

# **Fort Edmonton Park Repository: Functional Program**

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## 1.0 INTRODUCTION

### 1.1 Project Background

The City of Edmonton maintains a collection of approximately 90,000 historic artifacts related to the founding and development of Edmonton. These artifacts date back to the first half of the twentieth century and range from household accessories to vehicles. The majority of the City's artifacts are stored at the Edmonton Artifact Centre, a portion of a re-purposed brewery known as the O'Keefe Building. A large portion of the City's collections can also be found at Fort Edmonton Park, where they are on display in historic homes and used to animate the living history village.

In 2008, the City created the *Art of Living Cultural Plan* to secure and support the future of arts and heritage in Edmonton, as well as to bolster the City's creative potential. Among the recommendations of the Cultural Plan was the need to prepare for the future needs and best public use of the City's historical collections. The Cultural Plan highlighted the need to revitalize or relocate the Artifact Centre at the O'Keefe Building, determine a new collections management approach for the artifacts at the O'Keefe Building, and support the development of a City Museum. The Cultural Plan also recommended the need to provide adequate resources for the future storage and program needs of the City Archives that is facing a lack of archival storage space at its current location.

In 2010, the City commissioned Lundholm Associates Architects in association with Catherine C. Cole Associates to complete a collection storage strategy report for the City collections at the Artifact Centre, Fort Edmonton Park, as well as the City Archives. The study included an overview assessment of the City's artifact collection, an assessment of additional relevant collections, and an analysis of the Artifact Centre's potential as a collection storage facility. The study also calculated the requirements of the City Archives, including archival storage and related collection functions at an off-site storage facility. Included in the study was a general review of the City's public art collection, to determine if there could be efficient sharing of resources in a City collection storage strategy. This information was then consolidated into a proposed collection strategy with both short and long term collection storage recommendations.

The *Developing and Preserving Edmonton's Historical Collections: Artifact Centre and Archives Strategy* study found that the Artifact Centre did not provide adequate housing for the City's collections and recommended that the City construct two collection storage facilities to replace the current Edmonton Artifact Centre: one primary professional collection storage facility to house the majority of artifacts in the City's collection, and a secondary facility to house less vulnerable artifacts currently relevant to Fort Edmonton Park.

The primary City Collection Repository would provide professional museum standard collection storage, as well as collection related functions such as shipping / receiving, collection processing areas, and administrative space. The City Collection Repository would also house an off-site storage facility for the City Archives and accommodate the conservation requirements of the Public Art program of the Edmonton Arts Council.

## 1.0 INTRODUCTION

The Fort Edmonton Park Collection Repository would house collection objects in use at the Park, as well as minimal collection workspaces. The facility is intended to meet requirements to house and preserve the collection, however, it is not intended to equal the sophistication of the City Collection Repository. Vulnerable objects related to FEP would remain at the City Collection Repository.

This Functional Program for the Fort Edmonton Park Collection Repository carries forward the work of the previous study. As the next step in the Edmonton Collections Repositories projects, the City commissioned Lundholm Associates Architects to create a complete Functional Program for the collection storage facility at Fort Edmonton Park. This Functional Program is intended to translate and articulate, in spatial and technical language, the needs and aspirations of the City of Edmonton for the new Fort Edmonton Park Repository (FEPR). A separate document defines the requirements for the new City Collection Repository (CCR).



## 1.2 Scope of Functional Program

The *Fort Edmonton Park Repository Functional Program* attempts to provide a comprehensive understanding of the required collection storage building, including the facilities needed to house and preserve the City's collection at Fort Edmonton Park, minimal additional facilities for collection-related functions, and the resulting overall spatial requirements. A separate document defines the requirement for the primary City Collection Repository. The document addresses both subjective and objective design criteria and processes, from general principals to specific details. The objective of the Functional Program is to present, in one consolidated and concise source, all the original input to the design process from the project Steering Committee and representatives from the Edmonton Artifact Centre. The Functional Program presents the requirements for the new repository in a generic manner, applicable to any design and construction methodology, including phased construction. The principle is to provide as thorough a briefing on the project requirements as possible without limiting the potential design solutions.

The Functional Program presents the requirements for the building project and defines the institutional values, which should guide the design process. There are four primary uses for the document:

- 1) Definition of the design requirements
- 2) Guidelines for user analysis of the development and design proposals
- 3) Justification to approving agencies and sponsors
- 4) Control of the project content throughout the duration of the project

The need to provide reliable and appropriate conditions for the City's artifact collections at Fort Edmonton Park is emphasized through the principles of preventive conservation. The preservation of the collections is the most critical factor governing the technical design of the repository building. The building must provide a suitable environment and the means to maintain it, to enable the City to ensure its collections are preserved for future uses.

## 1.0 INTRODUCTION

### **1.3 Structure of Functional Program**

The Functional Program is organized into the following chapters:

#### ***Introduction***

A brief summary of all contextual aspects that have prompted the City of Edmonton to undertake this project, including a brief description of the City's collections and their current housing. This chapter will also outline the structure and methodology of the Functional Program document.

#### ***Project Objectives***

This chapter includes an overview of the requirements for a collection storage facility, as well as the rationale for the Fort Edmonton Park Repository. It also includes the rationale for the primary City Collection Repository for reference, and summarizes the intended relationship between the two facilities.

#### ***General Requirements***

The General Requirements chapter provides an outline of the functional model for the repository, functional diagrams of particular aspects of the facility, the overall functional and spatial requirements for the project, and a detailed space list.

#### ***Functional Group Requirements***

This chapter describes the specific functional requirements for each of the three functional groups in the project. Each group includes an introduction, which outlines the functions included in the group, with a series of subgroup sections as outlined in the space list. In each subgroup section, a detailed description of the function and users is included, as well as information on the desired proximity and adjacency requirements. Finally each subgroup contains qualitative criteria, which describes the general qualities and character that the spaces should have.

#### ***Preventative Conservation Criteria***

Preventative conservation requirements outline the environmental factors that need to be considered to safely house the City's collection within the FEP Repository. These requirements are intended to reduce further deterioration to artifacts and archival documents, as well as maintain each artifact's current state.

#### ***Technical Criteria***

The technical requirements needed for a collection facility are described here, following the traditional architectural and engineering disciplines. This chapter consists of interpretation of the functional, museological, and archival requirements in terms of building fabric and systems that pertain specifically to collection storage facilities.

#### ***Unit Space Requirements***

Detailed information and technical design criteria for each individual space identified in the space list are found here.

## 1.4 Methodology

The *Fort Edmonton Park Repository Functional Program* has been prepared using the following methodology:

A review of the previous *Developing and Preserving Edmonton's Historical Collections: Artifact Centre and Archives Strategy 2010* study was carried out to determine how the proposed changes to collection management, organization, and development will impact and guide the design of the collection. The previous study was also used as a guide to ensure the Functional Program carries forward the previously established project principles. Finally, the implications of creating two complementary collection facilities were reviewed and further tested through consultation with the Steering Committee.

Further user consultation with the EAC staff was carried out to determine in greater detail the spatial and functional requirements for the facility.

These requirements were then consolidated in the Functional Program document and articulated in the space list, functional model, and technical criteria. This information was presented to the Steering Committee and relevant stakeholders for review.

The information collected and the decisions made during the course of the study were once again consolidated into a final detailed space requirement for the collection repository with specific design criteria for each required space.

The area calculations for the City collection storage at FEP have been based on general estimates from a knowledgeable curator who performed the overview collection assessment in the previous collection strategy study. These estimates are dependant on a consistent operational model for the Park in the future, in which current City collection artifacts would continue to support programming at the Park. Should Fort Edmonton Park require different types and numbers of artifacts, the storage requirements of the City collection at the Park would need to be revisited. Nevertheless, the facility defined in this document is quite adaptable to future developments that might occur at FEP.

As well, if significant time elapses between this Functional Program document and implementation of the repository building project, the requirements and assumptions that guided the facility and its spatial requirements could require updating, and at the very least should be confirmed prior to beginning the design project.



## **2.0 PROJECT OBJECTIVES**

### **2.1 Nature of a Collection Storage Repository**

Collection care and preservation is the core function of a collection storage repository. The fact that material culture survives as well as it does is a tribute to the museums, heritage organizations, and archives that have taken the long-term preservation of their collections seriously. Collection storage for long-term preservation presents many challenges and the City of Edmonton Artifact Collection presents some unique problems that place particular demands on the design of the FEP collection facility.

A collection repository provides a proper storage space for the objects and documents in a collection. It is not a simple warehouse. Items stored in the facility include artifacts made up of a wide range of materials including: metals, wood, ceramics, glass, and synthetic materials. The City's collections include a full range of artifacts found in any historical collection, but also objects that are very large and frequently very heavy. These artifacts vary in shape and size and therefore need a variety of storage configurations. The artifacts are typically held in storage until they are moved for purposes such as display, loan to another institution, research, or conservation. Artifacts must be easily accessible for inspection, display preparation, and research, with as little movement as possible. Although typically organized by curatorial categories, environmental requirements and the configuration of the artifacts are often a more suitable basis for the organization of objects.

Collection repositories may also provide space for activities concerning the processing, preservation, and caretaking of collections. Workrooms are placed outside the collection storage areas to reduce risks to the collections. The related functions include registration, conservation, inspection, quarantine, treatment for contamination, and shipping / receiving.

## 2.0 PROJECT OBJECTIVES

### 2.2 Objectives for the Fort Edmonton Park Repository

The current primary storage facility for the City of Edmonton's collection is the Edmonton Artifact Centre (EAC) with additional collections housed at Fort Edmonton Park (FEP). Approximately 25% of the City's collection can be found on display or in use at FEP. The artifacts at the Park range from household items used to decorate historic homes, to functioning vehicles used by visitors and operated by costumed interpreters. The previous Collection Storage Strategy study conducted an assessment of the storage conditions at FEP to determine if the collection artifacts were in jeopardy. The study found that the Park does not provide adequate security or storage for the collection and recommended providing a new facility, located at the Park, to house those City collection materials that support FEP. The following highlights some of the specific planning and design objectives for the new FEP Repository:

#### ***Objective 1: Preservation and Security of the City Collection Artifacts in Use at the Park***

The Fort Edmonton Park Repository will house collection objects relevant to the Park, as well as minimal collection workspaces. The facility is intended to meet requirements to house, secure, and preserve the collection, but it is not intended to equal the sophistication of the City Collection Repository that will house the majority of the City's collection on a different site. It will also provide seasonal storage for some objects used in programs during the summer. Any FEP materials that require special conditions will be located at the main City Collection Repository. The FEP Repository is primarily a storage facility as all required collection-processing functions have been provided for at the new CCR or can be found in existing facilities at the Park.

