:

Single Line Diagrams

Full size - 762 mm x 1067 mm

Half size - 540 mm x 400 mm

Color Code

Red - Red items are fed by Emergency power

Orange - Orange items fed by UPS (base building systems)

Black - Black items are fed by Normal power

Blue - Blue items are fed by High Voltage power (750 Volts and up)

Black - Low voltage metering is represented in Black

Distribution Procedure

Normal power - Stops at last panel board (LP or RP) & all equipment on MCC.

Emergency power - Stops at last panel board (LP or RP) and all equipment on MCC.

Legend - The legend we utilize is based on ANSI Y32.2-1975 and subsequent revisions.

Posting Locations - Posted at every key switch point. i.e. - High (Medium) Voltage Gear. Low Voltage Switch Boards. Transfer Switch located in all locations.

**Effective Remaining Life** - As stated, the equipment installed within this facility is from various years; however, the majority of the electrical panels, disconnects and main power cable troughs are approaching or have reached their anticipated life expectancies. Replacement is required. Once completed, with regular maintenance and minor repairs, distribution equipment should operate as intended for the remaining life expectancy of the entire facility, or approximately 40 years.

**Recommendations** - Technical Services recommends that a complete project be implemented to both update and amalgamate the current main electrical services, as the current layout is confusing and overdue for replacement. It is recommended that all panels and disconnects, including the main, be removed and the following work be carried out.

<i>Description:</i> Replace main electrical service components.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Replace main disconnect with a new main combination distribution panelboard which will incorporate the main breaker and various sub breaker to feed panels. This should include all bonding and grounding components.	<i>Material &amp; Labour:</i> \$10,000
	<i>Contingency:</i> \$1,500
	<i>Project Soft Costs:</i> \$3,450
	<i>Total:</i> \$14,950

<i>Description:</i> Replace main electrical service components.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Amalgamate all non-essential circuits into one or two (as needed) 84-circuit panelboards to be located by new main distribution panel in basement electrical room. Reroute secondary feeders to this location.	<i>Material &amp; Labour:</i> \$3,000
	<i>Contingency:</i> \$450
	<i>Project Soft Costs:</i> \$1,035
	<i>Total:</i> \$4,485

<i>Description:</i> Relocate UPS system and associated panels.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Relocate current UPS system to the basement main electrical room area. Provide new UPS panels by this location and reroute existing secondary feeders that are currently on UPS power.	<i>Material &amp; Labour:</i> \$7,000
	<i>Contingency:</i> \$1,050
	<i>Project Soft Costs:</i> \$2,415
	<i>Total:</i> \$10,465

<i>Description:</i> Remove old equipment.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Remove all old abandoned equipment and main service cable trays/conduits once made obsolete by the above noted recommendations.	<i>Material &amp; Labour:</i> \$1,000
	<i>Contingency:</i> \$150
	<i>Project Soft Costs:</i> \$345
	<i>Total:</i> \$1,495

<i>Description:</i> Develop and post new Single Line Drawings.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Develop and post single line diagram drawings as per this report.	<i>Material &amp; Labour:</i> \$1,200
	<i>Contingency:</i> \$180
	<i>Project Soft Costs:</i> \$414
	<i>Total:</i> \$1,794

<i>Description:</i> Inspection/testing of lightning protection system.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Inspect, test and verify the condition of the existing lightning protection systems installed on the facility radar tower.	<i>Material &amp; Labour:</i> \$2,000
	<i>Contingency:</i> \$300
	<i>Project Soft Costs:</i> \$690
	<i>Total:</i> \$2,990

<i>Description:</i> Inspection/testing of customer pole line.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Inspect and verify the condition of the existing customer owned electrical pole line installed to service this facility and radar tower.	<i>Material &amp; Labour:</i> \$900
	<i>Contingency:</i> \$135
	<i>Project Soft Costs:</i> \$311
	<i>Total:</i> \$1,346

**4.02 EMERGENCY POWER** - A 23 kVA, 120/240 volt generator is located in an exterior prepackaged generator shed located at the north side of the facility by the parking area. This unit provides power upon normal power Hydro failure to select tenant owned critical equipment via a 100 A transfer switch and the above noted UPS system. Classification of this unit is important, as mandated maintenance and testing are considerably more stringent for generator sets classed as emergency. This noted, it is recommended that this unit be treated as an emergency power supply for testing and maintenance purposes due to the nature of operations of the equipment at this facility. This would mean that this installation must conform to the CAN/CSA 282-15 standard for all maintenance and testing procedures for emergency generator sets.

**Condition** - The existing generator set and its auxiliary equipment are in fair condition. However, several deficiencies that need to be rectified are listed below.

**Recent Repairs/Modifications** - Technical Services was informed that the unit was initially a natural gas generator but has been recently modified to a diesel type unit. Installation of a fuel tank was noted within the self-contained generator shed.

**Design Problems/Deficiencies -**

- A/ As per CAN/CSA 282-15, auxiliary battery operated emergency lighting pack capable of providing 50 lux for 2 hours at the engine, engine controller and transfer switch must be provided. Light heads should illuminate the control areas for the device it is installed for.
  
- B/ Details of maintenance and testing are not known at this time; however, as per CAN/CSA 282-15, mandated weekly, monthly, semi-annual and annual maintenance and testing procedures are required. It is recommended that a CAN/CSA 282-15 logbook be purchased and maintained within the generator room, as the levels of maintenance are clearly defined and will ensure this site is in compliance with mandated testing and maintenance protocols.

**Effective Remaining Life** - With mandated maintenance and testing as stipulated above, the current generator could be expected to perform as intended for the next 6 - 10 years. Evaluation for replacement would be required closer to this time frame.

**Recommendations -**

<i>Description:</i> Replace emergency lighting in generator room.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
An emergency lighting pack capable of providing 50 lux for 2 hours at the engine, engine controller and transfer switch must be provided.	<i>Material &amp; Labour:</i> \$120
	<i>Contingency:</i> \$18
	<i>Project Soft Costs:</i> \$41
	<i>Total:</i> \$179

<i>Description:</i> Generator maintenance	
<i>Action Year:</i> Annually	<i>Estimated Cost</i>
Annual budget for maintenance and testing in accordance with CAN/CSA 282-05.	<i>Material &amp; Labour:</i> \$1,600
	<i>Contingency:</i> \$240
	<i>Project Soft Costs:</i> \$552
	<i>Total:</i> \$2,392

<i>Description:</i> Purchase CSA 282-15	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Purchase logbook and keep by generator to ensure proper maintenance and documentation is available.	<i>Material &amp; Labour:</i> \$80
	<i>Contingency:</i> \$12
	<i>Project Soft Costs:</i> \$28
	<i>Total:</i> \$120

**4.03 EXTERIOR LIGHTING** - Exterior lighting is provided from wall mounted high intensity discharge type fixtures operating at 120 volts at the parking area and north facade. Front step lighting is provided by canopy mounted pot lights containing compact fluorescent lamps. All exterior lights are controlled by local photocells and/or switches.

**Condition** - All of the exterior lighting appeared to be in fair working condition; however, the fixtures were in poor shape. As this was a daytime inspection, no measurement was taken as to the amount of light the current setup will provide; however, it was noted that no lights were installed on the east, west and south tower areas. These will be very dark areas. A minimum of 10 lux lighting shall be provided around the facility as per the Canada Labour Code, Schedules II and III.

**Recent Repairs/Modifications** - At the time of site visit, there appears to have been no recent major repairs or modifications to the exterior lighting system within the last two years.

**Design Problems/Deficiencies** - It was noted that no lights were installed on the east, west and south tower areas. A minimum of 10 lux lighting shall be provided around the facility as per the Canada Labour Code, Schedules II and III.

**Effective Remaining Life** - The current lighting units may have 1 - 2 years left if proper maintenance is performed (broken fixtures are noted in canopy area); however, due to the deficiency noted above, additional new units will be required at the east, west and south sides of this facility.

**Recommendations** - In the next 1 - 5 years, it is recommended that a project to replace the current units with new LED technology wall packs and under-eave canopy lights be implemented. These new units will be virtually maintenance free for several years beyond regular lamp and ballast replacements and will provide the utmost in energy efficiency. It is recommended that additional fixtures be added on the east and west facades, as well as in the radar tower area, to ensure that a minimum of 10 lux average lighting level is present around the exterior of the facility once complete.

<i>Description:</i> Replace and add new exterior fixtures.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Install new LED technology wall packs and under- eave canopy lights on new central photocell control.	<i>Material &amp; Labour:</i> \$4,500
	<i>Contingency:</i> \$675
	<i>Project Soft Costs:</i> \$1,553
	<i>Total:</i> \$6,728

**4.04 INTERIOR LIGHTING** - The office area, corridors, and washrooms are lit by fluorescent fixtures of varying styles equipped with magnetic ballasts and T12 lamps. A local switch bank in the washroom corridor provides control to most of the interior lighting fixtures in the general office areas.

Lighting levels were found to be within the levels set by Labour Canada for the tasks being performed. Levels of illumination were taken in several areas. They are as follows (all levels are expressed in lux):

<i>Location</i>	<i>Actual</i>	<i>Required</i>
General office	512 – 600 lux	500 lux
Washrooms	205 – 300 lux	200 lux
Common Areas / Corridors	150 – 300 lux	100 lux

**Condition** - The general condition of the interior lighting can be considered to be fair; however, they were noted to be the least energy efficient fluorescent fixtures that contain magnetic ballasts and T12 lamps. Also, based on the age of the fixtures, there is a possibility some of the older ballasts still in use may contain PCB's. Verification of ballasts used is required to determine if PCB's are present. Fixture lenses were also noted to be either broken or completely missing from some of the fixtures throughout the facility.

**Recent Repairs/Modifications** - No recent repairs or modifications were completed on the interior lighting system within the last five to ten years.

**Design Problems/Deficiencies** - At the time of site visit, there are no major deficiencies or design problems with the current interior lighting system other than the age of the equipment and low efficiency ratings.

**Effective Remaining Life** - The interior lighting system should continue to perform satisfactorily, with general ballast lamp and lens replacements, over the next 6 - 10 years.

**Recommendations -**

<i>Description:</i> Annual repair cost of light fixtures.	
<i>Action Year:</i> Annually	<i>Estimated Cost</i>
Replace all missing lense covers and replace/repair all burnt out fluorescent lamps and ballasts as required.	<i>Material &amp; Labour:</i> \$350
	<i>Contingency:</i> \$53
	<i>Project Soft Costs:</i> \$121
	<i>Total:</i> \$523

<i>Description:</i> Retrofit to LED interior lighting technology.	
<i>Action Year:</i> 6 - 10	<i>Estimated Cost</i>
Retrofit current fixtures, or replace with new LED interior lighting fixtures designed to maintain current lighting levels.	<i>Material &amp; Labour:</i> \$15,000
	<i>Contingency:</i> \$2,250
	<i>Project Soft Costs:</i> \$5,175
	<i>Total:</i> \$22,425

**4.05 EMERGENCY LIGHTING** - This facility contains a small number of emergency battery packs located in the basement, workshop and classroom area. These units appear not to be tested and maintained and may not adequately provide the minimal of 10 lux that is required at intended exit routes. Emergency lighting is not required for a facility of this category under the National Building Code of Canada 2010; however, where voluntary installations exist, they must fully comply with the above noted code with regards to locations, light levels and testing and maintenance procedures. It is recommended that the minimal amount noted at this facility be removed to save on operational maintenance costs.

**Condition** - The current emergency lighting battery units are considered in poor condition and are not installed in locations to ensure levels as mentioned above.

