

## PART 1 GENERAL REQUIREMENTS

### 1.1. DESIGN METHODOLOGY

#### 1.1. A Scope

This scope of work shall be constructed under a single contract. The work consists of furnishing all labor, materials, equipment and services necessary to design and construct the cold storage vault.

This scope of work is for the design and construction of a self-contained refrigerated, prefabricated modular insulated metal panel cold storage vault and all necessary equipment and controls to be located within an existing curatorial storage facility. This vault will be used to store and preserve vulnerable, film-based photographic media requiring cold (35 degrees), dry (35% Rh) conditions. The film-based material will be stored on a combination of fixed shelving and/or mobile shelving units. The vault shall be ABAAS accessible.

The primary goal of the design will be a vault system that provides the environmental and security protection for the collection without relying on unnecessarily sophisticated, proprietary and/or high maintenance systems or using technologies that will increase life-time operational expense. The vault system shall provide continuous, energy-efficient operation over many years within a broad range of specified environmental parameters. The environmental parameters selected accommodate regional and seasonal climate variations. The system shall be designed to be as energy-efficient as possible and passively minimize fluctuations in temperature and Rh that would result in excessive cycling of refrigeration equipment.

#### 1.1. B Air Infiltration --

The wall panel system and all fenestrations and penetrations through the vault shall be vapor proof. The most effective way to control Rh fluctuations and temperature variations is to have a very tight enclosure system. A blower door test shall be required to verify that the cold storage vault is air-tight at one air change per hour at 50 pascals (1 ACH 50). The vault is not considered "occupied" space and as such will not require make-up air for that purpose. The fresh air exchange will normally occur only when staff enter and leave the vault.

#### 1.1 C Thermal Stability Test--

The thermal half-life of the empty vault shall be evaluated to determine a safe length of time that proper thermal conditions can be maintained in the event of major outage or equipment repair.

#### 1.1 D Vestibule --

##### **(INSERT ONE FOR RFP/RFQ)**

(A) No vestibule is required

(B) A vestibule/airlock will be constructed to minimize the transfer of air into the vault. (See appendix for description of the vestibule).

#### 1.1. E Climatic Fluctuation --

The refrigeration equipment and vault design shall control for all anticipated environmental changes that may occur inside the parent collection facility, mitigating the high and low temperatures and relative humidity that occurs through the year in relation to the external environment in which the parent collection facility is located in. The desired goal is to design a refrigeration system that can meet the design requirements without excessive cycling of equipment. The location and operation of blowers and ceiling fans shall minimize temperature and Rh stratification of air within the vault.

#### 1.1. F Temperature and Relative Humidity Set Points --

The desired temperature set point is 35 °F +/- 1 °F daily drift. The narrow fluctuation limit has been specified in order to minimize Rh fluctuations, and need to dehumidify, that results from wider temperature tolerances.

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

The design relative humidity (Rh) is **(INSERT ONE FOR RFP/RFQ)**

(A) Set point is 35% Rh +/- 3% daily drift.

(B) 15% to 65% Rh with no specified set point. In this situation, the need for a humidity control/dehumidification will be required only to maintain Rh levels below 65%.)

High levels of relative humidity will be controlled through a desiccant wheel due to lower energy demands. Other design proposals must demonstrate improved energy efficiency and performance.

#### 1.1. G Alarm Controls and Automatic Shutdown Controls:

An "out of range" temperature and relative humidity alarm system shall be provided along with auto-shutdown controls for the refrigeration system in case of extreme deviations that may indicate equipment failure. These alarm systems would be independent of each other and of the main controller and shall activate in the event the room temperature/or relative humidity becomes out of tolerance in either direction. All alarm and shutdown set points should be user adjustable (with appropriate password).

#### **(INSERT IF APPROPRIATE)**

The alarms will ring at a central station staffed 24/7.

##### a. Out-of-Range Temperature and Rh Alarms

Out-of-range alarms are required to indicate if the climate control is malfunctioning before a failure might occur. The temperature and Rh alarm setting/controller shall be user-adjustable and set at predetermined levels. Pre-determined alarm settings may be, for example:

- i. +/-10°F from the set point for the normal out-of-range temperature alarm.
- ii. +/-15% from the set point for the normal out-of-range Rh alarm.