#### ***Objective 2: Increase the Efficiency of the City's Collection Management Operations***

A purpose-built collection repository at FEP will not only aid in the preservation and security of the City's artifacts, it will also increase the efficiency of the City's collection management operations. Many of the artifacts in use at the Park are large in scale, such as rolling stock: wheeled and track-based vehicles, and agricultural equipment, that would be more efficiently stored in a collection repository at the Park rather than moved back and forth from the City Collection Repository. The City Repository will likely be a distance away from the Park and moving the many large artifacts between the two locations would be a significant drain on the City's resources. The FEP Repository will also be appropriately sized to accommodate large sized artifacts, with drive-in access for vehicles, a small workshop for preparation, and appropriate storage for heavy objects. This eliminates the need to provide this type of access at the City Repository. As the FEP Repository will be a support function, it will not require public access, significant administration facilities, or collection-related functions.

#### ***Objective 3: Provide a Facility that will Maintain the Historical Accuracy of FEP***

Fort Edmonton Park functions as a living history museum that provides visitors with the opportunity to view and interact with original artifacts that represent the history of Edmonton from 1846 to 1929. In this context, the need for the new FEP Repository to blend in with the historic environment of the Park is an important design consideration. With some consideration, it is very possible for the building to have an outward appearance of a period piece of architecture or a neutral background piece, or be sited out of public view, but function as a proper collection repository to house artifacts.

### **2.3 Objectives for the City Collections Repository**

*(for reference – full requirements for the CCR Repository are presented in a separate document)*

As previously stated, the current primary storage facility for the City of Edmonton's collection is the Edmonton Artifact Centre (EAC) – a portion of the O'Keefe Building. The previous collection storage strategy report included a building assessment of the O'Keefe Building to determine its ability to house the City's artifact collection. The report found the facility was inadequate for storing the collection and recommended provision of a new facility rather than investing in upgrading the current facility. The new facility would replace the existing function of the EAC on a yet to be determined site and include collection storage, collection processing functions, and administrative facilities. The following highlights some of the specific planning and design objectives for the new collection repository:

#### ***Objective 1: Care and Security of the Majority of Artifacts in the City Collection***

The current City collection storage facility does not provide adequate conditions in either quantitative or qualitative terms. It is the primary objective of the City to provide a professional building that will enable the majority of the City's collection to be preserved in museum-standard storage spaces with environmental control, fire protection, and security.

The importance of providing reliable and appropriate environments for the artifact collection cannot be overstated. The preservation of the collections, as part of the heritage of future generations, is the single most critical objective of the collection repository project.

Consolidating the City's collections into specific storage areas, separate from other collection functions, will improve security standards and allow light, temperature, relative humidity, and air quality to be controlled. Access to the collection will be strictly controlled and facilitated by appropriately planned circulation routes and collection moving equipment.

The intention is for the majority of artifacts in the City's collection to be held in storage at the new City Collection Repository (CCR). Those artifacts deemed suitably robust and relevant to the operations at Fort Edmonton Park (FEP), and also oversized and difficult to transport, will be stored at a purpose-built repository at the Park. Further discussion of the FEP Repository will follow this section.

#### ***Objective 2: Housing of the City Collection Processing Functions***

In addition to providing adequate storage space for the City's artifact collection, the future City Collection Repository will also include efficient space for other collection-related functions such as assessment, registration, conservation, and documentation. Proper spaces for corresponding offices and workspaces for each function are part of the Functional Program. The location of each group of functions will depend on their relationship to the process of collections management, and proximity to publicly accessible areas. Shared spaces such as meeting rooms, washrooms, change rooms, and kitchens are also a part of the functional model.

## 2.0 PROJECT OBJECTIVES

### ***Objective 3: Accommodating Complementary Organizations – City Archives and Edmonton Public Art***

Concurrent with the needs of the City Artifact Collection are the needs of the City Archives for additional off-site storage space and the needs of Edmonton Arts Council for Public Art conservation facilities. As both these organizations have complementary functions to the City collection caretaking, the previous Collection Strategy Report proposed the sharing of a number of facilities within the new City Collection Repository. The City Artifact Collection will be the primary user of the building, with additional archival storage space and archival operations spaces for use by the City Archives. Edmonton Public Art will share conservation facilities with the City Artifact Collection and the facility will provide a temporary holding space for the Edmonton Public Art collection. All the organizations will share the collection truck bay, shipping and receiving room, a central lobby, and staff support spaces such as meeting rooms, lunch rooms, and washrooms.

### ***Objective 4: Professional Standards***

The new City Collection Repository intends to provide a facility that supports the responsibility and professionalism of the City collection management in all aspects. The City intends to equip the Repository with proper environmental controls, fire protection, security, collection management and collection handling facilities, create conditions to national standards for collection conservation, and ensure that spaces for collection circulation have the capacity and equipment to handle oversized objects. The facility will also provide adequate storage capacity for future collection development. Administrative and office facilities for a developed staffing complement to manage the collection will also be provided.

### ***Objective 5: Building Quality***

The building project should deliver a facility whose building envelope, systems, and architectural detailing are appropriate for the long-term function of a collection storage repository. A building for which proper building science, life-cycle cost effectiveness, ease of maintenance, sustainable design, flexibility for future updating, high-level construction workmanship, and all aspects of safety and health standards are carefully considered.

### ***Objective 6: Future Needs and Development of the City Collection as well as the future City Museum***

In creating the Collection Repository, the City has considered the future redevelopment of the City Artifact Collection, the proposed future City Museum, and the advancement of collection management and related technology in the future. The building project will provide the necessary architectural flexibility and adaptability to accommodate changes to the collection, staffing, and technological requirements as best as possible. As well, the City intends to create a facility that in the future could support a museum dedicated to the City of Edmonton.



### **3.0 GENERAL REQUIREMENTS**

#### **3.1 Functional Model**

This chapter of the Functional Program provides a functional model outlining the general requirements for the new Fort Edmonton Park Repository. The model is described in four sections: an overall functional diagram, functional group requirements, a space requirements summary, and a detailed space list.

The functional diagram is provided to illustrate the ordering design principles, relative sizes, and adjacencies of the facility's spatial requirements. This diagram presents an ideal condition and the target relationships for the facility. It emphasizes major spatial relationships, hierarchies of access, and dominant circulation routes. This overall diagram also illustrates the required spaces for the complete collection facility.

General functional descriptions provide a written overview of the facility needs and organizational activities for each major functional area of the FEP Repository.

The space requirements summary and detailed space list provide a tabulation of the total net area for the new building, as well as an individual name, number, and area requirement for each required space. Net functional area is defined as true net space devoted to each function, measured to the inside face of defining partitions or boundaries: otherwise no circulation, building structure, or building service space is counted as functional area.

### 3.0 GENERAL REQUIREMENTS

#### 3.2 Functional Diagram

This section of the Functional Program identifies the ideal conceptual relationship between the various functions, circulation, and relationships with key points of access to the building and other external factors. This is presented in the overall functional diagram that follows.

There are several organizing principles that guide the grouping and placement of functions in the Fort Edmonton Park Repository. The key principals are as follows:

The FEP Repository is primarily a storage facility: there are no designated public functions within the building. The main entrance will be for staff access and will lead directly to the general office. The general office will provide City collection personnel with access to a staff washroom, staff circulation, and the collection circulation corridor.

The movement of collection artifacts and documents drives the spatial organization of the facility. A covered exterior truck access, at which trucks back up to an overhead door, is used for collection movement in and out of the building. The truck position is weather protected by the overhead canopy. The truck access is flush with the ground floor and a hydraulic lift is positioned just inside the access door to facilitate safe off loading. This entrance is also used for the movement of vehicles on their own wheels directly into the shipping / receiving room.

The shipping / receiving room is dedicated to the movement of artifacts delivered in trucks, as well as wheeled vehicles and farm equipment that will be driven or towed into the Repository. The floor of the shipping / receiving room is flush with grade and provides a hydraulic lift that will meet truck beds at the access door. The shipping / receiving room will open onto the main collection circulation corridor and provide direct access to the rolling stock collection storage area.

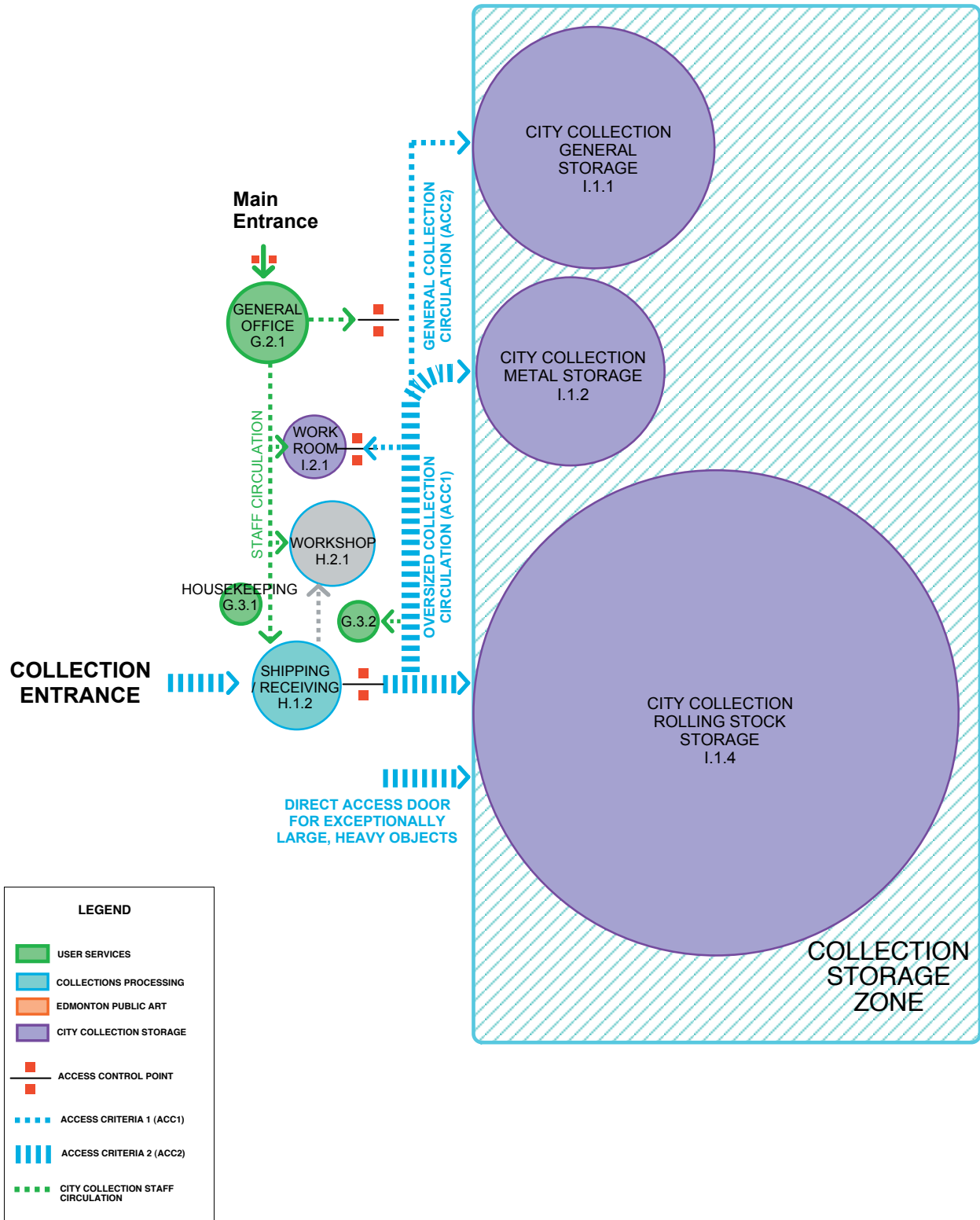
The truck access door and shipping / receiving room will collectively function as the 'collection gateway' within the Repository. An additional exterior overhead door into the rolling stock collection storage vault has been provided to allow direct access into this space for the rare exceptionally large and heavy collection objects. All non-collection shipping / receiving, such as garbage and recycling will occur at a separate entrance.