**Recent Repairs/Modifications** - None noted at the time of site visit.

**Design Problems/Deficiencies** - The current units were partially operational when tested and are not installed in locations to ensure levels as mentioned above. Replacement of current units is required and additional units should be installed to clearly illuminate intended egress routes from the facility.

**Effective Remaining Life** - The current units have surpassed life expectancy and should be replaced within the next 1 - 5 years.

**Recommendations -**

<i>Description:</i> Replace emergency light packs.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Replace existing emergency light packs and provide new units as listed above within this report.	<i>Material &amp; Labour:</i> \$1,450
	<i>Contingency:</i> \$218
	<i>Project Soft Costs:</i> \$500
	<i>Total:</i> \$2,168

**4.06 EXIT LIGHTING** - This facility contains a small number of exit signs located in the workshop and classroom area. These units appear not to be tested and maintained and may not adequately provide the clear indication to intended exit routes. Exit lighting is not required for a facility of this category under the National Building Code of Canada 2010; however, where voluntary installations exist, they must fully comply with the above noted code with regards to locations, testing and maintenance procedures. It is recommended that the minimal amount noted at this facility be removed to save on operational maintenance costs.

**Condition** - The current exit lighting units are considered in poor condition and are not installed in locations to clearly indicate intended emergency exit routes. Additionally, no battery backup of these units is provided.

**Recent Repairs/Modifications** - None noted at the time of site visit.

**Design Problems/Deficiencies** - The current units were partially operational and are not installed in locations to ensure clearly intended emergency egress routes. Replacement of current units is required and additional units should be installed to clearly indicate intended egress routes from the facility. Units should be provided with battery backup supply and are recommended to be of the "green running man" type as stipulated by both the National Building Code 2010 and Ontario Building Code 2010.

**Effective Remaining Life** - The current units have surpassed their life expectancy and should be replaced within the next 1 - 5 years.

**Recommendations -**

<i>Description:</i> Replace exit light packs.	
<i>Action Year:</i> 1 - 5	<i>Estimated Cost</i>
Replace existing exit light packs and provide new units as listed above within this report.	<i>Material &amp; Labour:</i> \$1,500
	<i>Contingency:</i> \$225
	<i>Project Soft Costs:</i> \$518
	<i>Total:</i> \$2,243

**4.07 FIRE ALARM SYSTEM** - This facility does not have fire alarm system equipment. It is not required for a facility of this category under the National Building Code of Canada 2010. Smoke detectors are installed and monitored as part of the facility security alarm system.

**4.08 SECURITY SYSTEM** - This facility contains a DSC PC 2550 intrusion alarm system that is only locally monitored. It is a very basic system with motion detectors, smoke detectors and door contacts that actuate the local alarm horn. There is a system control keypad located by the main doorway to the facility. The main control panel is located in behind the UPS in the 1st floor machine room area.

**Condition** - The security system was found to be in fair condition overall.

**Recent Repairs/Modifications** - At the time of site visit, it appeared that no major recent repairs or modifications have been made to the security system.

**Design Problems/Deficiencies** - This system is only locally monitored. There is no remote monitoring at this time.

**Effective Remaining Life** - The current system is of older technology and would be due for replacement within the next 6 - 10 years if deemed necessary to client operations.

**Recommendations -**

<i>Description:</i> Replace security system.	
<i>Action Year:</i> 6 - 10	<i>Estimated Cost</i>
Replace the main security system and components (keypad, alarm contacts, motion detectors and smoke detectors) with like system and incorporate remote monitoring.	<i>Material &amp; Labour:</i> \$5,000
	<i>Contingency:</i> \$750
	<i>Project Soft Costs:</i> \$1,725
	<i>Total:</i> \$7,475

**4.09 TELEPHONE & COMMUNICATION SYSTEM** - The main telephone line enters the facility via underground cables to rear wall of the workshop area and terminates into a Nortel - Norstar Flash multi-line BIX board system. From this area, single conductors are installed surface mount and free air through wall cavities and cable troughs to minimal end user jack locations.

**Condition** - The telephone and communications system was found to be in fair condition overall.

**Recent Repairs/Modifications** - At the time of site visit, it appeared that no major recent repairs or modifications have been made to the telephone/communications systems.

**Design Problems/Deficiencies** - None noted at the time of site visit.

**Effective Remaining Life** - With constant updates and technology changes, the effective remaining live of the current systems is not limited to the life of the facility. Changes are made to the system based on operational requirements of the end users within the facility and therefore, forecasting at this time is not feasible.

**Recommendations** - None noted at the time of site visit.









# ANNEXES

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## **ANNEX A**

## **PHOTOGRAPHS**

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PS-001 – Fading surfaces at site identification sign.



PS-002 – Standing water and vegetation growth at various locations throughout gravel paving.

**RADAR BUILDING**



AR-001 – West and north elevations.



AR-002 – South and part west elevations.



AR-003 – East and south elevations.



AR-004 – Part north and east elevations.

**RADAR BUILDING**



AR-005 – Spalling concrete at foundation.



AR-006 – Deteriorated concrete at foundation corner.



AR-007 – Spalled concrete and exposed rebar with corroded surface at foundation.



AR-008 – Loading dock stair with missing guard (right), cracked concrete with rusting rebar staining, and open joints at tile nosing - leakage below.

**RADAR BUILDING**



AR-009 – Water damage in basement electrical room - at underside of loading dock stair.



AR-010 – Deteriorated wood bumper at loading dock edge.



AR-011 – Water at bottom of basement access ramp.



AR-012 – Deteriorated concrete at underside of penthouse roof slab.

**RADAR BUILDING**



AR-013 – Spalled concrete and exposed rebar with corroded surface at underside of penthouse roof slab.



AR-014 – Deteriorated paint finish and corroded metal surfaces at loading dock canopy column.



AR-015 – Deteriorated concrete along top edge of loading dock canopy.



AR-016 – Deteriorated concrete at underside of loading dock canopy.

**RADAR BUILDING**



AR-017 – Deteriorated mortar joints at north elevation (area above classroom ceiling).



AR-018 – Crack through upper portion of masonry wall.



AR-019 – Stained masonry surfaces on east elevation.



AR-020 – Crack through foundation and lower portion of masonry wall.

**RADAR BUILDING**



AR-021 – Broken concrete window sill.



AR-022 – Deteriorating mortar at ends of rusting lintels.



AR-023 – Rusting and deformed lintel and deteriorated sealant at glass block head.



AR-024 – Open joint at concrete window sill.

**RADAR BUILDING**



AR-025 – Deteriorated sealant at glass block jamb.



AR-026 – Cracked glass block.



AR-027 – Deteriorated metal at bottom of door and frame.



AR-028 – Unsealed holes at door outer surface.

**RADAR BUILDING**



AR-029 – Deteriorated insulation pad below rooftop equipment.



AR-030 – Standing water throughout roof areas.



AR-031 – Ballast scouring at southwest corner of upper roof area.



AR-032 – Metal roofing not flashed into wall along edge.

**RADAR BUILDING**



AR-033 – Leakage/seepage at bottom of basement access ramp.



AR-034 – Water damaged door, frame, finishes and electrical equipment at basement electrical room adjacent to access ramp.



AR-035 – Leakage and damaged finishes in electrical room below exterior stair. Also, inconsistent application of insulation.



AR-036 – Several damaged areas of suspended plaster ceiling in northeast room of basement – reason unknown.

**RADAR BUILDING**



AR-037 – Water damage at underside of penthouse.



AR-038 – Water damaged ceiling tiles in office area.



AR-039 – Deteriorating vinyl tile flooring and daylight visible at door edges and sills.



AR-040 – Warped ceiling tiles throughout classroom.

**RADAR BUILDING**



ME-001 – Electric baseboard heaters (basement).



ME-002 – Electric baseboard heater (basement).



ME-003 - Electric baseboard heater (basement).



ME-004 – Wall mounted electric fan heater.

**RADAR BUILDING**



ME-005 – Electric baseboard heater (kitchen).



ME-006 - Electric baseboard heater (hallway).



ME-007 – Electric baseboard heater (office).



ME-008 – Weil-McLain decommissioned hot water boiler (yr. 1996).

**RADAR BUILDING**



ME-009 – Keep-Rite condenser (roof).



ME-010 – Keep-Rite condenser (roof).



ME-011 – Mitsubishi condenser (roof).



ME-012 – Mitsubishi evaporator (equipment room).

**RADAR BUILDING**



ME-013 – AHU (UPS room).



ME-014 – AHU (ceiling space office).



ME-015 – Heat recovery ventilator (disconnected).



ME-016 – Obstructed exhaust fan (kitchen).

**RADAR BUILDING**



ME-017 – Wall mounted thermostat (baseboard heaters).



ME-018 – Wall mounted thermostat (AHU).



ME-019 – Wall mounted control (AC Mitsubishi).



ME-020 – Thermostats for heat control in the emergency generator portable unit.

**RADAR BUILDING**



ME-021 – Roof drain.



ME-022 – Roof drain collector.



ME-023 – Sump pump (yr. 2012).



ME-024 – Sewer tank.

**RADAR BUILDING**



ME-025 – Water well.



ME-026 – Electric domestic hot water tank (yr. 2006).



ME-027 – Toilet and sink.



ME-028 – Shower.

**RADAR BUILDING**



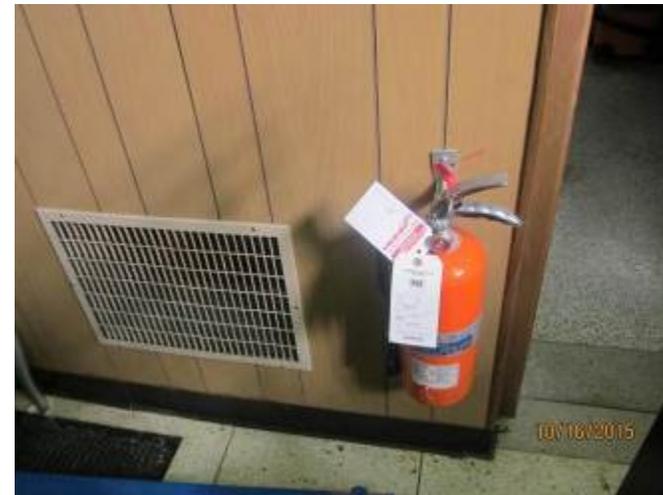
ME-029 – Stainless steel kitchen sink.



ME-030 – Laundry/janitor sink.



ME-031 – Portable fire extinguisher.



ME-032 – Portable fire extinguisher.

**RADAR BUILDING**



EL-001 – Main electrical 400A disconnect.



EL-002 – Main service equipment and troughs.



EL-003 – Example of rust-out on service equipment.



EL-004 – Electrical equipment installed in wood cabinets.

**RADAR BUILDING**



EL-005 – Corroded main facility electrical system grounding.



EL-006 – Overloaded emergency power panel.



EL-007 – UPS installed in furnace room near heat source and flammable materials.



EL-008 – UPS backed up power panels.

**RADAR BUILDING**



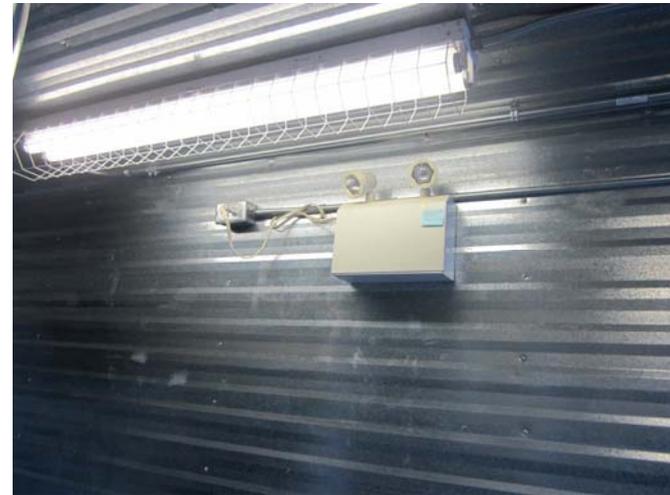
EL-009 – Consumer hydro pole line.