##### b. Auto-Shutdown Controls for refrigeration equipment

Auto shutdown is required to prevent overheating or interior vault condensation in the event that severe equipment malfunction occurs or out-of-range alarms go unheeded and conditions worsen. The temperature and Rh auto-shutdown setting/controller shall be user-adjustable and set at predetermined levels. Pre-determined alarm settings may be, for example:

- i. Auto Shutdown for temperature:  
+/-20 °F from the pre-determined set point of the temperature.
- ii. Auto shutdown for Rh:  
+/-20 % Rh from the predetermined set point or range limits for the Rh.

#### **(INSERT ONE FOR RFP/RFQ)**

(A) For example, a vault with a set point of 35% +/- 5%, the auto shutdown Rh is 55% maximum and 15% minimum).

(B) For example, a vault maintained at 15-65% the auto shut down Rh 85% maximum and 5% minimum.

For example, for a vault with set points of 35 °F and 35% Rh, the auto-shutdown temperature is a maximum 55°F and minimum 25 °F and the auto shutdown Rh is a maximum 55% and minimum 15%Rh.

#### 1.1. H Backup Systems/redundancies--

#### **(INSERT ONE FOR RFP/RFQ)**

(A) No back up refrigeration system or desiccant wheel is required.

(B) A degree of redundancy is achieved by utilizing two independently circuited refrigeration systems, each operating at 100% of full capacity, operated on an automatic lead/lag control. In addition, two desiccant wheels each operating at 100% of full capacity, on an automatic lead/lag control are required.

#### 1.1. I Power back up Systems--

The vault shall have the design capability to be connected to a dedicated (plug-in) generator during prolonged power outages. [The expected capacity of the plug-in generator will be adequate to maintain conditions temporarily for several days.] Provide a manual transfer switch and plug for the generator.

#### 1.1. J Security Systems--

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

The security measures shall conform to that used at the collection facility. The vault access shall have a keyed access in addition to: **(INSERT ONE FOR RFP/RFQ)**

- (A) Both electronic key card access (default to lock in the event of power failure) and numeric keypad access at the entry door conforming to the type used at that facility.
- (B) Numeric Key Pad conforming to the type used at that facility.
- (C) Electronic key card (default to locked in the event of power failure) conforming to the type used at that facility.
- (D) Other (DESCRIBE)

#### 1.1. K Fire Monitoring

The vault shall incorporate a fire detection system integrated into the system used at the facility. Rate of rise detectors shall be used in the refrigerated vault.

#### 1.1 L Fire Suppression (INSERT ONE FOR RFP/RFQ)

- (A) Frost-free (dry pipe) sprinkler heads shall be tied into and extended from the existing wet pipe sprinkler system through the vault ceiling, place according to code requirements. All penetrations shall be thoroughly sealed. Provide manual shut off valve for the water line feeding the vault in an easily accessible location. (For sites with sprinkler systems and remote monitoring).
- (B) No sprinkler system or other suppression system shall be installed within the vault (For sites without sprinklers or remote monitoring, nor staff for disaster recovery).
- (C) Dedicated 3M Novec 1230 Fire protection Fluid system shall be used for the vault. (For sites without sprinklers or remote monitoring)

#### 1.1. M Instructions and Maintenance Manual –

The contractor will be responsible for providing a maintenance plan for the cold storage vault in addition to conducting a training session for government staff and maintenance contractors on proper operation and maintenance. The manual will include sequential operating instructions, routine preventative maintenance instructions and schedules, complete schematics, and sources for parts.

#### 1.1. N Commissioning--

The cold storage vault shall be commissioned during design, installation and after substantial completion to verify that all systems and controls perform as designed. A commissioning plan shall be developed early in the design process. Upon completion of the vault and before being put into service the following systems shall be commissioned: the security system, refrigeration system, panel construction and door operations, fire detection system, fire suppression, temperature and Rh alarm controls and shutdown features. Complete blower door test (air infiltration) and determine thermal half load of empty vault. All materials should meet the specifications described in the specification and approved shop drawings. Commissioning should be done by an independent commissioning agent.