In close proximity to the shipping / receiving room is a modest preparation workshop for the FEP City collection. The workshop will not contain collections and will serve as a carpentry workshop for collection related fabrication.

The FEP City collections are stored in a number of collection 'vaults' that have a specialized collection environment, fire protection, security, and storage equipment that corresponds to the material in storage. Access to the collection vaults is strictly controlled and separate from the main staff circulation.

In order to minimize the time staff spend in the collection vaults, or access to the vaults by visiting researchers, there is a dedicated collection workroom provided that allows for long term study of collections. Access to this space must be strictly controlled.

**Fort Edmonton Park Repository Overall Functional Diagram**



### 3.0 GENERAL REQUIREMENTS

#### 3.3 Functional Group Descriptions

In order to clarify the functional operations to be accommodated in the new Fort Edmonton Park Repository, a list of required spaces for all activities was compiled. Spaces were then grouped into three functional categories: User Services, Collection Processing, and FEP Collection Storage. Listed below are the functional categories for both the City collection repositories. Groups A to F are the functional space groups found in the main City Collection Repository (listed here for reference). Groups G to I list the functional spaces that are found in the Fort Edmonton Park Repository.

Group A: Public Access	(relates to the CCR facility)
Group B: Collection Processing	(relates to the CCR facility)
Group C: City Collections Storage	(relates to the CCR facility)
Group D: Administration / Operations	(relates to the CCR facility)
Group E: Archival Operations	(relates to the CCR facility)
Group F: Archival Records Storage	(relates to the CCR facility)
Group G: User Services	
Group H: Collection Processing	
Group I: FEP Collection Storage	

This section presents the specific functional requirements for the three space groups in the Repository. Each group and sub-group is described with a brief explanation of the overall function and character of the space group, as well as the requirements of the individual spaces. A summary of area requirements can be found in following section 3.4. Unit space sheets for each space are found in Chapter 6.0 of this Functional Program.

#### **Group G: User Services**

The new FEPR is entirely a non-public facility. The primary users include City collection staff such as curators, conservators, and interns. The facility will have one staff entrance that will lead directly to the main staff office and provide access to a staff washroom. The office will provide workstations for computers and printers, telephone and internet access, and storage for files directly related to the Repository. This office is intended to be an itinerant workspace because the majority of administrative functions, records, and files related to the City's collections and the permanent staff offices will be housed at the main CCR facility.

Group G consists of two sub-groups: G.1 Arrival, and G.2 Administrative Facilities.

#### ***Subgroup G.1: Arrival***

##### *Vestibule*

The main access point for users at the FEP Repository is the vestibule that leads to the staff general office. The vestibule provides a secure point of access to the facility for authorized staff.

##### *Washrooms*

A set of staff washrooms should be placed adjacent to the general office and easily identifiable from the main entrance. Accessibility must conform to the Alberta Building Code.

***Subgroup G.2: Administrative Facilities******General Office***

The general office will provide an open area for approximately three staff members. As most staff will work primarily at the main CCR facility, this office is only for occasional use when staff is working directly with the FEP collection at the Park. This open office should be pleasant and comfortable and natural light is preferred. Workstations should reflect the latest ergonomic and supportive practice for open office design. An informal meeting space should be included.

This office will also require space for filing, office supplies storage, and office equipment.

**Group H: Collections Processing**

This functional group encompasses the operations responsible for the physical care, handling, and storage of City artifacts. Activities in this category include documentation, evaluation, conservation, and shipping / receiving. This area is entirely off-limits to the public.

To ensure the safe movement of large collection objects, it is crucial for the circulation spaces in this group to meet the access criteria defined in Chapter 6.0 Unit Space Requirements.

***Subgroup H.1: Shipping / Receiving***

The shipping / receiving areas will process all incoming and outgoing shipments of collection artifacts, archival documents, public art works, office supplies, and conservation equipment and supplies. The shipping / receiving areas should be utilitarian, but of light coloured, high quality finishes, with special attention to the facilitation of housekeeping to minimize contamination risks.

***Truck Loading Area***

A protected exterior overhead door will provide access for trucks to deliver and pick up collection artifacts and related materials. All incoming and outgoing artifacts, collection materials, and collection-related goods would enter and exit the building via this door. The access door will require an exterior canopy that extends at least 3.0 meters from the building face. The grade of the truck access point should be flush with the floor of the shipping / receiving room to allow wheeled vehicles to be driven into the shipping / receiving room. A hydraulic lift inside the access door will meet various levels of trailer truck beds arriving at the access door. The lift will remain flush with the floor of the shipping / receiving room when not in use. A trench drain should be installed at the entrance to the access door to prevent water from entering into the shipping / receiving room.

***Shipping / Receiving Room***

All collections entering or leaving the Repository will require a clean, safe, secure, environmentally controlled room for shipping and receiving. It will contain a hydraulic platform at the door of the truck access point to handle the height difference between the truck bay floor and the variable truck bed heights. The size of the lifting device should be (W x D) 3.048 m x 4.879 m or 10' x 16'. The lift in its lowered position must be flush with the floor with a load capacity of 4,545 kg (10,000 lbs). The impact of wheeled vehicles passing over the lift will also have to be allowed for.

### 3.0 GENERAL REQUIREMENTS

Once the access door is closed, collection materials will be allowed to recover normal temperature in the shipping / receiving room and then be moved into the appropriate collection storage area. The doorway between the truck dock and the shipping / receiving room, as well as the door between the shipping / receiving room and the collection circulation corridor, should be sized as defined in the Unit Space sheets.

#### ***Subgroup H.2: Preparation***

The preparation subgroup at FEP includes a preparation workshop for carpentry requirements at the Park.

##### *Preparation Workshop*

The preparation workshop is involved in collection-related fabrication. The preparation workshop will house the usual tools and equipment associated with rough and finished woodworking. It will require a saw dust removal system as well as ambient air filtration. Shop equipment will require power supply to suit specialized equipment. Proper ventilation and other safety requirements must be met to ensure a high level of compliance with codes and regulations for workplace health and safety.

#### **Group I: FEP Collections Storage**

The collection storage functional group includes those spaces where the City will store its artifact collection at the FEP Repository. The purpose of the collection storage is to provide a secure and safe environment to preserve the artifacts. The collection storage facilities at the Park Repository consist of a general collection vault, a metals storage vault, and a rolling stock storage vault. Each vault has distinct requirements for environmental control and storage equipment, depending on the specific materials stored.

It is ideal to have all collection storage vaults consolidated in one area of the building for efficiency and security. If it is necessary to have the collection spaces on more than one level, they should be vertically aligned with a freight elevator serving each area. The size and load capacity of the freight elevators must be determined by the largest and heaviest objects that would be stored on the upper level. All collection vaults and collection workrooms must be clean, secure, and meet the collection access requirements. Doors for vaults must be sized according to the access requirements listed in the Unit Space sheets.

Collection storage spaces must be easy to clean and maintain without the risk of contaminating the artifacts. Mechanical equipment that poses the risk of water leakage or requires maintenance access must be kept away from collection storage.

These spaces are primarily accessed by staff, including conservators and curators, volunteers, and interns. Access to these spaces will be strictly monitored for security reasons.

***Subgroup I.1: FEP Collection Storage***

The proposed collection housing categories are as follows:

***General Collections Storage***

The small portion of the City's general artifact collection that is frequently in use at Fort Edmonton Park will be stored in this collection vault. These artifacts can be stored primarily on utility shelving.

***Metals Storage (includes I.1.4 Allowance for Metal Farm Equipment)***

This storage area houses metal artifacts from the City artifact collection that are frequently relevant to operations at the Park. There is also an area allowance for the metal farm equipment currently stored outdoors at the Park. These collections are usually heavy and large in size and would typically require specialized moving equipment to be moved from one area to another. These artifacts require heavy-duty rack shelving for storage.

***Rolling Stock Storage***

This category of storage refers to City collection artifacts on wheels, such as cars, trucks, farm equipment, and carriages. These artifacts are frequently large, heavy, and have demanding circulation and turning radii requirements. They are typically stored on the floor of the storage area, and smaller items can be stacked if specialized storage equipment is provided. The rolling stock storage area will require an separate exterior overhead access door to allow extremely large collection objects direct access to the storage space. The height and width requirements for this space should be verified during the design phase to ensure it will accommodate the largest possible wheeled collection artifacts.

***Subgroup I.2: Collection Workspace***

In addition to collection storage, a collection storage workroom has been provided for the improved security and safety of the artifact collections. Extended study or treatment is not encouraged within collection storage spaces. A collection workspace is provided as a secure area for researchers and staff to work with individual artifacts. Collection workrooms must be climate controlled, with appropriate relative humidity and temperature for the types of objects being examined. Workrooms should be adjacent to collection storage spaces to reduce handling and movement of objects.

***Collection Workroom***

The intention is to provide one workroom strategically located adjacent to the general collection storage space. This is a utilitarian space that must be easy to clean and designed to aid the ease and safety of movement of collection objects. Doors and circulation spaces must allow for easy movement of large objects. The workroom will provide computer terminal access, a layout table for artifacts, and house a washer / dryer exclusively for the City artifacts at FEP. The collection workroom will be highly secured with limited access.

3.0 GENERAL REQUIREMENTS

3.4 Space Requirements Summary

		PROPOSED SPATIAL REQUIREMENTS	
SPACE GROUP			
	Sub-Group	sm	sf
SUMMARY:			
FEP COLLECTION REPOSITORY:			
G	User Services	76.6	825
H	Collections Processing	111.5	1,200
I	FEP Collections Storage	1,371.3	14,760
<b>TOTAL FEP REPOSITORY (NET AREA)</b>		<b>1,539.3</b>	<b>16,785</b>

NET AREA

**All area figures express net functional area: true net space devoted to each function measured to inside face of defining partitions or boundaries.** Internal circulation within exhibition spaces and aisles / maneuvering space in collection storage spaces are counted as part of the functional area. Otherwise no circulation, building structure, or building service space is counted as functional area.