EL-010 – Typical lightning grounding/protection installation.



EL-011 – Emergency power generator system.



EL-012 – Emergency power generator room emergency light.

**RADAR BUILDING**



EL-013 – Exterior light under canopy.



EL-014 – Example of no exterior lighting around facility.



EL-015 – Typical interior lighting.



EL-016 – Typical interior lighting.

**RADAR BUILDING**



EL-017 – Basement lighting.



EL-018 – Typical older type lamps/no lens.



EL-019 – Typical emergency lighting pack.



EL-020 – Minimal exit light (not code compliant).

**RADAR BUILDING**



EL-021 – Main security system panel.



EL-022 – Security system keypad.



EL-023 – Integrated smoke detector to security system.



EL-024 – Main telephone/communications equipment.

## **ANNEX B**

## **REFRIGERANT INVENTORY**

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There is no refrigerant inventory available for inclusion with this report.

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**ANNEX C**

**DRAWINGS**

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**ANNEX D**

**HERITAGE STATEMENT**

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**ANNEX E**

**ACCESSIBILITY AUDIT**

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# **BARRIER-FREE ACCESSIBILITY AUDIT**

**EXETER RADAR STATION  
41651 THAMES ROAD (County Road 83)  
EXETER, ON**

**TB DFRP IDENTIFIER: 70917**



**PREPARED BY:  
COLIN ERWIN  
TECHNICAL SERVICES  
PROFESSIONAL & TECHNICAL SERVICES  
REAL PROPERTY SERVICES  
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA**

**Site Visit: 2015-10-16  
Report Date: 2015-12-30**

**PROJECT/WSBE NO: R.077969.001**



Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

**Canada**

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**BIBLIOGRAPHY**

**APPENDIX A: Accessibility Standard for Real Property (November 1, 2006)**

## 1.0 INTRODUCTION

Technical Services was contacted by Environment Canada (EC) through Jeff Allard (Research, Analysis and Project Officer) to review Barrier-free accessibility condition at the Exeter Radar Station (Exeter, ON). This work was carried out in conjunction with the completion of a Building Condition Report.

The objective of this barrier-free accessibility audit is to:

Identify accessibility improvements required in order to bring the base building elements of the facility in compliance with the *Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property* and the *CAN/CSA-B651-2004 Accessible Design for the Built Environment Standard*.

Identify the incremental improvements required in order to bring the base building elements of the facility in compliance with the *Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property*, and the *CSA-B651-2012 Accessible Design for the Built Environment Standard*.

Identify the Class D construction Costs associated with compliance with each of the above.

Document facilities and areas exempted from the requirements of *Treasury Board Accessibility Standard for Real Property* and the rationale supporting the exemptions.

### 1.1 Federal Accessibility Standards

The current policy regulating accessibility to federal facilities is identified in the Treasury Board of Canada *Accessibility Standard for Real Property (ASRP)*, which replaced the 1998 *Treasury Board Real Property Accessibility Policy* on November 1, 2006. For reference purposes, a copy of the ASRP has been included as Appendix A of this document.

Section 5 of the ASRP, *Accessibility Requirements*, provides a detailed 'scoping' of accessibility requirements for federal real property, and these requirements have been included under the headings for the various base building and/or site elements audited in this study.

Section 5.2 of the ASRP also specifies the use of the Canadian Standards Association B651 Standard as the technical reference for accessibility, and PWGSC's 1990-1995 Accessibility Program resulted in upgrading of its inventory of Crown Owned and Leased inventory to comply with the *CAN/CSA B-651-M90* and *CAN CSA B651 95* editions of the *Barrier-Free Design Standard*. Although amendments between the M90 and 95 editions of the standard were relatively minor, the standard was superseded in August 2004 by the *CAN CSA B651 04 Accessible Design for the Built Environment* standard. B651 04 presents numerous technical changes from the two earlier editions of the standard and also incorporates the accessibility requirements of the *CAN CSA B44 00 Elevator Code* as a mandatory annex of the standard.

In March, 1992, the Accessibility Office, PWC Headquarters issued an Accessibility Evaluation Guide that identifies various 'Assessment Considerations' for existing installations that vary slightly from the technical requirements identified in *CAN CSA B651* and do not compromise effective use by persons with disabilities. These have been noted where applicable. While the Accessibility Evaluation Guide contains additional Assessment Considerations in addition to those identified in this report, those that have been problematic or open to interpretation have not been referenced in this document. Note also that these Assessment Considerations are not intended for application in new construction, which should be designed fully in accordance with the requirements of the *CAN CSA B651*.

## 2.0 FACILITY OVERVIEW

Facility Name:	Exeter Weather Radar Station
Municipal Address:	41651 Thames Road, Exeter, ON
Crown-Owned or Leased:	Crown-Owned
TB DFRP Identifier:	70917
Total Rentable Area (m <sup>2</sup> ):	234
Building Height (Storeys):	1-storey above grade + basement
Total Parking:	undefined
Date of Construction and major capital Improvements:	1940's (original construction), 1980's (renovation)
Client Departments in Facility/Floor Location:	Environment Canada (exclusive)
Service/utility areas not audited:	Janitors closets, mechanical, electrical and telecommunications rooms, loading docks, long-term 'dead' storage areas, basement level, etc.

### 3.0 WALKWAYS

#### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:

c) public areas (including, but not limited to.... walkways);

k) Accessibility shall include routes from accessible parking areas, local public transit stops and all drop-off areas that are within the limits of the federal property to main entrances.

### 3.1 Existing Conditions

The following are below the minimum standard requirement:

- There is no exterior walkway providing access to the building entrance.
- There is no ramp providing access to the building entrance.
- The stair providing access to the building entrance:
  - Has tread's which are too shallow.
  - Does not have horizontal strips at nosing's.
  - Does not have adequate handrails.
  - Does not have detectable warning (tactile attention) indicator at top of stair.

### 3.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment

- Provide a ramp serving the building entrance.
- Reconstruct the stairs serving the building entrance.
- Provide a hard surfaced walkway connecting the accessible parking with the building entrance with stair and ramp.
- Provide guards around the loading dock perimeter at the building entrance.

### 3.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment

Modification listed in 3.2 will ensure compliance with CSA-B651-12.

### 4.0 PARKING

#### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:

j) Where employee or visitor parking is provided, the quantity of accessible parking spaces provided shall conform with municipal by-laws or the following table, whichever has the higher number of accessible spaces:

<i>Total parking spaces</i>	<i>Minimum No. of accessible spaces</i>	<i>Total parking spaces</i>	<i>Minimum No. of accessible spaces</i>
<i>up to 25</i>	<i>1</i>	<i>151-200</i>	<i>6</i>
<i>26-50</i>	<i>2</i>	<i>201-300</i>	<i>7</i>
<i>51-75</i>	<i>3</i>	<i>301-400</i>	<i>8</i>
<i>76-100</i>	<i>4</i>	<i>401-500</i>	<i>9</i>
<i>101-150</i>	<i>5</i>	<i>more than 500</i>	<i>2% of total</i>

Accessible parking spaces shall be within a reasonable and safe proximity of the federal facility but may be distributed among distinct parking areas.

#### 4.1 Existing Conditions

The following are below the minimum standard requirement:

- There are no defined parking spaces existent at the facility – vehicles are parked at random throughout the gravel paved areas.

#### 4.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment

- Provide one (1) hard surfaced accessible parking stall, complete with access aisle, pavement markings and vertical signage (*see also required modifications for '3.0 Walkways' and '5.0 Building Entrances' when considering location*).

#### 4.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment

Modification listed in 4.2 will ensure compliance with CSA-B651-12.

### 5.0 BUILDING ENTRANCES

#### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

*5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:*

- a. Entrances. Frequently used points of access to the property must be equipped with a power door operator at main entrances to real property. Where entry to or exit from the facility is through a series of doors in a vestibule-like arrangement, at least one complete set of doors allowing access to the vestibule area shall be so equipped.*

#### **PWGSC Assessment Considerations:**

*Where fixed building constraints preclude the modification of a ...vestibule (i.e., to provide sufficient manoeuvring space at doors or adequate space between two doors in series), automatic door openers prove to be a relatively low cost solution.*

*Where vestibules or privacy screens restrict manoeuvring space, doors can sometimes be removed for easy access as long as privacy is not inhibited.*

#### 5.1 Existing Conditions

The following are below the minimum standard requirement:

- The main building entrance vestibule is too small to accommodate barrier-free access.
- The loading dock lobby doors are not provided with power door operators.

#### 5.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment

- Provide the loading dock lobby doors (both exterior and interior vestibule doors) with power door operators and replace hardware to suit.

#### 5.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment

Modification listed in 5.2 will ensure compliance with CSA-B651-12.

### 6.0 VERTICAL MOVEMENT

#### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:

b) passenger elevators;

In addition to the above ASRP requirement, PWGSC generally includes platform lifts, ramps and open circulation stairs related to internal routes of travel.

#### **PWGSC Assessment Considerations:**

##### Elevators

Undersized elevator cabs need not be replaced unless they cannot provide the required 1200 mm depth required for a person in a wheelchair to pull in. If there are two identical control panels, only one need be modified to be accessible.

#### **Additional PWGSC Assessment Considerations:**

##### Elevators:

As handrails in elevator cabs are utilized for stabilization purposes only, existing handrails are left as is. Since the BFDS requires handrails on all non-access walls, new handrails are installed where they are not yet provided on all non-access walls and any existing handrail(s) are replaced to match.

### **6.1 Existing Conditions**

There are no vertical movement elements present in this building – as the basement level is used solely for service/utility/storage, access to/from (including the ships ladder and the vehicle access ramp) is not included within this review.

### **6.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment**

Not applicable.

### **6.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment**

Not applicable.

## **7.0 INTERIOR DOORS AND CORRIDORS (Base Building)**

#### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:

e) interior doors and corridors;

### **7.1 Existing Conditions**

Door hardware throughout is 'knob' type.

The following are below the minimum standard requirement:

- Operation of door hardware requires tight grasping and twisting.
- Required clear spaces are too small at several doors, including the entrance vestibule, the washroom, the lunchroom, the workshop (from the corridor), and the classroom.

### **7.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment**

- Replace 'knob' type hardware throughout with 'lever' type – approximately 8 units.

- Reconfigure the entrance vestibule, washroom and lunchroom – *in conjunction with required corrective actions identified under '8.2' and '11.2'.*
- Remove the workshop door.
- Reverse the swing of the classroom door.

### 7.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment

Modification listed in 7.2 will ensure compliance with CSA-B651-12.