## 1.2 REFERENCES

The publications listed below form a part of this scope of work to the extent referenced. The publications are referred to in the text by the basic designation only.

#### 1.2. A Code and Industry Standards-

There is generally broad consensus on museum collection protection requirements; however, there are significant conflicts between individual professional disciplines on the specific requirements. The various building codes, ASHRAE recommendations, professional guidelines and manuals maybe conflicting when judged side by side. It is the role of the contractor along with the entire design team and NPS staff to determine the best approach that offers maximum protection to the collection. This will require that all the design team members work together and not be inwardly focused on their individual discipline requirements.

#### 1.2. B NPS Museums Handbook Standards-

The National Park Service Museum Handbook Part I: Museum Collections shall be used as a general reference for this project. The standards are written in a question/answer format that provides technical

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

and practical information for managing collections. The contractor shall be familiar with the standards in order to understand the philosophical approach the NPS takes to collection preservation and management. Familiarity with the standards will better prepare the contractor for working with NPS museum staff on this project.

The handbook recommendations may be supplemented by recent research on photographic media preservation that offers improved standards and approaches to film preservation. The handbook can be downloaded from the NPS website at <http://www.nps.gov/history/museum/publications/index.htm>

#### **1.2. C National and Local Codes-**

The cold storage vault design, construction and installation shall conform to all applicable national and local codes. The work shall be executed to the highest industry standards.

The publications referenced below to the extent that are applicable are a part of this Scope of Work.

#### **AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA)**

AMCA 210 (1999) Testing Fans for Rating

AMCA 500 (1994) Test Methods for Louvers, Dampers and Shutters

#### **AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)**

ARI 410 (1991) Forced-Circulation Air-Cooling and Air-Heating Coils

ARI 750 (2001) Thermostatic Refrigerant Expansion Valves

ARI 760 (1994) Solenoid Valves for Use With Volatile Refrigerants

#### **AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)**

ASHRAE 15 (2001) Safety Code for Refrigeration

ASHRAE 17 (1998) Method of Testing Capacity of Thermostatic Refrigerant Expansion Valves

#### **AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)**

ASME B31.5 (2001) Refrigeration Piping and Heat Transfer Components

#### **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM A 525 (1993) General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process

ASTM B 75 (1999) Seamless Copper Tube

#### **AMERICAN WELDING SOCIETY (AWS)**

AWS A5.8 (1992) Filler Metals for Brazing and Braze Welding

#### **NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

NFPA 70 (2002) National Electrical Code

NFPA 72 (2007) National Fire Alarm Code

NFPA 90A (1999) Installation of Air Conditioning and Ventilating Systems

#### **UNDERWRITERS LABORATORIES (UL)**

UL 303 (1987; R 1995, Bul. 1997) Refrigeration and Air-Conditioning Condensing and Compressor Units

UL 508 (1999) Industrial Control Equipment

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

#### 1.3 QUALIFICATIONS

All work specified in this scope of work shall be performed by a firm with archival cold storage room design and construction experience. The firm shall submit certification that they have successfully completed at least five projects of comparable scope within the past 10 years. The firm shall provide contact information for the projects submitted including contact names, addresses and telephone numbers. Certification shall be submitted as part of the bid.

#### 1.4. SUBMITTALS

Refer to the Government general contract conditions for submittal requirements.

##### 1.4. A Certification of Qualifications-

Submit a certified letter attesting that the contractor is qualified as outlined above and confirming that final installation will meet or surpass the requirements stated herein.

##### 1.4 B Life Cycle Cost and Performance Analysis

Submit a list of life cycle costs and performance analysis in the pre-design proposal.

##### 1.4. C Drawings/Plans--

Construction or shop drawings to the NPS Contracting Officer showing the layout of the vault in plan and section, with large scale details at the floor sill, wall/floor junction, and wall /ceiling junction, and also showing layout of all ducting, refrigeration equipment and lines, whether inside the vault, above the ceiling or in adjacent rooms and spaces of the main curatorial facility. Show all salient construction features and details. Clearly outline all governing parameters and impacts on adjacent spaces. Include complete piping and wiring diagrams.