GROSS AREA PROJECTION

Gross area is the total size of the building measured to the outside of the exterior walls and is used in estimating building cost. Gross area is only determined accurately through building design. For collection storage facilities, the gross area usually falls in the range between 1.3 and 1.7 times the net area. This project has a high requirement for space for mechanical and electrical systems, which will tend to increase the gross area. On the other hand, the largest areas in the project are collection storage spaces with a simple circulation system proposed. This simplicity will tend to make the gross to net ratio lower. With all factors considered, and with careful discipline over the design, the gross to net ratio can probably be kept to 1.35:1.0. **The projected gross area based on the current program of net space is therefore 2,105 sm / 22,660 sf.**



**3.5 Detailed Space Requirements List by Functional Group**

				PROPOSED SPATIAL REQUIREMENTS	
SPACE GROUP					
	Sub-Group			sm	sf
<b>G</b>	<b>USER SERVICES</b>				
<b>G</b>	<b>.1</b>	<b>Main Entrance</b>			
G	.1	.1	Vestibule	<b>4.6</b>	50
G	.1	.2	Washrooms	<b>as required</b>	as required
<i>Subtotal Sub-Group G.1</i>				<b>4.6</b>	<b>50</b>
<b>G</b>	<b>.2</b>	<b>Administrative Facilities</b>			
G	.2	.1	General Office	<b>46.5</b>	500
<i>Subtotal Sub-Group G.2</i>				<b>46.5</b>	<b>500</b>
<b>G</b>	<b>.3</b>	<b>Building Operations</b>			
G	.3	.1	Housekeeping	18.5	200
G	.3	.2	Emergency Response Supply Room	7.0	75
<i>Subtotal Sub-Group G.3</i>				<b>25.5</b>	<b>275</b>
<b>TOTAL GROUP G: USER SERVICES</b>				<b>76.6</b>	<b>825</b>
<b>H COLLECTION PROCESSING</b>					
<b>H</b>	<b>.1</b>	<b>Shipping / Receiving</b>			
H	.1	.1	Truck Access	<b>0.0</b>	0.0
H	.1	.2	Shipping / Receiving Room	<b>55.7</b>	600
<i>Subtotal Sub-Group H.1</i>				<b>55.7</b>	<b>600</b>
<b>H</b>	<b>.2</b>	<b>Preparation</b>			
H	.2	.1	Preparation Workshop	<b>55.7</b>	600
<i>Subtotal Sub-Group H.2</i>				<b>55.7</b>	<b>600</b>
<b>TOTAL GROUP H: COLLECTION PROCESSING</b>				<b>111.5</b>	<b>1,200</b>

3.0 GENERAL REQUIREMENTS

SPACE GROUP					
Sub-Group				sm	sf
<b>I</b>	<b>FEP COLLECTIONS STORAGE</b>				
<b>I</b>	<b>.1</b>		<b>FEP Collection Storage</b>		
I	.1	.1	General Collection	<b>180.6</b>	1,944
I	.1	.2	Metals Collection	<b>233.9</b>	2,517
I	.1	.3	Rolling Stock Collection	<b>929.0</b>	10,000
I	.1	.4	Allowance for Metal Farm Equipment	<b>in I.1.2</b>	in I.1.2
<i>Subtotal Sub-Group I.1</i>				<b>1,343.5</b>	<b>14,460</b>
<b>I</b>	<b>.2</b>		<b>Collection Workspace</b>		
I	.2	.1	Collection Workroom	<b>27.9</b>	300
<i>Subtotal Sub-Group I.2</i>				<b>27.9</b>	<b>300</b>
<b>TOTAL GROUP I: FEP COLLECTIONS STORAGE</b>				<b>1,371.3</b>	<b>14,760</b>
<b>TOTAL FEP COLLECTIONS REPOSITORY (net area)</b>				<b>1,559.4</b>	<b>16,785</b>

NET AREA

**All area figures express net functional area: true net space devoted to each function measured to inside face of defining partitions or boundaries.** Internal circulation within exhibition spaces and aisles / maneuvering space in collection storage spaces are counted as part of the functional area. Otherwise no circulation, building structure, or building service space is counted as functional area.

GROSS AREA PROJECTION

Gross area is the total size of the building measured to the outside of the exterior walls and is used in estimating building cost. Gross area is only determined accurately through building design. For collection storage facilities, the gross area usually falls in the range between 1.3 and 1.7 times the net area. This project has a high requirement for space for mechanical and electrical systems, which will tend to increase the gross area. On the other hand, the largest areas in the project are collection storage spaces with a simple circulation system proposed. This simplicity will tend to make the gross to net ratio lower. With all factors considered, and with careful discipline over the design, the gross to net ratio can probably be kept to 1.35:1.0. **The projected gross area based on the current program of net space is therefore 2,105 sm / 22,660 sf.**

## 4.0 PREVENTIVE CONSERVATION CRITERIA

### *Introduction*

The following chapter provides an overview of preventive conservation criteria that influences the technical criteria for the FEP collection repository. Not all aspects of preventative criteria are applicable to the FEP repository, however it is included for the general orientation of readers, including the future design team. The applicable criteria for preventive conservation is further clarified in the technical requirements (chapter 5.0) as well as the Unit Space sheets (chapter 6.0).

Storage standards for museum collections evolved in the latter half of the twentieth century to a point where there is general agreement on most points of practice. These criteria develop from the science of preventive conservation, which reflects the importance of the storage conditions in the longevity of the objects. In turn, this focus derives from a fundamental aspect of museum mandates concerning the preservation of collections for future generations. Authoritative organizations such as the Canadian Conservation Institute, the Smithsonian Conservation Laboratories, and the Getty Conservation Institute develop and publish guidelines and principles that help museums apply best practice to take care of their collections. In recent years, the Canadian Conservation Institute has played a key role in updating the Museums and Archives section (Chapter 21) of the *ASHRAE Applications Handbook* (2003), which is widely used by the engineering professions in North America.

The collection caretaking functions to be housed in museum and archive facilities place special demands on their design, construction, and operation. In many instances, the design criteria exceed present building codes and general institutional building standards. In the case of environmental control systems, redundancies and backup systems are called for that clearly exceed the usual building practices. The following sections, organized by categories of risk to the collections, explain these requirements and the reasons they are important.

The primary causes of deterioration and loss of collections are:

<b>Light:</b>	intensity, duration, ultraviolet content
<b>Relative Humidity:</b>	variation, extremes
<b>Temperature:</b>	variation, extremes
<b>Insect / Animal Pests:</b>	moths, dermestids, wood-boring insects, rodents
<b>Contaminants:</b>	various pollutant sources including dust
<b>Water Damage:</b>	rain and ground water entry, plumbing leaks
<b>Physical Damage:</b>	structural failure, inadequate support, improper handling, inappropriate storage conditions, overcrowding, blocked or narrow aisles, shelving that is too high, inadequate corridors
<b>Damage due to Fire:</b>	fire, smoke, and by water from sprinklers and firefighting measures
<b>Theft and Vandalism:</b>	intentionally caused loss or damage
<b>Vibration:</b>	damage to collections due to earthquake and other sources of vibration

#### 4.0 PREVENTATIVE CONSERVATION CRITERIA

##### ***Light***

When designing lighting systems for collections storage, one basic fact must be considered in all decisions: light damages many classes of artifacts and works of art. For many objects, any and all light is damaging and the damage is irreversible and strictly cumulative – directly related to the intensity of the light and the length of exposure. Storage methods attempt to minimize this danger.

Excessive or improper exposure to light causes damage through the acceleration of chemical processes, colour change, and fading. Many pigments lose colour saturation or change hue and chroma. The degree of sensitivity varies widely from one material to another. For more stable objects, even small increments of change must be taken seriously in long-term exposures.

In collection storage areas, the preferred approach is to provide good overall light levels (approximately 500 lux) for inspection, retrieval, and housekeeping, but switched in local zones that allow only the area being worked in to be lit at any one time. Operational practice will ensure that collection storage areas are dark most of the time. Provision of collection work spaces close to the collection storage helps minimize the time that lights are on in the storage. Objects are brought out to the workspace for any lengthy process, permitting the general storage to remain dark.

##### ***Relative Humidity***

Relative humidity control presents challenges in Canadian museum and collections buildings, yet the issue is fundamental: uncontrolled fluctuations and inappropriate levels account for very significant collection losses. Inappropriate levels or fluctuations cause damage to collection objects and works of art through mechanical stress, differential response, microbiological decay, and chemical degradation. These damages occur within the first season of acquisition, as well as the result of repeated stresses over many years. Relative humidity damages are the most costly to repair and the most visible.

One of the important considerations with humidity controlled environments is the building envelope. Flaws in the building envelope can permit humidity to condense on cold surfaces within the envelope, causing potentially serious problems. The heating, ventilating, and air conditioning systems must provide precision environmental controls to the building to the standards defined for RH, temperature, and air purity. Systems must provide efficiency and economy in both capital and operating costs. Maintenance procedures must be clearly outlined in a preventive maintenance plan to encourage compliance and minimize system failures. Equipment must be arranged for easy access and replacement.

The system must be designed to include redundant pieces of critical or difficult-to-repair or replace equipment, to permit the maintenance of critical environments in the event of equipment failure. The system must be designed to maintain the specified environments under emergency conditions, such as electrical power supply interruption. The systems must also be designed in a manner that avoids disruption to environmental conditions for equipment maintenance shutdowns. The electrical system must provide sufficient backup capacity to operate those systems to a degree required to maintain the environment within the specified limits during an interruption in electrical supply.

## 4.0 PREVENTATIVE CONSERVATION CRITERIA

***Setpoint Selection***

Recent research by the Smithsonian Institution Conservation Analytical Laboratory has indicated that the degree of flatlining prescribed in the last thirty years may be excessively rigid for many collections. This research does not suggest that uncontrolled environments do not cause damage, but rather that the middle range in which minimal damage will occur may be slightly wider than previously believed. Similarly, there may be a slightly wider tolerance for short-term fluctuation limits. This information has been much debated by conservators who must balance the findings of research scientists with observed behaviour of collection objects, in the context of their specific institutions.

The possibility that lower winter humidity setpoints might be acceptable is of interest in its potential to alleviate problems in existing gallery and museum buildings, and to simplify the design of new situations. For many years the Canadian Conservation Institute (CCI) has endorsed a compromise humidity regime for use in older buildings, which cannot tolerate the 50% RH year round setting which was then being recommended for new buildings. This standard is 40% RH in winter with stepped adjustment seasonally to 55% RH in summer.

Setpoints selected for this facility reflect the relatively robust nature of objects to be stored here. More vulnerable objects will be stored at the City Collection Repository.

***Temperature***

Temperature directly affects rates of chemical and biological decay. The latter is virtually eliminated below 5°C. Chemical change is similarly diminished at lower temperatures. Colour photographic materials, paper records, furs, and plastics are examples of collection materials that are frequently given cool or cold storage environments.

Generally, compliance with the measures listed under RH will provide a system that can easily keep the space within an acceptable temperature range.

***Insects and Animal Pests***

Vertebrate animal pests can cause damage to collections through eating, shredding for nesting material, or staining with wastes. Common pests include mice, rats, squirrels, porcupines, raccoons, bats, and birds. Insect and animal pests are a major concern. Outbreaks of pests can quickly do irreparable damage to artifacts that can even result in total loss. As well, the cost of intervention to control an outbreak will be time for staff to clean, move, and freeze artifacts. The preferred prevention method is exclusion by having a well constructed, tightly sealed building fabric.