## 8.0 WASHROOMS

### Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:

5.1. *In the management of real property, custodians shall at a minimum, provide access to and use of the following:*

f) *Washrooms*

#### PWGSC Assessment Considerations:

*One accessible male washroom and female washroom, or alternatively one accessible individual washroom, is required on each floor in existing buildings based on the ASRP 5.2 'Note: This technical standard ...does not apply retroactively to accessibility requirements of real property in the inventory prior to October 1, 2004'.*

*Only one lavatory per washroom has to be accessible.*

*Where fixed building constraints preclude the modification of a washroom vestibule (i.e., to provide sufficient manoeuvring space at doors or adequate space between two doors in series), automatic door openers prove to be a relatively low cost solution.*

*Where vestibules or privacy screens restrict manoeuvring space, doors can sometimes be removed for easy access as long as privacy is not inhibited.*

*If the toilet was installed with its centerline located at 430 mm from the wall carrying the grab bar...it need not be moved.*

*Flush controls that are not on the transfer side of the toilet need not be relocated.*

*Where existing urinals do not meet the CAN/CSA B651 requirements, they do not have to be replaced if toilet fixtures are available in accessible stalls.*

*The replacement of urinals in male washrooms is not applicable under the PWGSC Assessment Considerations. The requirement for accessible urinals as well as raised vertical markers over urinals will be addressed through PWGSC Duty to Accommodate requests.*

### 8.1 Existing Conditions

The following are below the minimum standard requirement:

- The existing washroom size is too small to accommodate barrier-free access.

### 8.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment

- Either construct a new washroom, or reconstruct/reconfigure the existing washroom to meet required design standard lunchroom – *in conjunction with required corrective actions identified under '7.2' and '11.2'.*

*NOTE: either an alternate location or additional space from adjacent rooms/areas will be required.*

### **8.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment**

Modification listed in 8.2 will ensure compliance with CSA-B651-12.

## **9.0 DRINKING FOUNTAINS**

### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

*5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:*

*h) Drinking fountains. One accessible cooler or fountain shall be provided in each location where water coolers or drinking fountains are provided;*

### **PWGSC Assessment Considerations:**

*PWGSC Standards for Leased Accommodation only require one accessible fountain per floor.*

### **9.1 Existing Conditions**

There are no drinking fountains provided in this building.

### **9.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment**

Not applicable.

### **9.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment**

Not applicable.

## **10.0 PUBLIC TELEPHONES/TACTILE SIGNAGE**

### **Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:**

*5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:*

*g) public telephones. When banks of public telephones are provided, there must be at least one public telephone per bank accessible to persons in wheelchairs and one public telephone per bank accessible to persons with hearing impairments. All direct-line telephones and at least one charge-a-call telephone, when provided, shall be similarly accessible*

*Tactile signage. Tactile signs shall be provided for the following: washrooms, emergency exits, elevators, and stairwells.*

### **PWGSC Assessment Considerations**

*Public telephones located in the entrance lobbies of PWGSC leased facilities are generally not modified as they do not constitute part of the leased premises.*

### **10.1 Existing Conditions**

Various signage is provided throughout; there are no 'public use' telephones present in this building.

The following are below the minimum standard requirement:

- No tactile signage is provided at the washroom and the exit locations.

### **10.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment**

- Provide tactile signage at the washroom and the exit locations – approximately 3 locations.

### 10.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment

Modification listed in 10.2 will ensure compliance with CSA-B651-12.

## 11.0 PUBLIC AREAS

### Accessibility Requirements of the Treasury Board Accessibility Standard for Real Property:

5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:

c) Public areas (including, but not limited to, cafeterias, lounges, recreation areas, eating areas, patios, libraries, and walkways);

l) Accessible seating spaces shall be provided within auditoriums, theatres, and other general assembly areas in conformance with the quantities identified in the National Building Code of Canada.

m) Classrooms, auditoriums, meeting rooms and theatres with an area of more than 100 square meters shall be equipped with an assistive listening system encompassing the entire seating area.

### 11.1 Existing Conditions

The only 'public area' present at this building is the lunchroom.

The following are below the minimum standard requirement:

- The existing kitchenette has several deficiencies, including: work surface too high, and no knee space.

### 11.2 Modifications Required to Comply with CAN/CSA-B651-04 Accessible Design for the Built Environment

- Modify kitchenette to meet b-f access requirements lunchroom – *in conjunction with required corrective actions identified under '7.2' and '8.2'.*

### 11.3 Incremental Modifications Required to Comply with CSA-B651-12 Accessible Design for the Built Environment

Modification listed in 11.2 will ensure compliance with CSA-B651-12.

## 12.0 BUILDING EXEMPTIONS

With regards to exempting all or parts of facilities from accessibility requirements, the Accessibility Standard for Real Property includes the following reference:

### Exemptions and Minor Variations

5.5. Certain elements of real property may be exempted from the full accessibility requirements unless the intended use requires public access or the job requirements are such that a person with a disability could meet these requirements. Custodians shall establish internal procedures for identifying and seeking the deputy head's approval of full or partial exemptions from the accessibility requirements of this standard. They shall document the rationale for these exemptions and maintain records of all real property that is partially or fully exempted in accordance with this standard.

5.6. If the criteria that justified the exemption change, the custodian shall reassess the real property against this standard to ensure that the exemption is still justified.

5.7. Custodians may allow minor variations from the accessibility requirements of this standard (including the technical standard). However, such variations shall be consistent with the general intent of this standard and shall not affect the general accessibility of a specific property.

5.8. Where the accessibility requirements of this standard will significantly reduce the heritage quality of the property, some deviation from this standard is permitted. In deviating from the standard, custodians shall ensure that the following requirements are met:

- a. access shall be provided to at least one main level of the building;
- b. there shall be full access to government services and employment opportunities;
- c. where washroom facilities are provided in an inaccessible location, equivalent facilities that are accessible shall also be provided; and
- d. for inaccessible exhibitions, another version of the exhibition, such as a video display, shall be provided in an accessible area.

In response to 5.2 above, PWGSC has adopted the exemption criteria identified in the 1998 Real Property Accessibility policy (eg. which preceded the current Accessibility Standard for Real Property) for the purposes of formalizing exemptions under the 2005-2009 Audit Program.

Various new buildings or structures, due to their specialized design function or requirements, may be candidates for a reduced level of accessibility or can be completely exempted from barrier-free design requirements. Such facilities include, but are not limited to, the following:

**1. Naturally inaccessible facilities in remote locations**

This would include, for example, mountain top installations not accessible by vehicles, facilities on islands not served by accessible ferry systems, below-grade excavations not serviced by elevators, etc.

**2. Unattended monitoring stations**

This would include facilities, which are not occupied on a full time-basis such as:  
-facilities housing monitoring/test/experimental equipment or instrumentation, which are monitored on an intermittent basis.  
-lookout/observation towers.

**.3 Facilities designed and constructed to accommodate able-bodied personnel (i.e where being able-bodied is a specific part of the job requirement)**

This would include such facilities as guardhouses, service garages, utility buildings, warehouses, processing plants etc. Offices and support functions provided for the sole use of the able-bodied staff located in these facilities can also be exempted.

**.4 Facilities where operational requirements preclude reasonable access by persons with disabilities**

This could include facilities where immediate evacuation is required in the event of an accident. See also **Hazardous Occupancies** and **Facilities designed and constructed to accommodate able-bodied personnel**.

**.5 Hazardous Occupancies**

*In some cases, access need not be provided to certain parts of a facility such as boiler rooms, roofs, elevator pits, elevator penthouses, mechanical rooms, electrical vaults, piping or equipment catwalks, or areas of hazardous occupancy (as defined by the National Building Code of Canada and the National Fire Code of Canada), unless the intended use requires public access or the job requirements are such that a person with a disability could meet these requirements.*

Based on the definitions of the National Building Code of Canada, this would include the following:

*-high hazard industrial occupancy means an industrial occupancy containing sufficient quantities of highly combustible and flammable or explosive materials which, because of their inherent characteristics, constitute a special fire hazard.*

*-medium hazard industrial occupancy means an industrial occupancy containing in which the combustible content is more than 50 kg/m<sup>2</sup> or 1200 MJ/m<sup>2</sup> of floor area and not classified as high hazard industrial occupancy).*

- .6** *No barrier free access is required to the second storey of a two-storey building if the second storey is less than 600 m2 rentable and there is full access to government services and employment opportunities on the ground floor. The same provisions apply to single-storey buildings where the basement is used as an operational second floor.*

This would include facilities where, for example, government services, offices and employee amenities (meeting rooms, kitchenettes, photocopy and business machine areas, etc.) are already located on an accessible Ground Floor and the second storey and/or basement level is less than 600 m2 rentable and consists of private offices only. Where a person in a wheelchair is located on an accessible ground floor, staff that supervises or is supervised by, this person should be co-located on the same floor.

- .7** *Facilities to be permanently vacated or removed from federal inventory within one year*

This would include facilities which, for example, are to be vacated dispose of, demolish, decommission or otherwise within the course of the 2005 to 2009 audit program. While RPA identifies a one year term, take into consideration planning, design and implementation time frames.

## **12.1 Recommended Exemption**

The following parts of the facility are identified for exemptions under the Accessibility Standard for Real Property and were therefore not examined in this accessibility audit: janitors closets, mechanical, electrical and telecommunications rooms, storage areas, basement level, etc.

It is also recommended that this building be considered for full exemption, presuming that given its location (remote location) and its use (infrequent use, designed/constructed to accommodate able-bodied personnel), it is outside the scope of areas identified for inclusion under the ASRP.

## ACCESSIBILITY COMPLIANCE SCORE

### 12.2 Existing Compliance with B651 04

(Simply pick the appropriate score and the calculation will be done automatically)

A	B	C	D	
Accessible Element	Weighting (%)	Scoring * (4, 3.5, 3, 2.5, 2, 1.5, 1, 0)	Weighted Score (B X C)	Full Compliance Ranking Score (for info only)
Walkways	5	0.0	0	20
Parking Spaces	5	0.0	0	20
Entrances to Property	20	1.0	20	80
Passenger Elevators-Platform Lifts	20	4.0	80	80
Interior Doors and Corridors (Base Building)	10	2.0	20	40
Washrooms	20	1.0	20	80
Water Coolers - Drinking Fountains	5	4.0	20	20
Public Telephones	5	4.0	20	20
Tactile Signage	5	0.0	0	20
Public Areas	5	1.0	5	20
<b>Total</b>	<b>100%</b>	<b>17.0</b>	<b>185</b>	<b>400</b>
<b>% Compliance of Asset</b>			<b>46%</b>	

**% Compliance of Asset / % de conformité de l'Actif =  $\frac{\text{Total D}}{400}$**

#### Scoring \*

- 4 = Full compliance: Fully meets Treasury Board Accessibility Standard for Real Property (ASRP) and CAN/CSA B651 technical requirements or PWGSC acceptable technical variances.
- 3.5 = Excellent: Requires minor adjustment of existing elements to comply with ASRP and CAN/CSA technical requirements (signs/ accessories/grab bar relocations, maintenance items, painting, etc.).
- 3 = Very Good: Requires replacement of existing elements to comply with ASRP and CAN/CSA technical requirements (signs/ accessory installations, new controls for existing door operators, new grab bars, etc.).
- 2.5 = Good: Requires installation of new element to comply with ASRP and CAN/CSA technical requirements (installation of power door operators, grab bars, elevator control panels, etc.).
- 2 = Moderate: Requires minor architectural/structural or mechanical interventions to comply with ASRP and CAN/CSA technical requirements (modification of ramps, reconfiguration of accessible stalls, replacement of elevator panels, lowering of drinking fountains, etc.).
- 1.5 = Poor: Requires major architectural/structural or mechanical interventions to comply with ASRP and CAN/CSA technical requirements (extension of ramps, reconfiguration of washrooms, replacement of elevator cabs, replacement of drinking fountains, etc.).
- 1 = Very Poor: Requires construction of new accessibility elements to meet ASRP or CAN/CSA technical requirements (construction or installation of new ramps, washrooms, lifts/elevators, drinking fountains, etc.).
- 0 = ASRP Accessibility elements cannot be accommodated due to architectural, structural or other limitations.