##### 1.4. D Preliminary Operational controls and schematic-

Submit preliminary operating manual showing control sequences, control data, and schematics.

##### 1.4. E MSDS-

Submit Material Safety Data Sheets for all materials to be used on this project.

##### 1.4. F Operating Manuals-

At time of substantial completion, furnish three complete Operating Manuals for sequential operation, start-up, shut-down, with pertinent control data and schematics, test reports, room arrangement, and any components requested by the government.

##### 1.4. G Warranties-

Warranty the installed work and mechanical system components. ((Refer to section 3.6 for specific warranty requirements.))

##### 1.4. H Meetings-

Hold necessary meetings with NPS personnel, building lessors (where applicable) and the vendor during design phase, construction, and commissioning. The first meeting shall occur during the schematic design phase, to review, discuss and confirm design approach.

##### 1.4. I Installation Testing-

The contractor will conduct all required testing, piping, wiring, installation, start-up, and adjustments required for a complete installation.

##### 1.4. J On-Site Training-

Train the NPS staff and building lessor on the operation and maintenance of the equipment and control systems.

## 1.5 SITE CONDITIONS

The contractor shall examine project conditions at the site with regard to access, dimensions, existing conditions and the general areas of the proposed work as they impact the existing parent storage facility.

NPS anticipates that demolition will be required at this site for **(SELECT A, B and/or C AS APPLICABLE FOR RFP/Q)**:

Removal of non-load bearing, office-type doors and walls Wall penetration and sealing of openings for utility conduits and/or ductwork required for the vault.

Other (DESCRIBE)

If the contractor determines that demolition may be necessary for installation of refrigeration equipment or power, the contractor shall inform the contracting officer representative (COR) during the initial project scoping period. Unless NPS indicates otherwise, the contractor shall provide for any demolition required for the vault installation in their design proposal.

## PART 2 PRODUCTS

### 2.1. FACTORY FABRICATED INSULATED WALL AND CEILING PANEL ENCLOSURE SYSTEM

#### 2.1. A Dimensions-

The design vault dimensions shall fit within the available space while allowing easy access to all refrigeration equipment and controls. The designed vault shall accommodate the projected shelving layout provided by NPS. The contractor shall inform NPS if the proposed shelving layout adversely impacts the vault design (e.g., best location of fans for air distribution etc.)

The anticipated available vault space at this site has a maximum dimension of:

\_\_\_\_ Ft. W x \_\_\_\_ Ft. L x \_\_\_\_\_ Ft. H. [**W x L x H**]

The estimated exterior size of the proposed vault is \_\_\_\_ Ft. W x \_\_\_\_ Ft. L x \_\_\_\_\_ Ft. H. (See attachment XX)

[**W x L x H**]

#### **(INSERT IN RFP/Q IF APPLICABLE)**

The estimated exterior size of the air lock at this site has a maximum dimension of:

\_\_\_\_ Ft. W x \_\_\_\_ Ft. L x \_\_\_\_\_ Ft. H. (**W x L x H**)

#### **(INSERT IN RFP/Q IF APPLICABLE)**

**[WACC VAULT SPEC]** The anticipated maximum dimension of the shelving system is slightly less than the vault interior (see attachment for diagram) permitting a side access aisle 5 Ft 6 In. W running along length the compacted mobile carriages. The height of the shelving is **Ft. H.**

The anticipated maximum overall dimension of the shelving system is: \_\_\_\_\_ Ft. W x \_\_\_\_ Ft. L x \_\_\_\_\_ Ft. H. and is slightly less than the vault interior (see attachment for diagram) permitting a **(INSERT SIDE OR CENTER)** access aisle 5 Ft 6 In. W running along length the shelving units. The height of the shelving is **Ft. H.**

Shelving layout diagram is attached.