Insect pests are numerous and include many species of beetles, wasps, ants, bees, dermestids, moths, flies, and roaches. Exclusion is also important – for example, in denying access for nest building to wasps and bees. But many of the other perpetrators enter the building within the collection itself, on staff clothing, or with food deliveries. The design considerations are therefore to create conditions that encourage good housekeeping and ease of inspection. Food and garbage facilities should be strictly segregated from collection areas. Compartmentalization and zoning of mechanical systems can reduce the extent of infestation and be useful if extermination efforts become necessary. The availability of a freezer used for treatment of incoming collections and an integrated pest management program will also help to eliminate pests.

#### 4.0 PREVENTATIVE CONSERVATION CRITERIA

##### **Contaminants**

It is generally recognized that air pollutants, gaseous and particulate, threaten the conservation of collection objects and works of art. The Canadian Conservation Institute has published an excellent review of this subject: *Airborne Pollutants in Museums, Galleries, and Archives: Risk Assessment, Control Strategies, and Preservation Management*, by Jean Tétreault, Canada 2003. Offending agents which must be considered include: sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), carbon dioxide (CO<sub>2</sub>), hydrogen chloride (HCl), acetic acid, formaldehyde (HCHO), fine particulate (TSP – Total Suspended Particulate), and metallic fumes.

Filtration is the primary approach to avoid airborne contaminants from reaching the collections. Filtration must be specifically designed with respect to the ambient environment. Space should be allowed within the air handling units for later upgrading of the filtration components, should the ambient conditions change. Air intakes should be located appropriately high and at an authorized distance to avoid drawing in pollutants from local sources such as the shipping/receiving or parking areas. Electrostatic filtration must not be used unless the resultant ozone is removed.

The large and changing variety of materials used in construction present one of the most difficult to control threats to museum and archive collections through contact and off-gassing. This is a fairly recent area of study for conservation scientists and the constant emergence of new materials requires knowledgeable, up-to-date information to make clear recommendations. Publications by the Canada Mortgage and Housing Corporation on healthy material alternatives, the above referenced publication by the Canadian Conservation Institute, and WHMIS Material Safety Data Sheets now required by labour and health regulating agencies, are helpful in identifying the major groups of corrosive and acidic off-gassing materials. The following chart gives a general indication of preferred and prohibited materials.

4.0 PREVENTATIVE CONSERVATION CRITERIA

**Off-gassing of Construction Materials - Preferences**

<i>Material</i>	<i>Best</i>	<i>Worst</i>
Wood and Wood Products (no wood is perfect – substitute metal with powder coating, galvanized or stainless steel, acrylic sheet, glass)	aged, seasoned, dry wood, beech, birch, mahogany	young, unseasoned wood, knots, red cedar, oak, douglas fir, sweet chestnut
Waferboards, Chipboards, Hardboards, Plywoods, Melamine-laminated Boards, Overlay Plywoods (substitute as above)	those with phenol formaldehyde, polyurea, epoxy adhesives, medium and high density overlays, ABS and phenolic laminates, exterior grade plywoods and particle boards	those with urea formaldehyde, polyformaldehyde, drying oil, rubber contact cement type adhesives, interior plywoods and particle boards, waferboard, chipboard, untempered hardboard, oil tempered hardboard, fiberboards
Papers, Cardboards	acid-free tissue, permalife paper, mat board, corrugated paper board, folder stock, honeycomb paper panels, non-woven spun bonded polyethylene sheeting	acidic newsprint, kraft papers, cardboard, common papers, glassine
Coatings, Paints, Varnishes, Stains	moisture-cured urethane, two-component urethanes and epoxies, polyurethane-based liquid plastics, acrylic latex emulsion, vinyl acrylics, acrylic urethane, butadiene-styrene vapour barriers	oil-based and alkyd paints, oil-modified polyurethane varnishes, latex varnishes, one-component epoxies, corrosion resistant paints, chlorinated rubber paints
Plastics	polyethylene, polypropylene, polyester, polystyrene, acrylic, Mylar (terephthalate), silicone, polycarbonates, air-bubble	chloride compounds, vulcanize or chlorinated rubbers, neoprene, polyvinylchloride, cellulose nitrate, cellulose acetate
Sheetings	polyurethane with polyesters, polyethylene, cross-linked polyethylene, PEVA, polypropylene, polystyrene, silicone	urea-formaldehyde impregnated paper, laminated paper boards
Foams	polyethylene foam, cross-linked polyethylene, white extruded polystyrene, ethylene/vinyl acetate copolymers, polypropylene, silicone	polyester polyurethane foam, polyether, chloroprene, polyvinyl chloride, rubber with sulphur vulcanizing agents
Plastic and Foam Boards	corrugated plastic boards, paper-faced laminated panel boards, styrene plastic-faced laminated panel boards, aluminum sheet coated on panel boards	urea-formaldehyde laminated panel, polyurethane, polyvinyl chloride foam boards
Wires and Tubes	nylon and polyester monofilament, plastic coated wire, polyethylene or silicone tubing, Teflon, glass	polyvinyl chloride tubing, vulcanized rubber, chloroprene rubber, neoprene
Adhesives and Tapes	polyacrylics, starch paste, 3M Scotchpar #415, two component epoxies, hot wax and polyethylene glues, polyvinyl acetate emulsions, animal glues, starch paste	most epoxies, polysulphides, most polyvinyl acetate emulsions and solids, cellulose nitrate, most contact cements
Textiles	unbleached cotton, linen, polyester, needlefelt, acrylic felt, nylon, hook and loop fasteners, polyacrilonitriles, non-woven polyester sheeting	wool, fabric treated with flame retardants, durable press finishes, rubber backed carpet

#### 4.0 PREVENTATIVE CONSERVATION CRITERIA

##### ***Water Damage***

Water damage from both external and interior sources has been the cause of extensive losses in museum and archival collections. Particular care must be taken to ensure that the building envelope is weather tight, denying entry of rainwater under all conceivable weather conditions. Generally, it is poor planning to place collection materials in below-grade spaces. If unavoidable, particular care must be taken to ensure no infiltration of water through foundation walls, at service entry points, and through slabs on grade. In addition, providing for water removal through drainage, perimeter channels, etc. in the event of infiltration, is desirable.

Reliance on system components having a high maintenance requirement to remain effective, such as caulking, short life-span membranes, etc. should be avoided. Particular problem areas include: roof areas not properly drained, poorly detailed flashing, sloped glazing, skylights, snow build up against vertical surfaces, inadequate ground surface drainage, and poorly constructed operable windows.

Water damage can also result from interior sources such as sewer backup, leaking pipes, and blocked drains. Water-using mechanical equipment and water piping (except sprinklers) must not be located above collection spaces. These should be located in service corridors away from the collections. Where water is unavoidable in the collection areas, adequate drainage, as well as drip pans and alarms, should be placed under equipment and piping.

##### ***Physical Damage***

Generally, physical damage is an operational concern. However, there are several design considerations that can contribute to lessening this area of risk. It is unacceptable to have mechanical and electrical equipment requiring maintenance located within collection spaces, since this results in risk of accidental damage to collections by workers carrying tools and equipment. Provision of properly designed corridors, doorways, elevators, dumbwaiters, loading docks, and related spaces facilitates the safe movement and handling of collection materials.

The concerns surrounding shipping and receiving collection materials combine those of artifact circulation generally, with the special needs that arise when items must move in or out of the building. Providing for easy access and turnaround for delivery trucks; an indoor (or as a minimum weather protected) truck bay; level loading / unloading facilities; easy security supervision; and direct access to the non-public circulation systems are essential.

One of the most common threats to collections is overcrowding in storage. This can create unsafe situations for retrieving an object when blocked by other objects, and through contact and movement between objects. Similarly, collection materials placed in aisles can lead to risks to both staff and collections. In some cases overcrowding can create micro-environments by not allowing adequate air circulation that in turn lead to mold and insect damage.

Design live loads can only be determined through a collaborative process in which intended storage configurations and planning assumptions are agreed. All collection storage space should assume use of compact storage throughout the space regardless of whether compact systems will be used initially. In areas where conversion of storage systems to compact systems will be done in future, depress slabs to accommodate future rails and fill to finish floor level with lightweight concrete. This will permit future installation to avoid ramps.



## 4.0 PREVENTATIVE CONSERVATION CRITERIA

***Damage Due To Fire***

Catastrophic losses of collections have occurred from fires, from smoke, and from the water used in firefighting. Although there is concern about water damage from accidental or legitimate discharge, fire authorities and experts and most conservation bodies agree that water sprinklers are the best single source of protection after prevention. The building codes generally permit the sprinkler system itself to function as the alarm (generally, water flow through an open head signals the alarm). Since in this scenario there is inevitably some level of fire, smoke, and water damage, an earlier warning system is desirable in museum and collection facilities. This is usually a smoke detection system which gives a warning earlier than sprinkler discharge and permits the possibility of intervention before discharge. Extra sensitive smoke detection systems such as VESDA are increasingly being used in collection storage facilities.

Compartmentalization is an effective way of minimizing the potential impact of a fire. This involves the arranging of collection storage rooms in as small a number of modules as can be functionally tolerated and constructing the divisions between them as well as all six sides of the perimeter of as high a fire rating as can be afforded. This should be arranged to coincide with separate environmental zones required for separate collection categories if possible.

In addition to sprinklers, the building must be equipped with a standpipe fire hose system and hand-held fire extinguishers of the most appropriate type, selected for the nature of the combustibles, the potential severity, the effectiveness of the extinguisher on the hazard, the potential for damage to collections from extinguisher agents, the ease of use, the personnel available to effectively operate the extinguisher, the adverse chemical reactions between the extinguishing agent and the burning materials, the safety of the operators, and the maintenance requirements for the extinguisher.

***Theft And Vandalism***

Preventing intentional loss and damage is a preoccupation of those responsible for collections. The high commercial value of many works of art and artifacts is generally well known. The collections held by public museums represent a major asset. Many objects are irreplaceable. Some of these items can easily be carried and all are potentially subject to vandalism.

Security measures generally consist of an integrated combination of operational and facility means. The facility aspects, in turn, consist of two categories: electronic monitoring including detection, alarm, and communication systems, and physical barriers to access including zoning of access, design of spatial envelopes, and access control hardware. A security presence or monitoring is required at all points of entry and egress, including shipping/ receiving and staff entrances



## 5.0 TECHNICAL REQUIREMENTS

The following technical design criteria are, where applicable, based on the general preventative conservation design principles presented in the previous chapter. The technical design criteria directly applies to the function of the FEPR, taking into account the use and level of sophistication of the facility. The technical design criteria are organized under traditional building system disciplines.

### 5.1 Architectural Systems

#### ***Building Envelope***

The building envelope is considered to include exposed and concealed walls and panels, windows, roof lights, glassed frames, penetrations (doors, shutters, louvres, etc.), slabs on grade or over unheated space, roof, terrace, or traffic deck. All components of the envelope must meet the following criteria:

The envelope must meet or exceed current regulations and best practice for energy conservation. Fire rating must be in accordance with the current National Building Code. The envelope must resist all external forces which can be reasonably predicted over a 100 year period, including air pressures and earth or structural movement. The envelope must permit the maintenance of the interior temperatures and humidities specified for particular collection spaces under predictable extremes. The insulative layer must be continuous throughout this envelope and tight to all penetrations. All elements positioned external to the insulative layer must be designed to accommodate expansion and contraction within the service temperature range of  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ . All elements which are within the insulative layer must be designed to accommodate expansion and contraction within the service temperature range of  $-20^{\circ}\text{C}$  to  $+30^{\circ}\text{C}$ .