If a particular accessible element is not applicable to a specific building (for example, single storey building with no elevators, no public telephones, etc.), assign a full score for that specific element. This approach is to avoid the need to redistribute the scoring to the other accessible elements.

### 12.3 Existing Compliance with B651 12

(Simply pick the appropriate score and the calculation will be done automatically)

A	B	C	D	
Accessible Element	Weighting (%)	Scoring * (4, 3.5, 3, 2.5, 2, 1.5, 1, 0)	Weighted Score (B X C)	Full Compliance Ranking Score (for info only)
Walkways	5	0.0	0	20
Parking Spaces	5	0.0	0	20
Entrances to Property	20	1.0	20	80
Passenger Elevators-Platform Lifts	20	4.0	80	80
Interior Doors and Corridors (Base Building)	10	2.0	20	40
Washrooms	20	1.0	20	80
Water Coolers - Drinking Fountains	5	4.0	20	20
Public Telephones	5	4.0	20	20
Tactile Signage	5	0.0	0	20
Public Areas	5	1.0	5	20
Total	100%	17.0	185	400
<b>% Compliance of Asset</b>			<b>46%</b>	

**% Compliance of Asset / % de conformité de l'Actif =  $\frac{\text{Total D}}{400}$**

#### Scoring \*

- 4 = Full compliance: Fully meets Treasury Board Accessibility Standard for Real Property (ASRP) and CAN/CSA B651 technical requirements or PWGSC acceptable technical variances.
- 3.5 = Excellent: Requires minor adjustment of existing elements to comply with ASRP and CAN/CSA technical requirements (signs/ accessories/grab bar relocations, maintenance items, painting, etc.).
- 3 = Very Good: Requires replacement of existing elements to comply with ASRP and CAN/CSA technical requirements (signs/ accessory installations, new controls for existing door operators, new grab bars, etc.).
- 2.5 = Good: Requires installation of new element to comply with ASRP and CAN/CSA technical requirements (installation of power door operators, grab bars, elevator control panels, etc.).
- 2 = Moderate: Requires minor architectural/structural or mechanical interventions to comply with ASRP and CAN/CSA technical requirements (modification of ramps, reconfiguration of accessible stalls, replacement of elevator panels, lowering of drinking fountains, etc.).
- 1.5 = Poor: Requires major architectural/structural or mechanical interventions to comply with ASRP and CAN/CSA technical requirements (extension of ramps, reconfiguration of washrooms, replacement of elevator cabs, replacement of drinking fountains, etc.).
- 1 = Very Poor: Requires construction of new accessibility elements to meet ASRP or CAN/CSA technical requirements (construction or installation of new ramps, washrooms, lifts/elevators, drinking fountains, etc.).
- 0 = ASRP Accessibility elements cannot be accommodated due to architectural, structural or other limitations.

If a particular accessible element is not applicable to a specific building (for example, single storey building with no elevators, no public telephones, etc.), assign a full score for that specific element. This approach is to avoid the need to redistribute the scoring to the other accessible elements.

13.0 CLASS D CONSTRUCTION ESTIMATE

Accessibility Standard for Real Property Requirements	% of Adjustment	B651-04	B651-12
3.0 Walkways		\$12,225	\$0
4.0 Parking		\$3,500	\$0
5.0 Building Entrances		\$5,600	\$0
6.0 Vertical Movement		\$0	\$0
7.0 Interior Doors and Corridors		\$3,200	\$0
8.0 Washrooms		\$25,000	\$0
9.0 Water Coolers/Drinking Fountains		\$0	\$0
10.0 Public Telephones/Tactile Signage		\$240	\$0
11.0 Public Areas		\$32,000	\$0
<b>Subtotal</b>		<b>\$81,765</b>	<b>\$0</b>
Regional Adjustment Factor	22.0%	\$17,988	\$0
General Contractor's overhead & Profit	15.0%	\$14,963	\$0
Estimated Design Allowance	30.0%	\$34,415	\$0
<b>Total Estimated Construction Cost</b>		<b>\$149,131</b>	<b>\$0</b>

**Notes:**

- 1) Excludes GST,

## BIBLIOGRAPHY

Accessibility for All, Report of the Standing Committee on Human Resources, Skills Development, Social Development and the Status of Persons with Disabilities, June, 2005.

Accessibility Standard for Real Property, Treasury Board of Canada Secretariat, November 1, 2006

Real Property Accessibility, Treasury Board of Canada Secretariat, June 30, 1998.

CAN/CSA B651 95 Barrier-Free Design, Canadian Standards Association, September 1995.

CAN/CSA B651 04 Accessible Design for the Built Environment, Canadian Standards Association, August, 2004.

CSA B651 12 Accessible Design for the Built Environment, Canadian Standards Association, May 2012.

Accessibility Evaluation Guide, Accessibility Office, Public Works Canada, January, 1994.

Canada Labour Code, Part II: Canada Occupational Safety and Health Regulations, December 23, 1998.

**APPENDIX A:**  
**Accessibility Standard for Real Property (November 1, 2006)**

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1. Effective date
2. Application
3. Context
4. Purpose
5. Accessibility requirements
6. References
7. Enquiries

## Accessibility Standard for Real Property

### 1. Effective date

This standard is effective November 1, 2006.

### 2. Application

This standard applies to all departments within the meaning of section 2 of the *Financial Administration Act*, unless specific acts or regulations override it.

### 3. Context

The *Canadian Human Rights Act* (CHRA) gives effect to the principle that all individuals should have equal opportunity to have their needs accommodated, consistent with their duties and obligations and to function as members of society, without being hindered in, or prevented from, doing so by discriminatory practices. The CHRA prohibits discrimination in the provision of goods, services, facilities or accommodation customarily available to the general public and prohibits the adverse differentiation between individuals.

### 4. Purpose

The Treasury Board *Policy on the Management of Real Property* holds Deputy Heads responsible for providing barrier-free access to, use of and exit from real property in accordance with this standard. This standard establishes minimum requirements for the accessibility of real property to meet the objectives of the policy. This standard is issued pursuant to the *Financial Administration Act*, subsections 7(1), 9(1.1), 9(2) and the *Federal Real Property and Federal Immovables Act*, subsection 16(4).

### 5. Accessibility requirements

5.1. In the management of real property, custodians shall at a minimum, provide access to and use of the following:

- a. Entrances. Frequently used points of access to the property must be equipped with a power door operator at main entrances to real property. Where entry to or exit from the facility is through a series of doors in a vestibule-like arrangement, at least one complete set of doors allowing access to the vestibule area shall be so equipped.
- b. Passenger elevators.
- c. Public areas (including, but not limited to, cafeterias, lounges, recreation areas, eating areas, patios, libraries, and walkways).
- d. Federal work areas (including, but not limited to, offices, on-floor storage areas, meeting and training rooms, computer rooms and spaces for business machines).
- e. Interior doors and corridors.
- f. Washrooms.
- g. Public telephones. When banks of public telephones are provided, there must be at least one public telephone per bank accessible to persons in wheelchairs and one public telephone per bank accessible to persons with hearing impairments. All direct-line telephones and at least one charge-a-call telephone, when provided, shall be similarly accessible.
- h. Drinking fountains. One accessible cooler or fountain shall be provided in each location where water coolers or drinking fountains are provided.

- i. Tactile signage. Tactile signs shall be provided for the following: washrooms, emergency exits, elevators and stairwells.
- j. Where employee or visitor parking is provided, the quantity of accessible parking spaces provided shall conform with municipal by-laws or the following table, whichever has the higher number of accessible spaces:

<b>Total Parking Spaces</b>	<b>Minimum No. of Accessible Spaces</b>	<b>Total Parking Spaces</b>	<b>Minimum No. of Accessible Spaces</b>
up to 25	1	151–200	6
26–50	2	201–300	7
51–75	3	301–400	8
76–100	4	401–500	9
101–150	5	more than 500	2% of total

Accessible parking spaces shall be within a reasonable and safe proximity of the federal facility but may be distributed among distinct parking areas.

- k. Accessibility shall include routes from accessible parking areas, local public transit stops and all drop-off areas that are within the limits of the federal property to main entrances.
- l. Accessible seating spaces shall be provided within auditoriums, theatres and other general assembly areas in the quantities identified in the *National Building Code of Canada*.
- m. Classrooms, auditoriums, meeting rooms and theatres of more than 100 square metres shall be equipped with an assistive listening system encompassing the entire seating area.

5.2. In meeting accessibility requirements for real property, departments shall apply the technical standard found in the publication entitled “Accessible Design For the Built Environment” (CAN/CSA-B651-04).

**Note:** This technical standard has applied to the accessibility requirements of real property acquired (including lease renewal), under construction or undergoing major refit since October 1, 2004. It does not apply retroactively to accessibility requirements of real property in the inventory prior to October 1, 2004.

5.3. For Crown-leased real property outside Canada, custodians shall make best efforts to meet the standard.

5.4. Departments shall adapt residential units to the technical standard when employees or their immediate dependants require accessibility.

### **Exemptions and minor variations**

5.5. Certain elements of real property may be exempted from the full accessibility requirements unless the intended use requires public access or the job requirements are such that a person with a disability could meet these requirements. Custodians shall establish internal procedures for identifying and seeking the deputy head’s approval of full or partial exemptions from the accessibility requirements of this standard. They shall document the rationale for these exemptions and maintain records of all real property that is partially or fully exempted in accordance with this standard.

5.6. If the criteria that justified the exemption change, the custodian shall reassess the real property against this standard to ensure that the exemption is still justified.

5.7. Custodians may allow minor variations from the accessibility requirements of this standard (including the technical standard). However, such variations shall be consistent with the general intent of this standard and shall not affect the general accessibility of a specific property.

5.8. Where the accessibility requirements of this standard will significantly reduce the heritage quality of the property, some deviation from this standard is permitted. In deviating from the standard, custodians shall ensure that the following requirements are met:

- e. access shall be provided to at least one main level of the building;
- f. there shall be full access to government services and employment opportunities;
- g. where washroom facilities are provided in an inaccessible location, equivalent facilities that are accessible shall also be provided; and
- h. for inaccessible exhibitions, another version of the exhibition, such as a video display, shall be provided in an accessible area.

## **6. References**

### ***Treasury Board policy instruments***

- Federal Identity Program Manual, Section 4.3b. Tactile Signage
- Management of Information Technology Standards
- Policy on the Duty to Accommodate Persons with Disabilities in the Federal Public Service
- Policy on the Management of Real Property

## **7. Enquiries**

Please direct enquiries about this standard to your departmental headquarters. For interpretation of this standard, headquarter officials should contact:

Real Property and Materiel Policy Division

Treasury Board of Canada Secretariat

L'Esplanade Laurier

140 O'Connor Street

Ottawa ON K1A 0R5

Telephone: (613) 941-7173

Facsimile: (613) 957-2405

E-mail: [rmpd@tbs-sct.gc.ca](mailto:rmpd@tbs-sct.gc.ca)

Date Modified: 2006-06-26

**ANNEX F**

**LIFE SAFETY SYSTEMS TESTING & FIRE  
CODE COMPLIANCE**

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## 0.0 PREAMBLE

There are three major elements in any fire/emergency defense program:

- Emergency preparedness.
- Fire prevention.
- Fire protection.

In other words, one has to prevent fires, but also has to be ready for fires that do occur. Most fire hazards and emergencies can be prevented or mitigated early by eliminating or controlling fire hazards, installing and maintaining life safety systems, installing and maintaining signs and posted information, and the establishment of a fire safety plan in those occupancies where it is considered necessary.