#### 2.1. B Double-wall, insulated, pressurized, refrigerated enclosure system--

##### a. Foam-In-Place Isocyanurate or Polyurethane Panels

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

Interior and exterior skin shall be a minimum of .032" thick white painted aluminum, or .040" thick solid galvanized sheet metal, pre-painted with two coats of white polyester or modified epoxy enamel. The overall panel insulation shall be foam-in-place with a minimum "R" value of 30, preferably higher. Insulation shall bond to the panel and shall have a minimum compressive strength of 28 pounds per square inch (preferably higher) for wall and ceiling panels. Sections shall match without distortion and shall be aligned by tongue and groove joint with silicone gasket, fastened by cam lock devices, a maximum 46" apart in any direction with a minimum of 3 per joint. Provide snap-in cover for each locking device access hole.

#### b. Flooring-

The floor shall be uniformly level.

The vault floor will **(INSERT ONE FOR RFP/RFQ)**

(A) be placed directly on sealed concrete slab floor. Prior to installation of the mobile compact shelving, the floor shall be insulated with dense, rigid, solid insulation panels with a minimum R value of 7 per inch. The shelving contractor will insulate the floor as required for that installation per the mobile shelving contract.

(B) be constructed with insulated floor panels capable of withstanding an anticipated load of **(INSERT ONE FOR RFP/RFQ)**

(1) 600 lbs/SF

(2) 1000 lbs/SF load capacity that can accommodate free standing storage shelving.

#### c. Foam

All foam shall be Class 1.

#### d. Panel Thickness

The walls and roof panels shall be a minimum of 4 inches thick with a minimum R value of 30.

#### e. Flame Resistance

The Flame-Resistance Characteristics shall not exceed a rating of 25, when tested per ASTM E84 for standard time period (10 minutes)

#### f. Joints

Fabricate the vault with a minimum number of joints. Fabricate panels with tongue-and-groove construction with every tongue side including an interior and exterior foamed-in-place flexible gaskets to assure an air and vapor tight joint. Joints shall be cam-lock.

#### g. Penetrations

All penetrations must be vapor sealed. All electrical penetrations should utilize EYS seal.

#### 2.1. C Trim Items-

Fabricate from materials and finishes identical to those used in construction of insulated panel assembly, except where heavier thickness metal sheets are required to provide adequate strength to ensure a rigid assembly or closure. All trim items which separate the climate controlled interior of the cold storage enclosure from an external space shall be constructed and insulated identically to, and with the same, or heavier gauge, materials as those used for the fabrication of the cold storage enclosure panels.

#### 2.1. D Corner Panels-

Single units with a continuous outer metal skin. Corner panels shall employ a right-angle configuration with exterior horizontal dimensions of 12 inches on each side and have the same construction features and finish as the wall panels.

#### 2.1. E Structural Performance-

Design entire panel installation so that the walls are self-supporting without internal structural framing where possible. Ceiling system may be suspended from building structure above if the existing building design and construction can support it, with all suspension hardware provided by the vault contractor.

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

Ceiling system shall be capable of withstanding dead loads, without exceeding deflection of any panel joint of  $L/200$  where "L" is the span length within the completed casing structure, and capable of supporting the live load of two service technicians equipped with tools and service equipment.

#### **2.1. F Swinging Entry / Egress Doors and Frames-**

Fabricate all doors and frames of construction identical to wall panels and as follows:

##### **a. Dimensions**

The doors shall measure 80 inches high and 36 inches wide. The threshold needs to be set 3 inches above the interior floor in order to accommodate for the floor insulation and mobile storage rails

##### **b. Perimeter and Frame:**

Provide double gaskets on top and both sides of door and adjustable rubber wiper gasket on bottom edge of door.

##### **c. Anti-Condensate System**

Provide door and jamb assembly fabricated or equipped in such a manner that the assembly shall remain free of condensation under the vault operating conditions.

##### **d. Hardware**

Fabricate hardware from high-pressure die-cast zinc alloy or other corrosion resistant metal, with a chrome finish. Hinges shall be self-closing type with pin and cam design. Doors shall be equipped with an interior safety release to permit opening of the door from inside the enclosure. Provide security hardware coordinated to interface with the building security system, including all circuiting, power supplies and connections as required for operation as follows: panic exit device with exterior lever handle and electrically retractable latch, magnetic-lock, card-reader, numeric keypad, request to exit motion sensor, request to exit pushbutton device and door-position monitoring contact.