The membrane air / vapour barrier must be properly placed in the wall construction, have very low permeability, and retain its performance under maximum wind load conditions or pressure differentials. The barrier must be rigid and durable and must be continuous through the envelope, with all elements of the barrier durably and functionally integrated at joints. Air / vapour exfiltration from the building must be tested following completion of air barrier installation and must satisfy criteria which support the specified interior environments without degradation of building components.

The envelope must secure the interior against invasion of pests, vermin, insects, plant and fungoid spores, and other organisms which may promote conditions which could cause deterioration of collections. The envelope must resist intrusion by unauthorized persons. Louvres, shutters, door and window frames, and other openings must be integrated with the building envelope.

Glazing systems must be designed and made to safely withstand local environmental conditions in accordance with the applicable building code. Metal glazing frames must be designed to prevent transmission of temperatures that would permit condensation to form on inner surfaces. Where extreme conditions may overcome the thermal break, the framing must accommodate, by design, the dispersal or disposal of condensate. Glassed areas must meet all envelope criteria except that thermal performance may be reduced.

## 5.0 TECHNICAL REQUIREMENTS

Exterior doorways must be constructed to minimize air passage, with durable effective weatherstrip on all sides, using the best technology available. Door frames must be designed to prevent condensation on inner surfaces and be integrated with the insulative layer and the air / vapour barrier. Doors must be insulated to keep inner surface temperatures above the dew point at lowest external design temperature. Ductwork connected to louvres forms part of the building envelope and must respond to all criteria.

### ***Accessibility***

The design of the facility must be in accordance with current regulations and guidelines published by recognized accessibility advocate groups. Consultation with an advisory group or consultant during the design period is also recommended to achieve the most sensitive results.

### ***Finishes***

The finishes within all areas of the building must conform to the preventive conservation considerations outlined in the Chapter 5 section on Contaminants and at the same time be supportive of the architectural concept and the stated design objectives.

The design process must weigh each finish material and coating choice against the following criteria:

- functional performance: sound transmission, sound absorption, reflectance, stability
- durability
- maintenance: all finishes must be cleanable and require minimal maintenance
- ease of access for maintenance purposes
- acceptability from a collection conservation perspective based on stability over time
- reaction with other materials
- sustainable design considerations
- fire spread rating

Finishes in areas with little or no supervision such as washrooms and corridors must be vandal-proof, easy to monitor for pests, and easily cleanable. Serious consideration should be given to upgrading the quality of finishes in mechanical and electrical spaces beyond usual practice to better support pest management practices.

### ***Daylight***

The implications of the admission or restriction of daylight to specific spaces must be analyzed. Generally, daylight should not be admitted to any areas where collection material will be present.

In collection storage areas, the preferred approach is to provide good overall light levels (approximately 500 lux) for inspection, retrieval, and housekeeping, but switched in local zones that allow only the area being worked in to be lit at any one time. Operational practice will ensure that collection storage areas are dark most of the time.

Provision of collection work spaces close to the collection storage helps minimize the time that lights are on in the storage. Objects are brought out to the workspace for any lengthy process, permitting the general storage to remain dark.

***Circulation***

Circulation spaces and systems must respond to three primary criteria:

- the safe circulation of collection materials through the Fort Edmonton Park Repository with specific attention to the movement in and out of the building itself
- safe and straightforward movement of staff.
- organization of circulation routes within a concept of access zones

All movement of collection materials, whether crated or not, should involve as little handling and as few hazards for the objects as possible, as well as avoiding damage to the building. To achieve this, the typical patterns of movement, and sequence of functions involved in the use of collection materials, must be considered and every effort made to minimize the distances and manipulations involved.

Conveyance vehicles should ride easily and smoothly; corridors should be wide enough for easy manipulation, and unobstructed, with as few turnings as possible; doors should accommodate vehicles and objects with ease; routes should be short and direct, with few doors. Changes in floor finish from room to room should not result in significant thresholds that would cause carts to be jarred.

If travel between floors is necessary, a freight elevator equipped to accommodate the largest object to be stored on the upper level should be provided.

The concerns surrounding shipping and receiving collection materials combine those of artifact circulation generally, with the special needs that arise when items must move in or out of the building. Providing for easy access and turnaround for delivery trucks; a minimum weather protected truck access point; level loading / unloading facilities; easy security supervision; and direct access to the collection circulation systems is essential.

All interior doors and collection circulation routes, including freight elevator, in the path between collection shipping/receiving and all spaces designated as having collection present must accommodate the dimensional criteria noted in the Unit Space Sheets.

Doorways between the loading dock and the holding areas must be sized to accommodate the objects described above, with their crates and any conveyance needed to move these. Movement by forklift is common.

The ideal collection material loading condition is an enclosed truck bay to provide indoor parking for transport vehicles, including tractor-trailers with the doors closed. However, a protected exterior truck access point can provide adequate protection for the shipping and receiving of collection material. When providing an exterior truck access point, an overhead canopy projecting at least 3.0m from the face of the building is required.

To assist in side and rear loading of vehicles which will vary in size and height, and so that a minimum of lifting of heavy objects is required, generously sized hydraulic lifts are required at the truck access point or within the internal truck bay. The hydraulic lift platform should also allow a forklift to drive on and off of trucks for movement of large and / or heavy items, and there should be a permanent parking space for the forklift.

## 5.0 TECHNICAL REQUIREMENTS

The design of circulation systems and mechanical and electrical spaces must allow for movement of maintenance materials and equipment, and for replacement of mechanical and electrical equipment. Access for all maintenance, adjustment, and monitoring requirements must be allowed for without requiring access through collection spaces.

## 5.2 Structural Systems

### ***Choice of Systems***

The purpose of this section is to identify criteria for consideration in structural system selection and design. In new construction, the inherent qualities of *poured-in-place reinforced concrete* structure offer many advantages, and facilitate meeting the specialized criteria for the collection storage building. The following advantages of concrete must be considered in the weighing of cost and other criteria during the system selection process:

- inherent fire protection and separation
- reduced structure-borne sound and vibration transmission
- simplified detailing of enclosure (air barrier) which is more likely to lead to a satisfactory result at less cost
- greater structural loading flexibility – i.e. better lateral distribution of loads

For large collection storage spaces where longer spans are required, structural steel framing may be preferred for floors or roofs above these spaces.

### ***Design Loads***

The structure of the building must be designed and executed in accordance with the applicable building codes including seismic considerations. Live load design criteria must also be discussed with City Collection representatives in areas where the requirement may exceed code requirement including collection storage and collection processing spaces.

Design live loads can only be determined through a collaborative process in which intended storage configurations and collection processing assumptions are agreed. All collection storage space should assume use of compact storage throughout the space regardless of whether compact systems will be used initially.

## 5.0 TECHNICAL REQUIREMENTS

### 5.3 Mechanical Systems

#### ***Heating, Ventilating, and Air Conditioning Systems***

The HVAC systems must provide precision environmental control to the building to the standards defined in the Unit Space Sheets, Chapter 6.0.

The following general criteria must be met:

- Systems must follow advanced practice for energy conservation and other principles of sustainable design *except where in conflict with continuity of interior environmental criteria*. In no case will energy saving measures be permitted to compromise the interior environmental criteria presented in this document. All mechanical systems must be thoroughly coordinated with the architectural design and not encroach upon critical spatial dimensions such as collection storage and circulation routes and exhibition space requirements.
- Systems must provide efficiency and economy in both capital and operating costs. Maintenance procedures must be clearly outlined in a preventive maintenance plan to encourage compliance and minimize system failures. Equipment must be arranged for easy access and replacement. Complete as-built drawings and equipment manuals must be furnished at completion.

Note the following observation by Stefan Michalski of the Canadian Conservation Institute that can also be applied to collection storage facilities:

*“One unfortunate syndrome worldwide is the construction of an elaborate museum building by generous capital grants and outside technocrats, which is then operated on a shoestring by mere mortals. The result has been many white elephants built through the 1970s and 1980s. Our primary advice to museums now is: design building systems for reliability, for the long haul, and for local operating resources.”*

Outdoor ventilation air must be supplied at rates which recognize concern for indoor air quality.

Direct exhaust must be provided for those spaces with an identified need. Energy recovery measures should be considered for all exhaust points.

The properties of the exhausted air and the nature of its exhaust must comply with all applicable environmental regulations with staff safety being a primary consideration. Makeup air must be conditioned to maintain the environmental criteria for the given space.

Mechanical equipment involving liquids (coils, humidifiers, condensers, etc.) must not be located above collection storage areas or other spaces such as the collection workroom where collection material is likely to be present.

The mechanical systems must be controlled and monitored from a central microcomputer, with graphic display, keyboard, and printer. The system must sound an alarm if environmental conditions deviate from the prescribed limits, or if any component of the system fails. The control / monitoring system must also record, over time, the environmental conditions in all spaces. Reporting will be to both the CCR facility and a designated remote City location.



Dual stage filtration including pre-filtration panels, and high efficiency bag filters shall be used in all air-handling units. Additional space should be reserved in the units for further future upgrading of the filtration component. Specific analysis of the ambient air at the building location is required to determine filtration requirements. Edmonton is considered generally to have medium-high air pollution levels.

Access arrangements for mechanical systems should minimize the need for access by maintenance personnel to collection spaces. Access should be designed to permit replacement of the largest components when required.

In order to minimize the risk of water damage to the collection, water and drainage pipes (excepting the sprinkler system) must not pass over collection storage, or other areas where collection materials are housed. Floor drains must be provided in washrooms, mechanical rooms, shipping / receiving, elevator pits, and all other spaces where water may accumulate.

Generally, collection storage spaces should not be located below grade. However, if this is unavoidable, a drainage system must be installed and sized to quickly carry away water in the event of water entry. Floor drains must also prevent backflow of water, entry of pests, and entry of sewer gases.

### ***Fire Protection***

The concern for life safety is paramount and should be met by thoughtful compliance with applicable codes and standards. However, the concern for the protection of the collections is not automatically accounted for by straightforward compliance with codes, and therefore requires special consideration.

Reference should be made to the applicable codes and design guidelines. Consultation with local fire-fighting authorities during the design stage is recommended. Every effort should be made to produce a building that will resist the spread of fire and not materially contribute to the fire load or fire growth rate. The integrity of the fire separations must not be compromised by the openings created to provide access, or by the design of HVAC equipment. As well, walls and ceilings must be finished with materials having a flame spread rating maximum of 25.

The dedicated collection storage area within the facility, that includes a number of individual collection storage vaults, requires a two hour fire separation to segregate the collection storage from other functions within the Repository. In addition, any collection storage vault that exceeds 464.5 sm (5,000 sf) should be compartmentalized into smaller areas that are segregated by a two hour fire separation. These requirements are in addition to and regardless of, the code requirements for the facility. All details normally required in a two hour rating, such as fire dampers and rated doors shall be provided.