Inspections are essential to maintain a satisfactory standard for fire safety in buildings and to ensure the protection, conservation and consequent minimization of risks to life, property and the Government's financial position. Inspections limit the risk of life and property losses from fire by identifying and causing the correction of those conditions which contribute to the occurrence and spread of fire.

## 1.0 ADMINISTRATIVE PROVISIONS

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation with regards to a building owners' administrative responsibilities.*

### **1.1 RESPONSIBILITY: OWNERSHIP/CUSTODIANSHIP & FACILITY MANAGEMENT -**

The "responsible person" is someone who has control, or a degree of control, of the premises or fire prevention systems within the premises. If you are the responsible person, you must make sure that everyone who uses your premises can escape if there is an emergency. The people you need to think about include anyone who might be granted access to your premises, including employees, visitors or members of the public. You need to pay particular attention to those who may need special help, such as elderly or disabled persons or children. If you are the responsible person, you must make sure that a fire-risk assessment is carried out. You can appoint some other competent person to do the actual assessment, but you are still liable by law.

The enforcing authority, which is usually the local fire services for private sector, and HRSDC Labour Programs for Crown owned, must be satisfied with your safety measures. If not, they will tell you what you need to do. If they find major problems, they can restrict the use of your premises or close them altogether until you deal with the problems they find.

**Reference:** NFC, Division C, Part 2.2.1.1 & COSHR Part 17.9.1 - Unless otherwise specified, the owner or the owner's authorized agent shall be responsible for carrying out the provisions of all acts, regulations, codes and standards as applicable to building and occupant fire safety. Building owners are responsible to arrange for the inspection, testing and maintenance of all fire protection equipment and systems in properties under

their control and administration in accordance with the National Building Code (NBC), and the National Fire Code (NFC).

**1.2 RECORDS & DOCUMENTATION RETENTION** - Records contain vital information which are often linked to administrative actions such as testing and/or inspection requirements of fire protection equipment. Testing/inspection documents provide evidence of conformity to legislated requirements, and demonstrate DUE diligence.

**Reference:** NFC, Division C, Part 2.2.1.2 & COSHR Part 17.9.2 -The initial verification or test reports for each system shall be retained throughout the life of the system. Where references identified in this report require that records of inspections, maintenance procedures or tests be retained for examination by the authority having jurisdiction, such records shall be retained during the required time interval between the inspection, maintenance procedure or test, or for a minimum of two years, whichever is greater.

**1.3 FIRE SAFETY PLAN** - Fire Safety Planning prevents the occurrence of fire by the control of fire hazards in a building, ensures operation of fire protection systems by establishing maintenance procedures, and provides a systematic method of safe and orderly evacuation of the building in the event of a fire or other emergency. Therefore, the importance of implementing a fire safety program and informing occupants of the building fire safety procedures, is essential. A building owner has a legal duty to ensure that the building complies with the regulations at all times, even if the building has not been inspected by fire authorities.

**Reference:** NFC, Division B, Part 2.8.2 - Fire safety planning shall be prepared in accordance with the NFC and shall incorporate the requirements of the Treasury Board Standard for Fire Protection for the protection of public civil servants, and federal real property assets. The plan shall be developed in cooperation with the local fire authority as per the requirements of the above identified references, and it is recommended that the fire safety plan be forwarded to the District Office of HRSDC Labour Programs, Fire Protection Engineering for review and acceptance prior to implementation.

The Fire Safety Plan shall be kept in the building for reference by the fire department, supervisory staff and other personnel. Fire Safety Plans shall be reviewed at intervals not greater than 12 months to ensure that it takes account changes in the use and other characteristics of the building.

**1.4 PERSONS RESPONSIBLE FOR FIRE SAFETY & EMERGENCY PREPAREDNESS** - Trained supervisory staff (when possible) can be of great value in directing and assisting the orderly movement of people in the event of a fire, and performing fire control until the fire department arrives. Evacuation procedures rely heavily on supervisory staff and are complex, in that such staff require continued ongoing training, frequent drilling, and must be continuously on the premises in order to fulfil their responsibilities during an emergency. The Fire Safety Plan identified above may also incorporate the establishment of a Building Emergency Organization for buildings, as prescribed in Part XVII of the Canada Occupational Health and Safety Regulations. This document may incorporate additional procedures for all other non-fire related emergencies which could occur in a building.

**Reference:** NFC, Division C, Part 2.2 & COSHR Part 17.9.2 - A fire emergency organization is required in all buildings that are more than three storeys, including storeys below grade, or when the occupant load usually in a building exceeds the number given in Part XVII of COSHR or HRSDC Labour Programs, Fire Protection Engineering requires a fire emergency organization to accommodate unique situations. During the preparation and implementation of emergency procedures, the fire safety plan referred to above shall be prepared as an independent document which can make up part of the entire Emergency Procedures Manual.

**1.5 FIRE DRILLS** - Fire drills are important exercises and provide an opportunity for fire evacuation plans for buildings and personnel to be developed, confirmed or modified if necessary. Fire drills also give the opportunity for building occupants who have specific duties during the course of fire evacuation to exercise their duties and report any problems they may encounter.

**Reference:** NFC, Division B, Part 2.8.3 - As per the requirements of the NFC, at least one scheduled evacuation drill involving all occupants shall be conducted annually in all Government of Canada buildings or occupied areas of buildings. All evacuations, false alarms and scheduled drills shall be recorded and the results maintained on file for a period of two years. A post mortem or follow-up report shall be completed after each fire drill, recording the results, and be retained on file for a period of two years.

## 2.0 BUILDING & OCCUPANT FIRE SAFETY

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation as applicable for the safety of occupants, the elimination or control of fire hazards, and the installation maintenance of certain life safety system.*

**2.1 CLASSIFICATION & MAJOR OCCUPANCY OF BUILDING** - The occupancy classification can be defined as the use to which the occupants or tenants use all or a portion of the building. The premise upon which occupancy classifications are based is that certain occupancies, by their very nature, will have higher fire loads and greater numbers of occupants within them. Occupancy classifications can be found in the National Building Code.

**Reference:** NFC, Division B, Part 2.1.2 & NBC, Division B, Part 3.1.2 - For the purpose of applying the NFC, every building or part thereof shall be classified according to its major occupancy in conformance with the NBC. The buildings at this facility are classified under the National Building Code of Canada 2005 (NBC), Part 3, as a mixed use facility and are identified below.

**2.2 FIRE SEPARATIONS** - A fire wall or fire separation is a wall with a specific degree of fire resistance that is designed to prevent the spread of fire within a structure or between two structures. Because fire walls/separations are designed to protect against the spread of fire, no combustible construction is permitted to penetrate these walls. Fire walls/separations are also self-supporting so that they can maintain their stability.

**Reference:** NFC, Division B, Part 2.2 & NBC, Division B, Part 3.1.2 - Where a building contains more than one major occupancy, such occupancies shall be separated from each other in conformance with the NBC. Where rooms or spaces within a building contain a high hazard occupancy, such occupancies shall be separated from the remainder of the building by fire separations. Structures constructed as Major "Group D - Business and Personal Services, occupied by federal civil servants only, are generally accepted by the Federal authority having jurisdiction as a single occupancy type. Therefore, fire separations are not required between different Federal departments or entities, only those as described above.

**2.3 CLOSURES** - Two of the most important functions of closures, in terms of life safety, are to act as a barrier to fire and smoke and to serve as a component of a means of egress. Openings in fire separations shall be protected with closures in conformance with the NBC, so that the integrity of the fire separation is maintained. When doors are used as closures and serve as a component of a means of egress, they must be constructed so that the way of exit travel is obvious. They shall be kept closed, they may be latched but not locked against the egress; otherwise, occupants will not be able to use them unless they have a key.

**Reference:** NFC, Division B, Part 2.2 & NBC, Division B, Part 3.1.8 - All closures in fire separations shall be tested at intervals not greater than 24 hours to ensure that they remain closed unless the door is equipped with a hold-open device conforming to the NBC. Doors in fire separations shall also be operated at intervals not greater than one month to ensure that they are properly maintained, not obstructed, blocked, wedged open, or altered in any way that would prevent the intended operation of the closure. Where vestibules or stair shafts are pressurized as a means of smoke control, all doors in the path of exit travel shall be tested to ensure that they can be operated as required when the entire smoke control system is being tested on a quarterly basis. Where doors are equipped with approved hold open devices, they shall be tested no greater than monthly to ensure they release upon a fire alarm. All doors should have a clear path for opening and closing and should move easily. All window glass and hardware should be in place and in good repair. All doors should close tightly and latch properly to provide an effective barrier against fire and smoke, should there be a fire situation. Doors with self closing devices must automatically return to the closed and latched position after being opened.

**2.4 FIRE DAMPERS & FIRE STOP FLAPS** - Fire dampers and fire flaps are also used as closures in fire separations to prevent transmission of flame and smoke where air ducts penetrate fire separations. A fire damper can be installed in a vertical or horizontal assembly of materials designed to restrict the spread of fire in which openings are protected. The NBC specifies where fire dampers are required and the fire/flame spread rating for each wall/floor assembly.

**Reference:** NFC, Division B, Part 2.2.2.4(5) & NBC, Division B, Part 3.1.8.9 - All fire dampers, smoke dampers and fire stop flaps shall be inspected at intervals not greater than 12 months to ensure that they are in place and are not obviously damaged or obstructed. As per the requirements of the NBC reference above, a tight fitted access door shall be installed for each fire damper to provide access for the inspection of the

dampers and to reset the fusible link release mechanism. It is recommended that all dampers be inventoried or identified on building drawings to ensure inspections are performed on all the devices within a 12 month cycle.

## **2.5 FIRE HAZARDS**

*A fire hazard is any situation in which there is a greater than normal risk of harm to people or property due to fire. A fire risk assessment helps you identify all the fire hazards and risks in your premises. You can then decide whether they are acceptable or whether you need to do something to reduce or control them.*

**2.5.1 Accumulation of Combustible Materials and Waste Handling** - Proper housekeeping, including the prompt removal of waste and keeping the workspace free of unnecessary combustible materials, will help to prevent or reduce the severity of fires. This can include anything from municipal trash to hazardous or biological materials, and construction materials. Excess garbage or materials that contribute to an increased fire load or which impede egress cannot accumulate in a work space.

**Reference:** NFC, Division B, Part 2.4 - Combustible waste materials in and around buildings shall not be permitted to accumulate in quantities or locations that will constitute an undue fire hazard. Combustible materials, other than those for which the location, room or space is designed, shall not be permitted to accumulate in any part of a means of egress, service room, or service space. Where storage rooms are provided for the storage of combustible waste materials, such rooms shall conform to the NBC. Outdoor storage receptacles such as dumpsters used for combustible materials shall be located so that they do not create an undue fire hazard to surrounding buildings.

## **2.6 ACCESS TO BUILDINGS**

*An extremely important aspect of life safety is the accessibility to the site for firefighters and fire fighter's apparatus. If fire fighters are unable to position their apparatus in a functional position close to the involved structure, the success of the fire fighting operations can be severely affected.*

**2.6.1 Fire Department Access to Buildings** - A concern for firefighting personnel at any given location is the ability to place fire fighting apparatus in a position where it can operate effectively during emergency operations. While it is primarily an issue at the time of construction concerning the layout, the dimensions of the driveways, access lanes, parking lots, and surface load capacities, concern and consideration must be given to the ongoing condition and maintenance of these access areas.