##### **e. View Port**

Provide a view port in each door. Insulated glazing shall be used. The window must be removable from the inside for easy replacement. Viewport assembly shall be fabricated or equipped in such a manner that assembly shall remain free of condensation on any surface. Provide frame and glass heating system where necessary. Clear vision area of window assembly shall have dimensions of 10 inches by 10 inches.

#### **2.1. G Service Door-**

(If required for readily-accessible access to refrigeration equipment , air filters, ductwork, etc.)

a. Fabricate service door at least thirty inches by thirty inches in size.

b. Fabricate doors of same thickness as panels.

c. Install a minimum of two ball-bearing hinges and two wedge-lever-type latches, operable from the inside and outside. Install doors to open against air pressure differential. Install neoprene gasket around entire perimeter of door frame.

#### **2.1. H Interior Lighting-**

Fluorescent lighting shall be installed in all rooms. Lights shall be supplied in either 1 or 2 Ft. Wide by 4 Ft. Long troffer, or 1 or 2 Ft. Wide by 4 Ft. Long surface-mounted configuration. The fixtures shall contain low temperature ballast. All lights shall be provided with "ultra violet" light filtering lens and the lighting level maintained at 35 foot candles (350 Lux) at 4 feet above the floor. The lighting layout shall result in a continuous even lighting across all shelving units.

#### **2.1. I Room Interior-**

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

The layout of equipment and panel systems shall be designed to maximize the storage area cubic footage while still providing easy access to the shelving units. The protrusion of refrigeration equipment into the vault space shall be minimized to the extent possible. Placement of refrigeration equipment shall maximize air distribution and minimize temperature/Rh gradients (air stratification). The location shall be coordinated with the preliminary shelving layout provided by the NPS.

#### **2.2 REFRIGERATION AND HUMIDITY CONTROL**

The refrigeration system shall be durable, energy efficient, properly sized for the space and expected loads of the vault, and designed to operate continuously over many years of service. Include all components necessary to accomplish effective, efficient, serviceable installation with thermal overload protection of compressor components. Noise abatement shall be incorporated where refrigeration equipment is located near staff work areas (e.g., a separate mechanical/equipment room with sound proofing, insulated ductwork, vibration control).

##### **(INSET ONE FOR RFP/RFQ)**

(A) No back up refrigeration system.

(B) A degree of redundancy is achieved by utilizing two independent refrigeration systems, each operating at 60% of full capacity, operated on an automatic lead/lag control. In addition, two desiccant wheels each operating at 60% of full capacity, on an automatic lead/lag control are required.

##### **2.2. A Compressor-**

Each condensing unit shall include a semi-hermetic compressor and shall be air-cooled.

##### **2.2. B Condenser-**

All condensing units shall be spring mounted. Seamless copper-tube, aluminum-fin coil, with separate and independent refrigeration circuit, is required for each compressor. Include liquid accumulator and sub cooling circuit and back seating liquid-line service access valve. Factory test coils at 450 psig. Each condensing unit shall be equipped with high/low pressure control, vibration eliminating devices on the suction and discharge line, fusible plug, liquid line dryer, moisture indicating sight glass, suction line filter, magnetic contactor on all three phase units, and all other safety mechanical devices. Select refrigerant to give optimum operation considering evaporating and condensing temperatures. Refrigerant shall conform to the latest protocol concerning its use based on ozone depletion potential. Only a Non-CFC and non ozone-depleting refrigerant shall be used.

The location and operation of blowers and ceiling fans shall minimize temperature and Rh stratification of air within the vault.