Access for the fire department to the property and to the building itself should be in accordance with applicable building codes. In addition, the fire department connection, which supplies water to both the sprinkler system and the standpipe system, should be well identified and easily accessible.

Care in the design and testing of the sprinkler system itself is also required to ensure reliability and to minimize the risk of accidental discharge caused by physical damage, freezing, or human error. The use of pre-action systems, self-closing heads, and other technical details can also be considered with a view to minimizing the risk of water damage beyond what is actually required to suppress the fire. Nevertheless, most experts recommend wet pipe systems because of their inherent reliability.

## 5.0 TECHNICAL REQUIREMENTS

Regardless of the system chosen, the following special measures can reduce the risk of collection damage from accidental or functional discharge: use of welded pipe to minimize joints, painting or marking of sprinkler pipes to prevent accidental cutting, protection of heads or concealed heads, regular inspection, and strategically located shut-off valves.

In addition to sprinklers, the building must be equipped with a standpipe fire hose system and hand-held fire extinguishers of the most appropriate type. Selecting the best fire extinguisher for the given situation depends on the nature of the combustibles, the potential severity, the effectiveness of the extinguisher on the hazard, the potential for damage to collections from extinguisher agents, the ease of use, the personnel available to effectively operate the extinguisher, the adverse chemical reactions between the extinguishing agent and the burning materials, the safety of the operators, and the maintenance requirements for the extinguisher.

## 5.4 Electrical Systems

### ***Power***

The electrical system must be designed to meet or exceed all applicable federal, provincial, and municipal codes. The electrical supply should exceed the immediate requirements of the building to allow for future requirements.

### ***Lighting***

Lighting systems will provide a high degree of flexibility and must be capable of meeting the previous outlined preventive conservation criteria and the specific requirements presented in the Unit Space sheets

### ***Fire Alarm System***

A two-stage, fully addressable, zoned, non-coded fire alarm system should be installed for the purpose of alerting the occupants of an emergency situation as well as initiating appropriate action of other building systems. The system should include the following:

- control panel to carry out fire alarm and protection function, including receiving the alarm signals, initiating general alarms, supervising the system continuously, activating zone annunciator, and initiating trouble signals
- trouble signal devices
- power supply facilities
- manual alarm stations
- automatic alarm initiating devices (addressable to locate signal)
- audible signal devices
- end of line devices
- annunciator panels
- visual alarm signal devices
- ancillary devices
- remote annunciator panels

Operation of any initiating device should cause the following:

- audible and visual signal devices to sound continuously throughout the building
- a signal to be transmitted to security or to an approved central station facility
- indication on the control panel and the remote annunciators of the zone from which the alarm originated
- automatic closing of fire and smoke doors that are normally left open
- immediate shutdown of the air conditioning and ventilation systems

The zoning of the fire alarm system should be based on floor area, building structural fire separations, and the severity of the hazard present within each area.

## 5.0 TECHNICAL REQUIREMENTS

### ***Fire Alarm Voice System***

The facility must be equipped with a high quality fire alarm voice system to allow the delivery of emergency instructions (voice) to all areas of the building from the security control room.

### ***Smoke Detection System***

An smoke detection system, comprised of both ionization and photoelectric smoke detectors, should be installed throughout the building including areas served by sprinkler systems. This may exceed code requirements but is a requirement for the protection of the holdings to give advance warning ahead of sprinkler discharge. The type, design, spacing, and area of coverage must be selected to reflect the area, volume, ceiling height, and fire hazard condition, which might be encountered in the particular areas of the building.

### ***Equipment Location***

Electrical switchgear, fuse boxes, or breaker panels, and all mechanical equipment requiring maintenance access, must be excluded from collection areas. All electrical equipment must be securely mounted a safe distance away from any combustible material.

### ***Communication Systems and Related Cable / Conduit Requirements***

The City of Edmonton will review its IT infrastructure requirements and will provide detailed requirements as the project develops.

## **5.5 Security Systems**

This section discusses a general model for collection storage facility security from general requirements for physical, operational, and electronic security to the identification of security zones and the application of requirements within each zone. It is recommended that the City of Edmonton have a professional security assessment completed prior to the design stage of the project.

### ***Concept***

The model concept of security discussed here is based on the utilization of several interacting security systems, which function in parallel and provide the levels of protection necessary to adequately safeguard personnel, collections, data, and assets from assessed threats. These interacting systems are described in the following sections.

### ***Operational Security***

In an ideal model, the building and site will have access to 24-hour per day, seven-day per week security coverage. After-hours guards must be able to monitor the entire building from a single position.

The number of security staff required will be determined by the vulnerability of the building to intrusions and the degree of protection afforded by the electronic security systems.

### ***Physical Security***

The facility must be designed so as to effectively prevent illegal access by use of adjacent objects such as trees or parked vehicles. The building fabric should be designed so that walls and roofs cannot be penetrated or scaled without the greatest of difficulty. There should be no lower adjacent structures which can act as a route to the roof or upper stories. All openings in structures that allow entry, such as vents, ducts, trap doors, and roof hatches, must be securable and electronically monitored. Manhole entrances for site utilities such as gas, water, sewage, electricity, telephone lines, and drainage outlets which provide access to ductwork or pipes that lead into the building, and which are large enough to accommodate people, should be secured and monitored. All utilities should be protected and not accessible to the public.

Windows on the ground floor are a considerable weakness and should be designed, illuminated, and protected so as to prevent easy access. The use of polycarbonate laminates should be considered. In the case where a window may give access to a transitional area, the glass should be either polycarbonate laminate or 1/2" plate glass. Accessible operating windows are not acceptable.

The number of doors into and out of the collection repository should be no more than the minimum number of doors required for efficient operation and fire safety, but should include separate access for catering supplies and food waste, construction waste, and chemical waste disposal. Hardware requirements should be determined at the time of the security assessment. All entry points should be clearly visible from the adjoining streets and well lighted.

### ***Electronic Security***

All security electronics will report to a central security system monitored by the City and collection staff.

## 5.0 TECHNICAL REQUIREMENTS

The following systems must be installed as directed in the specific 'security level' definitions which follow:

1. Electronic Alarm system: *Requirements to be determined through a security assessment at the schematic design stage.*
2. Closed Circuit Television System (CCTV): *Requirements to be determined through a security assessment at the schematic design stage.*
3. Card Access System: *Requirements to be determined through a security assessment at the schematic design stage.*
4. Security Communications: *Requirements to be determined through a security assessment at the schematic design stage.*

### **Security Levels**

Within the building, spaces will require varying degrees of security based on the contents and activity of the space. Security requirements are given in three levels according to the following guidelines:

#### LEVEL I (highest)

- secure storage for collections and restricted areas
- exterior doors

#### LEVEL II (high)

- workshop areas
- collection shipping / receiving area
- areas where sensitive records are stored
- audiovisual and high value attractive items
- any area that may contain collection material overnight
- emergency supply cabinets

#### LEVEL III (basic)

- general office space
- general storage and supplies
- areas that never contain collection material or attractive, high value items
- mechanical rooms

## 5.6 Commissioning

Commissioning is the process of managing the transition of the building from a construction mode to an operating mode. Attention to a well designed, well integrated commissioning process is particularly important to collection repository projects due to the reliance on the performance of systems for collection preservation. The objective of commissioning is to maximize the effectiveness of project delivery activities and of environmental support provided to staff and collections. Commissioning is a transitional process that moves the facility from a passive building to an active operating phase, ready for occupancy. Experience has shown that comprehensive commissioning is required in order to ensure that the intended museum requirements have been met.

Every building is unique. The nature and extent of commissioning varies according to the size, end-use, and complexity of the facility; and the types of systems installed. All systems must be commissioned. Commissioning will normally include the following:

### ***Performance Verification***

The purpose of verification is to ensure that the final product meets the initial requirements. Verification takes place as quality management activities during the implementation and commissioning phases of the product delivery system. It comprises examination of components, subsystems, systems, and environments.

### ***Documentation***

Complete, accurate, and usable documentation is needed to support those who deal with and operate the building. Resources must be allocated for the preparation of documents used to operate and manage the building in order to provide effective asset management.

### ***Passive to Active Hand-Over***

This transforms the static building facility into an active accommodation service ready for occupancy. Activities include:

- training of operating staff for normal and emergency conditions
- setting up service contracts
- installing signage
- establishing monitoring and information systems





## 6.0 UNIT SPACE REQUIREMENTS

### Guide To Unit Space Sheets

The Unit Space Sheets (USS) present the detailed criteria for each individual space required in the new Fort Edmonton Park Repository (FEPR). The types of entries indicated on these sheets are as follows: a yes indicated by √ or a no indicated by a blank space when applicable to the category; a numerical value when applicable to the specific category; a code for each category and option (e.g. ENV 3 for Environment Type 3); and a reference to an explanatory note indicated by a number in brackets (e.g. [3]). More than one type of entry may be indicated for one category (e.g. code + note). The following is a description of the categories of criteria presented in the Unit Space Sheets and the meaning of each of the possible entries. References to the CCR pertain to the new City Collection Repository, and are included for reference or comparison.

#### ***Space Name***

Each space has been assigned a name that is used consistently throughout this project.

#### ***Space Number***

This number is unique to each individual space, and is composed of a group identification letter, and a space number. For example, space G.1.1 has the following characteristics:

Space Group	G	User Services
Subgroup	G.1	Main Entrance
Individual Space	G.1.1	Vestibule

#### ***Activity Description***

This is a description of the primary functions or activities to be carried out in the space. It will include the primary activities and any additional activities that will require special consideration in design.

#### ***Facility Description***

This is a description of required and/or desired attributes of the space. It will include the basic facilities that will be in the space and any equipment that will require specialized consideration of electrical, mechanical, and other building systems.

#### ***Notes***

This section is used to expand on specific technical requirements.

## 6.0 UNIT SPACE REQUIREMENTS

### ***Floor Area***

The **net** functional area required to meet the functional requirements is indicated in square metres. All area figures express *net functional area*: true net space devoted to each function measured to inside face of defining partitions or boundaries. Internal circulation within exhibition spaces and aisles / manoeuvring space in collection storage spaces are counted as part of the *functional area*. Otherwise no circulation, building structure, or building service space is counted as functional area.

### ***Users***

The space may be used by *staff* (including security staff, contract personnel, and volunteers), *visitors* (including individual visitors and groups), and *others* (to be specified in a note). The presence of each type of user is indicated by ✓.

### ***Hours of Use***

The space may be used during normal City Collection Repository (CCR) office hours, defined generally as 7:00 AM to 6:00 PM but also includes any hours in which staff are at their job (e.g. evenings, weekends). The FEPR is not bound to the seasonal hours of Fort Edmonton Park. Special times refer to unusual events, such as weekend events, or any other special activities that occur outside of the Repository's general hours. These are indicated by a ✓ when applicable and are left blank when not applicable.

### ***Critical Dimensions***

Where one or more dimensions of a room or its proportions are critical to the planned operations, the dimensions are given here in feet and metres. Indicated ceiling heights in the Unit Space Sheets are a minimum and refer to the height from finished floor to the lowest obstruction at the ceiling plane.