**Reference:** NFC, Division B, Part 2.5 & NBC, Division B, Part 3.2.5 - Fire department vehicles shall have direct access to at least one face of every building by means of a street, yard or roadway in conformance with the NBC. Streets, yards and roadways provided for fire department access shall be maintained so as to be ready for use at all times by fire department vehicles.

**2.6.2 Access and Maintenance of Fire Department Connections** - Fire fighter's connections, or more commonly known as siamese connections because of their appearance, are physical connections to the building's water based fire protection systems, i.e. sprinkler, standpipe. These connections allow fire fighting personnel to connect apparatus to the building's sprinkler or standpipe and provide water when municipal supplies are not available or when additional water is required.

**Reference:** NFC, Division B, Part 2.5 & NFPA 25, NFPA 13 & NFPA 14 - Design, construction and installation of fire fighter's connections shall be in conformance with the above references. Access to fire department connections for sprinkler or standpipe systems by fire fighters and their equipment shall be maintained free of obstructions at all times.

## **2.7 SERVICE EQUIPMENT**

*Although there are a variety of fire scenarios that can be attributed to service equipment such as HVAC systems, chimneys, or commercial cooking equipment, the two primary hazards they pose are fires caused by the appliance itself, and/or the spread of fire and products of combustion through the air handling equipment.*

**2.7.1 Heating, Ventilation & Air Conditioning** - Heating, ventilation and air conditioning systems shall be operated and maintained so as not to create a hazardous condition. The major components within an HVAC system are heaters, air conditioners, fans, ducts, heat exchangers, and thermostatic controls. There are several installation, operation, maintenance and testing requirements for HVAC systems contained in the NBC, NFC, and the Canadian Standards Association.

**Reference:** NFC, Division B, Part 2.6.1.6 & NBC, Division B, Part 6 - Heating, ventilation, and air conditioning appliances and equipment shall be installed in conformance with the NBC. Except for self-contained systems within dwelling units, disconnect switches for mechanical air conditioning and ventilating systems shall be operated at intervals not greater than 12 months to establish that the system can be shut down in an emergency.

**2.7.2 Chimneys, Flues and Flue Pipes** - The inspection of chimneys and flues is important to detect problems with the venting system. Heating appliances and their venting systems can be hazardous when not properly installed, or when damage or deterioration has occurred. Inspections and servicing by a licensed professional are essential for safe, efficient operation of heating equipment and venting systems. During inspection of a chimney connected to an operating appliance, the presence of dense smoke at the outlet will indicate improper operation of the appliance, incorrect sizing of the chimney or that unsuitable fuels are being used.

**Reference:** NFC, Division B, Part 2.6.1.4 & NBC, Division B, Part 6.3 - It is a requirement of the National Fire Code for the owner of a chimney, flue or flue pipe to have it inspected annually, when an appliance is added, or after a chimney fire. Persons responsible for inspections must possess the necessary qualifications to ensure inspections are performed and in accordance with the NFC.

**2.7.3 Commercial Cooking Equipment** - Cooking is another very common cause of fires. Common cooking equipment that can be installed includes ranges, ovens, fryers, warming equipment, and exhaust equipment. While it is primarily an issue at the time of design and construction concerning the layout, the dimensions and effectiveness of these systems, range hoods and cooking equipment must remain in good working order; excess grease and dirt should not be allowed to accumulate on the equipment. In commercial cooking establishments, much of the attention is focused on the hood exhaust and fire protection equipment above the cooking area. These systems shall be designed and installed in conformance with the National Building Code.

**Reference:** NFC, Division B, Part 2.6.1.9 & NBC, Division B, Part 6.2.2.6 - Depending on the extent of equipment usage, the cooking equipment and entire exhaust system should be inspected weekly to determine if more frequent cleaning and/or maintenance is required prior to the six month inspection cycle. The use, inspection and maintenance of commercial cooking equipment exhaust and fire protection systems shall be in conformance with NFPA 96 Ventilation Control and Fire Protection of Commercial Cooking Equipment.

**2.7.4 Electrical Equipment Vaults** - Historically, electricity has always been a common cause of fires. When principals of safety are not followed, electrical energy can produce unwanted and unexpected fires. Most electrical fires are caused by either arcs or overheating. Over 90% of the energy in electricity is converted into heat, and unless the electrical energy is used efficiently, it almost always produces heat as an unwanted by-product.

**Reference:** NFC, Division B, Part 2.6.3 & NBC Division B, Part 3.6.2.7 - In accordance with the NFC reference, electrical equipment vaults shall not be used for storage purposes and shall be kept locked so that unauthorized persons will not have access to them. In accordance with the NBC reference above, if a building is sprinkled throughout, an electrical equipment vault need not be sprinkled provided the vault contains a smoke detection device which actuates the building fire alarm system in the event of a fire in the vault.

## **2.8 MEANS OF EGRESS**

*The “way out” or means of egress is one of the most important factors to be considered in determining whether the design and construction of an occupancy is safe. A means of egress is a continuous unobstructed way of exit travel from any point in a building or structure to the street, alley, or similar parcel of land which is at a safe distance away from the structure.*

**2.8.1 Corridors, Aisles, Open Floor Areas, and Exits** - All corridors, aisles and egress routes shall be kept free of obstructions at all times. No furnishings, decorations, other combustible or flammable objects shall obstruct exits. Corridors and other portions of the means of egress are meant to be a certain width so that the expected numbers of people can exit quickly in a fire situation. Any time there are obstructions, the possibility of people becoming trapped or slowed down in a fire, increases greatly. Since the prime function of corridors is to allow people to escape during a fire, we don't want these areas to be the origin of fire, or a means to allow it to propagate.

**Reference:** NFC, Division B, Part 2.7 & NBC Division B, Part 3 - The design and construction of all means of egress shall be provided in buildings in conformance with the NBC. Means of egress shall be maintained in good repair and free of obstructions at all times.

**2.8.2 Exit Stairs & Exit Passageways** - The only permissible openings in an exit are those that allow people to enter the exit from the building and those that empty directly to the exterior. Any openings to the exit must be protected by a self-closing fire door. Exit stairs are a critical component of the means of egress in multi-storeyed buildings. In order to provide a protected path of travel and to qualify as an exit, all interior stairs must be separated from the other parts of the building by proper construction.

Exit passageways are those components of a means of egress to satisfy the requirement that exit stairs discharge directly to the exterior. Exterior passageways serve as an egress path from an exit which leads occupants safely away from the building.

**Reference:** NFC, Division B, Part 2.7 & NBC, Division B, Part 3.4 - An exit shall be designed for no other purpose other than for exiting, except that an exit is permitted also to be designed to serve as an access to a floor area. Every path of egress and exit, including exit stairs, shall lead to and discharge directly to the exterior of the building, with a continuous fire separation that separates an exit from the remainder of the building. Means of egress shall be provided in buildings in conformance with the NBC. Exit facilities shall be provided from every floor area that is intended for occupancy. Means of egress shall be maintained in good repair and free of obstructions.

## 3.0 INDOOR & OUTDOOR STORAGE

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation as applicable to the storage of combustible products and dangerous goods, both inside and outside of buildings.*

**3.1 DANGEROUS GOODS** - A dangerous good is any solid, liquid, or gas that can harm people, other living organisms, property, or the environment. Dangerous goods may be radioactive, flammable, explosive, toxic, corrosive, biohazards, an oxidizer, an asphyxiant, a pathogen, an allergen, or may have other characteristics that render it hazardous in specific circumstances. Mitigating the risks associated with dangerous goods may require the application of safety precautions during their transport, use, storage and disposal.

**Reference:** NFC, Division B, Part 3 - Laws and regulations on the use and handling of hazardous materials may differ depending on the activity and status of the material. For example, one set of requirements may apply to their use in the workplace, while a different set of requirements may apply to spill response, sale for consumer use, or transportation.

Cylinders and tanks shall be protected against mechanical damage and shall be firmly secured in a position that will not interfere with the operation of the cylinder.

**3.2 INDOOR STORAGE** - Materials storage in any building or operation presents several potential hazards. Problems such as storing products too close to ceilings or sprinkler equipment, improper storage of flammable liquids and compressed gasses, or storage of materials blocking fire protection equipment or egress routes, can be found in many different types of material storage occupancies.

**Reference:** NFC, Division B, Part 3 - Storage requirements for both indoor storage of combustible products and dangerous goods are outlined in Part 3 of the National Fire Code and specify such requirements as access aisles, clearances, pile size, signage, sprinkler protection, ignition sources, and fencing. The requirements are based on the relative hazard or classification of a commodity.

## 4.0 FLAMMABLE & COMBUSTIBLE LIQUIDS

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation as applicable to the storage, handling, and processing of flammable liquids and combustible liquids in buildings, structures and open areas.*

**4.1 CONTAINER STORAGE AND HANDLING** - Flammable materials are substances that can ignite easily and burn rapidly. They can be common materials that are at most work places such as gasoline, solvents, and cleaners, or more volatile and dangerous liquids more commonly found in industrial occupancies such as acetones, toluenes or alcohol. Controlling the potential for fire and explosion with flammable liquids is done through safe storage, transfer, use and disposal.

**Reference:** NFC, Division B, Part 4 - The storage, handling and use of flammable combustible liquids shall be in accordance with Division B, Part 4 of the National Fire Code.

**4.2 FUEL-DISPENSING STATIONS** - Dispensing motor fuel raises a number of concerns, including: lack of supervision to prevent unsafe fuelling practices or filling of non-approved containers; lack of protection against interference or tampering with dispensing equipment and facilities; dependence on untrained persons for extinguishing small Class I & Class II combustible liquid fires; and increased reliance by the public on fire departments and other emergency services for response to any type of malfunction or problem at the unattended site.

**Reference:** NFC, Division B, Part 4.6.3.1 - Fixed dispensers for flammable liquids or combustible liquids shall conform to CAN/CSA B346-M, Power-Operated Dispensing Devices for Flammable Liquids.

## 5.0 HAZARDOUS PROCESSES & OPERATIONS

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation as applicable to operations that involve a risk from explosion, high flammability or related conditions that could create a fire hazard to life safety.*

**5.1 HOT WORKS** - Cutting and thermal welding practices can present significant hazards to the area in which they are being performed. They inherently provide two of the three sides of the fire triangle: an ignition source, and oxygen in the air. All that is needed is a fuel source and you have the potential for a serious fire.

**Reference:** NFC, Division B, Part 5.2 - This section shall apply to hot works involving open flames or producing heat or sparks, including, without being limited to, cutting, welding, soldering, brazing, grinding, adhesive bonding, thermal spraying and thawing pipes. Except as provided in section NFC, Division B, Part 5.2., hot work as described above shall conform to CAN/CSA-W117.2 "Safety in Welding, Cutting and Allied Processes."

## 6.0 FIRE PROTECTION EQUIPMENT

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation as applicable to the inspection, testing, maintenance, and operation of fire protection equipment and life safety systems.*

### 6.1 WATER BASED FIRE PROTECTION SYSTEMS

**6.1.1 Water Supplies, Water Main Valves & Back-flow Protection** - Water supplies for fire protection shall be readily available and of sufficient volume and pressure to enable emergency response personnel to control fire growth so as to enable the safe evacuation of occupants and the conduct of search and rescue operations, prevent the fire from spreading to adjacent buildings and provide a limited measure of property protection.

When water supplies are insufficient or fail, fire departments can utilize pumps on their apparatus to boost the water supply to the sprinkler and/or standpipe systems through a fire fighter connection, also called Siamese connections.