##### **2.2. C Condenser Fans**

Propeller-type vertical discharge; either directly or belt driven. Include the following:

- a. Permanently lubricated ball-bearing motors.
- b. Separate motor for each fan.
- c. Motors with thermal-overload cutouts.
- d. Dynamically and statically balanced fan assemblies.
- e. Low Ambient Control: Factory-installed fan speed control or fan cycling control in conjunction with refrigerant side flooded condenser low ambient control for operation to -20 degrees F.
- f. Condensate drain pan with adequate access for cleaning, properly sloped for drainage, and designed to prevent freezing of the line. A p-trap of sufficient depth should be installed to ensure a proper seal. A site glass may be installed to ensure that the p-trap is filled with water. Based on the site conditions at the parent collection facility and determination of best approach, condensate can be pumped/drained to one of the following:

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

- 1) open floor drain (outside the vault)
- 2) existing plumbing feature such as janitor's closet sink; restroom sink/drain
- 3) to the exterior of the building site/storm drain
- 4) evaporator pan and overflow container with an overflow alarm

#### 2.2 D Controls-

Operating and safety controls include the following:

- a. Manual reset, high-pressure cutout switches.
- b. Automatic reset, low-pressure cutout switches.
- c. Low oil pressure cutout switch.
- d. Compressor-winding thermostat cutout switch.
- e. 3-leg, compressor-overload protection.
- f. Phase loss protection.
- g. Control transformer.
- h. Magnetic contactors for compressor(s) and condenser fan motors.
- i. Automatic, non-recycling pump down and a timing device to prevent excessive compressor cycling.

#### 2.3 **AIR HANDLING SYSTEM**

Airflow within the vault shall be provided using remotely located self-contained air handler systems designed for this specific project. Coil fin spacing should be in keeping with standard commercial refrigeration practice for fin spacing at this temperature. The air handlers shall be double wall insulated construction and include belt-driven centrifugal blowers, DX coils, filter racks and dampers as required for this specific project. A single point power connection is required for all indoor equipment.

#### 2.4 **DEHUMIDIFICATION AND FILTRATION**

Humidification will not be required for the vaults.

##### 2.4 A Desiccant Dehumidifiers-

The vault dehumidifiers must be fully regenerative, non-dusting, chemical desiccant dehumidifiers, electrically reactivated and sized as required to maintain the specified Rh. Special care must be taken that the quality of the reactivation air be such that full regeneration can take place in the reactivation cycle.

The unit shall be located outside the vault. The units shall be installed (**INSERT ONE FOR RFP/RFQ**)

(A) through a duct for the return air for the refrigerant

(B) through an independent system to ensure that the desiccant's unit's internal fan will perform satisfactorily in by-pass mode.

- a. The unit shall utilize a silica gel wheel.
- b. Adequate access to the servicing side of the unit must be provided with all other ducted connections made to and from the room. All points of access to any part of the system must have adequate gasketing and cam action locks to ensure very tight seal.
- c. Fully integrate the dehumidifier ducting and controls with the overall room control system to achieve the required levels of humidity.
- d. Size ducts and dampers so as to allow the full range of adjustment as necessary. Upon start-ups, monitor humidity levels in the vault and adjust dampers regularly according to the agreed upon schedule until the vault reaches the required level.

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

- e. The waste heat generated from the desiccant dehumidifier may be exhausted into the existing parent collection storage facility if the contractor determines through engineering analysis that that the building wide HVAC system can handle the extra heat load and humidity during the cooling season. Otherwise, exhaust the heat to the exterior of the building via insulated ductwork.
- f. The waste heat generated from the desiccant dehumidifier may be exhausted into the existing parent collection storage facility for facilities requiring heating during the heating season.

#### 2.4. B Electrical-

The contractor shall verify the power capacity and provide the power design, connecting to the existing power supply in the parent collection storage facility. (NPS or FACILITY LESSOR TO PROVIDE THIS INFORMATION AS APPLICABLE). A GFI receptacle shall be installed inside the vault to support portable electrical devices such as air purifying units.

#### 2.4. C Exchange Air-

It is assumed that the vault air supply will be exchange naturally through the entrance door when the vault is used. The exchange air will be dependent upon the ambient parent facility conditions surrounding the vault location. The contractor shall verify the ambient climate conditions adjacent to the expected vault location, using the NPS facility's environmental logs.