This section is also used to define the access criteria for collection items of different size categories as follows:

#### **ACC 1 General Collection Storage and Handling**

The general minimum standard for City collection spaces including storage vaults, workrooms, and the general collection circulation is as follows:

**Continuous route including doorways having clear dimensions of 2.13 m (10'-0") high and 1.82 m (8'-0") wide.**

**Maximum required dimensions for turning radii of objects must be verified with the City Collection Repository staff during the design phase.**

Where no ACC number is given, a normal single leaf door .91m (3'0" x 2.13m (7'0")) should be adequate.

**ACC 2 Oversized Collection Storage and Handling**

The objects to be stored at the FEP Repository vary greatly in size, however a significant portion are large, heavy objects that require significant circulation space for movement. Therefore, any circulation routes to and from Shipping / Receiving, Rolling Stock Collection Storage, or Metal Collection Storage spaces must be sized to allow for transport of these oversized objects.

**Openings for oversized artifacts will require clear dimensions of 4.27 m (14'-0") high and 4.27 m (14'-0") wide.**

**Maximum required dimensions for turning radii of objects must be verified with the City Collection Repository staff during the design phase.**

***Collections***

The presence of the City of Edmonton's collection items in this space – whether permanently or temporarily – is indicated by a ✓. The presence of collection items means that technical criteria related to collection conservation apply to the design of building systems. This category also implies that the dimensions of the required access to the space must be of a scale to accommodate the movement of the collection materials.

No indication means that collection items will not be in this space and normal technical criteria apply.

6.0 UNIT SPACE REQUIREMENTS

**Environment**

The following summarizes the different categories of environmental criteria applicable to different spaces within the building complex. General application is indicated. Each category is indicated by a code.

CODE	CRITERIA						
ENV 1	<table border="0"> <tr> <td data-bbox="500 579 915 611"><b>TEMPERATURE SET POINT</b></td> <td data-bbox="1065 579 1192 611"><b>Summer</b></td> <td data-bbox="1256 579 1338 611"><b>22° C</b></td> </tr> <tr> <td></td> <td data-bbox="1065 617 1159 648"><b>Winter</b></td> <td data-bbox="1256 617 1338 648"><b>20° C</b></td> </tr> </table>	<b>TEMPERATURE SET POINT</b>	<b>Summer</b>	<b>22° C</b>		<b>Winter</b>	<b>20° C</b>
<b>TEMPERATURE SET POINT</b>	<b>Summer</b>	<b>22° C</b>					
	<b>Winter</b>	<b>20° C</b>					
<b>GENERAL ENVIRONMENT</b>	<table border="0"> <tr> <td data-bbox="500 720 992 751"><b>RELATIVE HUMIDITY SET POINT</b></td> <td data-bbox="1065 720 1192 751"><b>Summer</b></td> <td data-bbox="1230 720 1370 751"><b>≤ 60%RH</b></td> </tr> <tr> <td></td> <td data-bbox="1065 758 1159 789"><b>Winter</b></td> <td data-bbox="1230 758 1370 789"><b>≥ 30%RH</b></td> </tr> </table>	<b>RELATIVE HUMIDITY SET POINT</b>	<b>Summer</b>	<b>≤ 60%RH</b>		<b>Winter</b>	<b>≥ 30%RH</b>
<b>RELATIVE HUMIDITY SET POINT</b>	<b>Summer</b>	<b>≤ 60%RH</b>					
	<b>Winter</b>	<b>≥ 30%RH</b>					
staff offices and non-collection spaces	<b>PERMITTED FLUCTUATION</b>						
human comfort and health criteria	<table border="0"> <tr> <td data-bbox="500 930 878 961">Maximum Fluctuation/Time</td> <td data-bbox="1065 930 1182 961"><b>± 1.5° C</b></td> </tr> <tr> <td data-bbox="500 968 867 999">Fluctuation/Place to Place</td> <td data-bbox="1065 968 1182 999"><b>± 1.5° C</b></td> </tr> <tr> <td data-bbox="500 1005 932 1077">Maximum Rate of Temperature Set Point change (24hrs)</td> <td data-bbox="1065 1005 1182 1037"><b>± 1.5° C</b></td> </tr> </table>	Maximum Fluctuation/Time	<b>± 1.5° C</b>	Fluctuation/Place to Place	<b>± 1.5° C</b>	Maximum Rate of Temperature Set Point change (24hrs)	<b>± 1.5° C</b>
Maximum Fluctuation/Time	<b>± 1.5° C</b>						
Fluctuation/Place to Place	<b>± 1.5° C</b>						
Maximum Rate of Temperature Set Point change (24hrs)	<b>± 1.5° C</b>						
	<b>FILTRATION</b>						
	<p>Follow ANSI/ASHRAE standard 62.1-2004                  Ventilation for Acceptable Indoor Air Quality, Air Class 1</p>						

CODE	CRITERIA
ENV 2	<p><b>TEMPERATURE:</b> <span style="float: right;"><b>≤ 25° C</b></span>                      range limited to <span style="float: right;"><b>≥ 15° C</b></span></p>
FEP COLLECTION ENVIRONMENT	<p><b>RELATIVE HUMIDITY:</b> <span style="float: right;"><b>≤ 60%RH</b></span>                      range limited to <span style="float: right;"><b>≥ 30%RH</b></span></p>
all collection storage at the FEP Repository	<p><b>FILTRATION</b></p> <p>Follow ANSI/ASHRAE standard 62.1-2004                      Ventilation for Acceptable Indoor Air Quality, Air Class 1</p>

**Security**

This entry is a code for one of the following general security categories in a four level security program. These categories govern physical security, i.e., the construction and hardware required. Categories express level of security for function. Actual security measures used should be determined during the design process, in consultation with City Collection Repository staff and the FEP management company, and may include an internal intrusion detection system, interior and exterior space surveillance system, exterior lighting, access control, and construction criteria.

Code	Criteria
<b>SEC 1</b>	Highest Security (not used at FEPR)
<b>SEC 2</b>	High Security – Non-Public Areas
<b>SEC 3</b>	Basic Security

## 6.0 UNIT SPACE REQUIREMENTS

### ***Finish Groups***

Architectural finish requirements are presented in groups and are indicated by codes. The definitions of each group describes generic finish types and qualities where appropriate and permits greater discretion where selection is primarily a factor of architectural design. The intent of presenting these requirements is not to dictate specific finishes but to convey the functional criteria for those finishes. See also the "Contamination" segment in Chapter 5.0 and the "Finishes" segment in Chapter 6.0 Consider environmental and health implications of all materials.

The following categories are entered on Unit Space Sheets:

<b>Code</b>	<b>Criteria</b>
<b>FIN 1</b>	Floor     durable resilient flooring Walls     painted gypsum board Ceiling    accessible acoustic tile
<b>FIN 2</b>	Floor     densified concrete Walls     epoxy coated concrete block, concrete Ceiling    sealed or coated to prevent insect movement and for dust control
<b>FIN 3</b>	Floor     hard surface long wearing low maintenance (e.g. ceramic tile) Walls     moisture proof material low maintenance (e.g. ceramic tile) Ceiling    painted moisture resistant gypsum board
<b>FIN 4</b>	Floor     sealed concrete Walls     painted concrete block Ceiling    painted gypsum board

### ***Lighting***

Lighting requirements are given in the form of descriptions of systems appropriate to a function or task and location. More than one system may apply to a particular space. Lighting codes may be further modified with a lower case letter to designate further criteria of lighting systems within a space.

<b>Code</b>	<b>Criteria</b>
<b>L 1</b>	Lighting systems for Collection Storage to provide 300 lux ambient range of illumination on the face of the lowest shelves.
<b>L 2</b>	Lighting systems to provide normal level of illumination for offices (500 lux). Consider indirect or baffled sources to minimize computer screen glare.
<b>L 3</b>	Same as L 2 but workshops and workrooms adjustable up to 800 lux
<b>L 4</b>	Design lighting systems for specific function.
<b>a</b>	Design lighting over collection areas to be locally switched so that maximum area can be off when not in use.

***UV Exclusion***

Spaces requiring screening of the ultra-violet content of both natural and artificial sources of light are indicated with ✓.

***Daylight***

This category identifies the requirement for or restrictions against the admission of daylight for operational or conservation reasons. If left blank, the provision of daylight is neither required nor restricted. The possible entries are indicated by a code and are the following:

<b>Code</b>	<b>Criteria</b>
<b>D 1</b>	Daylight is required in the space.
<b>D 2</b>	Daylight must not be admitted to the space.
<b>D 3</b>	Provide daylight to this space if it is possible to do so.
<b>a</b>	The quantity of natural light admitted to this space must be manually controlled by blinds or drapery.

***Plumbing***

This category identifies the need for plumbing services and is indicated as a code.

<b>Code</b>	<b>Criteria</b>
<b>P 1</b>	Provide plumbing to suit equipment or facilities listed in the Space Description. Determine exact requirements in consultation with the Collection Repository during the design process.
<b>P 2</b>	Water and drainage pipes (except sprinkler systems) should not pass overhead.
<b>P 3</b>	During the design phase study measures to prevent accidental water damage through the accumulation of water with floor drains, either inside or outside the space, or by other means.

***Electrical***

This category identifies the requirement for electrical power. The possible entries are indicated by code. Electrical categories may be modified with a lower case letter indicating additional criteria. The possible codes and modifications are as follows.

<b>Code</b>	<b>Criteria</b>
<b>ELEC 1</b>	Provide normal distribution of power outlets following code requirements.
<b>ELEC 2</b>	Provide 110V outlets at counter height at 1.000 m spacing for work tables or where indicated.

## 6.0 UNIT SPACE REQUIREMENTS

- ELEC 3** Provide overhead retractable extension cords.
- ELEC 4** Provide power for additional computers: number of computers to be determined and/or verified in consultation with Collection Repository staff.
- ELEC 5** Provide electrical power to suit specialized equipment indicated in the Space Description. Determine final requirements in consultation with Collection Repository staff during design phase. Verify special voltage and phase requirements.
  - a** Provide GFI protection for power outlets.

### ***Telephone***

Spaces requiring an outlet jack on the general building telephone system are indicated with ✓.

### ***Information Technology***

This category identifies the requirements for data and communication infrastructure.

Spaces requiring at least one data outlet are indicated with ✓. A complete review of the FEP Repository's detailed IT network needs should be undertaken as part of the building design phase.

### ***Structural***

The categories of structural loads for which to design are indicated by a code:

- | <b>Code</b>    | <b>Criteria</b>   |
|----------------|---|
| <b>STRUC 1</b> | Normal Code requirements for the designated function should be followed.  |
| <b>STRUC 2</b> | Special live loads related to the functional requirements of the space to be determined in consultation with Collection Repository staff during the design process. The type of special loading to be expected in a space is indicated in the Space Description. The types of possible live loads include storage and movement of collections. Compact storage, whether installed or allowed for in future requires special considerations. |

The Unit Space Sheets follow. The number on each sheet corresponds to one in the Space Requirements List in Chapter 3.0.