**Reference:** NFC, Division B, Part 6.4., NFPA 25 - Water supplies for fire protection shall be maintained so as to be capable of providing the flow and pressure of water for which they were designed. Valves controlling water supplies to fire protection systems shall be inspected at intervals not greater than 7 days to ensure that they are wide open and are locked or sealed in that position. Fire sprinkler and standpipe systems where connected to a potable water system shall be protected against back-flow caused by back-siphonage or back pressure.

**6.1.2 Hydrants** - Fire hydrants are devices connected to water mains and are used by fire departments to obtain a continuous water supply for the suppression of fires. Rarely used for this purpose, but when it is required, it must be able to be located quickly with considerable assurance that it will operate as per its design criteria. Hydrants shall be maintained in good operating condition and shall be kept readily accessible for fire fighters' use and their locations shall be clearly identified. Hydrants are typically adjacent to fire access lanes and risk being buried by snow removal contractors. Landscaping and shrubbery shall be cut back to give clear access in the summer months and snow and ice clear in the winter months.

**Reference:** NFC, Division B, Part 6.4 & NFPA 25 - Inspections are required semi-annually for dry barrel hydrants and annually for wet barrel hydrants. All hydrants must be inspected after each operation with the necessary corrective action taken as applicable. Flow tests need to be conducted on all hydrants annually so they can be checked for ease and proper operation, and to confirm water availability. Underground and exposed piping shall be flow tested to determine the internal condition of the piping at minimum 5-year intervals. Any flow test results that indicate deterioration of available water flow and pressure shall be investigated to the complete satisfaction of the authority having jurisdiction to ensure that the required flow and pressure are available for fire protection.

**6.1.3 Fire Pumps** - The main function of a fire pump is to increase the pressure of the water that flows through it. Usually, a fire pump is required to supply a sprinkler system or standpipe system because the available water source, such as elevated storage tanks, ground storage tanks, municipal water supplies do not have adequate pressure to meet the fire suppression demand. The result of pump failure is most often catastrophic. The way to prevent this from happening is to continually make sure that the pump installation is in good operating condition and tested frequently.

**Reference:** NFC, Division B, Part 6.4 & NFPA 25 - Fire pumps driven by an electric motor shall be operated at intervals not greater than one week at their rated speeds until the satisfactory performance of the pump, driver and controller is verified in a no-flow condition. Fire pumps shall also be tested at full rated capacities at intervals not greater than 12 months in a flow condition to ensure that they are capable of delivering the rated flow.

**6.1.4 Sprinkler Systems** - Sprinkler systems provide a means for automatic application of water on fires and are designed to provide a quick and convenient means for applying water streams on a fire on any story of a building. Automatic sprinkler systems consist of water control valves, a system of piping, and a series of nozzle-like devices so arranged that the system will automatically distribute sufficient quantities of water to either extinguish a fire or prevent flashover until fire fighters arrive. Every sprinkler system must have an automatic water supply of adequate volume, pressure and reliability. The water supply must be able to reach the highest sprinkler in the system.

**Reference:** NFC, Division B, Part 6.4 & NFPA 25 - All sprinkler systems shall be designed and installed in accordance with the NFC and NFPA 13. Periodic inspections and testing shall be performed in accordance with NFPA 25 as applicable for the installed system type. Where an electrical supervisory signal device is provided for a

sprinkler system, initiating and transmitting devices shall be tested at intervals not greater than quarterly to ensure a signal is received at the annunciator.

## **6.2 EMERGENCY POWER SYSTEMS, LIGHTING & EXIT LIGHTING**

**6.2.1 Emergency Power Supply Equipment** - The purpose of emergency power supply equipment is to furnish an immediate, automatic source of electric power to a limited number of selected vital circuits in the event the regular power supply fails. It includes one or more solid fuel-driven emergency generators, emergency transfer switches, and a distribution system. The emergency power system, with the use of transfer switches, may also be used for furnishing emergency lighting.

**Reference:** NFC, Division B, Part 6.5. & CAN/CSA-C282 - Emergency power systems shall be inspected, tested and maintained in conformance with the reference above, "Emergency Electrical Power Supply for Buildings". Liquid fuel storage tanks shall be drained and refilled with fresh fuel at intervals not greater than 12 months if through regular testing, the fuel cannot be depleted more than 50% of its volume.

**6.2.2 Emergency Lighting and Unit Equipment** - The purpose for emergency lighting is to provide illumination or lighting when normal power is interrupted. Emergency lighting can be provided through a network of fixtures connected to the emergency electrical power supply from a generator. Where generators are not provided, emergency lighting is provided by means of battery powered unit equipment.

**Reference:** NFC, Division B, Part 6.5.1.6 - Self-contained emergency lighting units shall be inspected at intervals no greater than one month to ensure that the pilot lights are functioning and not obviously damaged or obstructed. Units shall be tested at intervals not greater than 12 months to ensure that the emergency lights will function upon failure of the primary power supply for a duration equal to the design criteria under simulated power failure conditions. After completion of this test, the charging condition for voltage and current and the recovery period shall be tested to ensure that the charging system is functioning correctly.

Except for unit equipment requirements above, emergency lighting supplied with power from an emergency generator shall be inspected at intervals not greater than 12 months to ensure that they are functional and provide a minimum lighting level of 10 lux in all egress routes.

**6.2.3 Exit Lighting Equipment** - The primary purpose of exit signs is to give building occupants the information they would not otherwise have to help them quickly identify the location of the nearest emergency exit and find their way outside safely.

**Reference:** NFC, Division B, Part 2.7.3.1 - Exit lighting and exit signs shall be provided in buildings in conformance with the NBC. Exit lighting and exit signs shall be illuminated at all times when the building is occupied.

### **6.3 FIRE ALARM & VOICE COMMUNICATION SYSTEMS**

*The purpose of a fire alarm system is to alert building occupants or fire authorities of the detection of such products of combustion or fire and alert or dispatch fire department personnel and/or apparatus to the incident. A fire alarm system is a system of detection devices, wiring, and supervisory equipment used for detecting a fire condition or products of combustion. The type of system installed in any given occupancy depends on the level of the life safety hazard, structural features and/or size of the building.*

**6.3.1 System Control Unit** - The system control unit is essentially the brain of the system. This unit is responsible for processing alarm signals from the initiating devices and transmitting them to the local or other signalling systems. The system control panel is often referred to as the fire alarm panel, annunciator panel or combination control annunciator panel. All the controls and testing devices are located in the system control unit.

**Reference:** NFC, Division B, Part 6.3 - All fire alarm systems and components shall be designed and installed in accordance with CAN/ULC-S524-05 "Standard for the Installation of Fire Alarm Systems". The maintenance, testing and inspection of fire alarm systems shall be in conformance with CAN/ULC-536-97 "Standard for the Inspection and Testing of Fire Alarm Systems", and Treasury Board Secretariat, OSH Directives, Chapter 3-4 "Standards for Fire Alarms". Records shall be kept of all maintenance procedures, tests and inspections for a period of two years for examination by the authority having jurisdiction.

**6.3.2 Initiating Devices** - Initiating devices are the manual and automatic devices that are either activated or that sense the presence of fire and then send an appropriate signal to the system control unit. Initiating devices include manual pull stations, heat detectors, smoke detectors, flame detectors, and combination devices.

**Reference:** See System Control Unit section above.

**6.3.3 Alarms and Signaling Devices** - The purpose of a signaling system is to give early warning of a fire. Signaling systems vary from very simple to the complex. A simple system may only sound a local evacuation alarm, whereas a complex system may sound a local alarm, control building services, and notify outside agencies to respond.

**Reference:** See System Control Unit section above.

**6.4 PORTABLE FIRE EXTINGUISHERS** - The most common fire protection device is the portable fire extinguisher. No portable fire extinguisher is suitable for use on all fires. Portable fire extinguishers are designated with a class or classes of fires they are designed to control. Fire extinguishers shall be selected and installed in conformance with NFPA 10, as prescribed by the references below.

**Reference:** NFC, Division B, Part 6.2 - Fire extinguishers are provided according to the building's anticipated hazards, based on the normal occupancy type and ordinary hazards. Each portable extinguisher shall have a tag securely attached to it showing the maintenance or recharging date, the service agency and the signature of the person who

performed the service. All fire extinguishing units shall be affixed with a label indicating the month and year the hydrostatic pressure test was performed and including the test pressure used and the name of the person or agency performing the test.

## **6.5 SPECIAL FIRE SUPPRESSION SYSTEMS**

**6.5.1 Wet Chemical Extinguishing Systems** - A wet chemical system is best suited for applications in commercial cooking range hoods, plenum, ducts and associated cooking appliances. It is an excellent extinguishing agent for fires involving a flammable liquid, gas, or ordinary combustibles such as paper and wood; however, it is most effective on fires caused by cooking hazards.

**Reference:** NFC, Division B, Part 2.1.3.5, 6.6 & NFPA 17A - Local application systems shall be designed, installed, tested, and maintained in accordance with the references above. Only properly trained and qualified persons should perform servicing, testing and inspection of these systems.

## **7.0 FIRE EMERGENCY SYSTEMS IN HIGH BUILDINGS**

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation as applicable to the inspection, testing and maintenance of the fire emergency systems installed in high buildings as described by the National Building Code.*

**7.1 VERTICAL TRANSPORTATION DEVICES** - Elevators safely serve the purpose for which they were designed under normal conditions. There are concerns, however, about the use of elevators by building occupants during fire-emergency conditions. Persons using an elevator can be exposed to excessive heat, smoke and toxic gases if an elevator cab stops at a floor on which fire is present. Also, elevator shafts tend to act as chimneys through which smoke, heat and toxic gases can rise. It is due to these conditions that most elevating devices are programmed or designed to become inoperable or return to the main floor and park allowing passengers to exit, and then the doors will close, preventing re-entry. Elevators installed in high-rise facilities are designed with additional emergency service features to minimize or mitigate these risks. Although these features are primarily designed for high-rise elevators, they are not restricted for this use and may be observed in low-rise or two-stop elevators.

**Reference:** NFC, Division B, Part 7.2.2., COSHR Part IV & CSA B44 - In addition to the legislated annual inspection described below, where emergency service features for elevators are present, they shall be tested to ensure that they operate in conformance with appropriate provincial, territorial or municipal requirements or, in the absence of such requirements, in conformance with CAN/CSA B44 "Safety Code for Elevators". Every elevating device and every safety device attached thereto shall be inspected and tested by a qualified person once every 12 months in accordance with Canadian Occupational Safety and Health Regulations, Part IV.

## 8.0 OTHER LEGISLATIVE REQUIREMENTS & SAFETY DEVICES

*This part provides information on the level of conformity to the National Fire Code and other Federal legislation pertaining to occupational health and safety requirements in regards to the safe occupancy of a building, and inspection, testing and maintenance of other safety equipment.*

**8.1 FIXED PLUMBED EMERGENCY SHOWERS/EYEWASH STATIONS** - Emergency showers and eyewash stations provide on-the-spot decontamination. They allow workers to flush away hazardous substances that can cause injury. The first 10 to 15 seconds after exposure to a hazardous substance, especially a corrosive substance, are critical. Delaying treatment, even for a few seconds, may cause serious injury. Accidental chemical exposures can still occur even with good engineering controls and safety precautions. As a result, it is essential to look beyond the use of goggles, face shields, and procedures for using personal protective equipment. Emergency showers and eyewash stations are a necessary backup to minimize the effects of accidental exposure to chemicals.

**Reference:** ANSI Standard Z358.1-1998 - Currently, there is no Canadian standard for the design or placement of eyewash stations or emergency showers. As a result, the American National Standards Institute (ANSI) Standard Z358.1-1998 "Emergency Eyewash and Shower Equipment" is generally used as a guide.

END.