The average condition of the parent collection facility's environment is approximately:

#### **(INSERT ONE FOR RFP/RFQ):**

- (A) Collection Storage Room set points are 65°F +/- 5°F and 35% Rh +/- 5%
- (B) Office ambient conditions are 65-75°F /20-60%Rh depending on season and day/night fluctuations
- (C) Other (DESCRIBE)

#### 2.4 D Gaseous Air Filtration

#### **(INSERT ONE FOR RFP/RFQ)**

- (A) Low static-pressure in line duct gas phase filters for the removal of acetic acid vapors are not required. Stand-alone room gas phase filter units and GFI electrical outlet may be required inside vault.
- (B) Low static-pressure, in line duct, gas phase filters (pleated type, Purafil or equivalent) for removal of acetic acid vapors are required. Manometer pressure drop instrumentation shall be used to determine when filters require removal due to particulate buildup. All openings for filter racks shall be sealed to prevent air leakage with air-tight gasketing and cam lock on the filter access door and shall be installed in the existing line of duct work. For an example of this type of system please reference the following: <http://www.purafil.com/literature/Purafil.pdf>

## 2.5. REFRIGERANT PIPING SYSTEM

Refrigerant piping, valves, fittings and accessories shall be in accordance with ASHRAE 15 and ASME B31.5. Refrigerant piping, valves, fittings, and accessories shall be compatible with the fluids used and capable of withstanding the pressures and temperatures of the service. All lines shall be installed to allow for linear expansion after start-up.

#### 2.5. A Refrigerant Pipe Tubing and Fittings-

Refrigerant shall be ACR type, hard drawn, Type L copper tubing with brazed joints. Wrought copper fittings shall conform to ASTM B 75. Refrigerant piping shall be insulated with closed cell electrometric pipe insulation sized for the refrigerant piping, ARMAFLEX or equal. All joints shall be taped.

#### 2.5. B Brazing Filler Metal-

Filler metal shall conform to AWS A5.8, Type BAg-5 with AWS Type 3 flux, except Type BCuP-5 or BCuP-6 may be used for brazing copper-to-copper.

#### 2.5. C Valves-

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

Valves shall be designed, manufactured, and tested specifically for refrigerant service. Valve bodies shall be of brass or bronze construction.

#### **2.5. D Refrigerant Shut-off Valves-**

Valves shall be of the globe or full-port ball type with a back-seating stem especially packed for refrigerant service.

#### **2.5 E Liquid Solenoid Valves-**

Valves shall comply with ARI 760 and be suitable for continuous duty with applied voltages 15 percent under and 5 percent over nominal rated voltage at maximum and minimum encountered pressure and temperature service conditions. Valves shall be direct-acting or pilot-operating type, packless, except that packed stem, seal capped, and manual lifting provisions shall be furnished.

#### **2.5 F Expansion Valves-**

Valves shall conform to ARI 750 and ASHRAE 17. Valves shall be the diaphragm and spring-loaded type with internal or external equalizers, and bulb and capillary tubing. Valves shall be provided with an external superheat adjustment along with a seal cap.

## **2.6 AIR DISTRIBUTION SYSTEM**

All ductwork and ductwork accessories associated with the cold storage vault shall conform to the latest SMACNA codes. All ductwork should be designed for a minimum of 1 inch of static pressure. All external insulation joints shall be sealed with foil backed tape. All ductwork connections shall be flanged (DuctMate or equivalent) to reduce leakage.

## **2.7 CONTROLS**

All instruments, controls, and major electrical components shall be installed in a combination controlled enclosure outside the vault door. The control panel shall have an easy-access service door for front servicing of all major electrical and instrument components. The front of the panel shall include a recessed control center with acrylic cover and lock to prevent unauthorized adjustments. In addition to control instruments, this panel shall include all circuit fusing, timers, switches, pilot lights, and the main and safety controls, alarms, and other devices required to operate the system. All control functions shall be labeled with descriptive nameplates or lenses on the control panel face. A complete schematic of the entire control system shall be mounted in the interior of the control panel.

#### **2.7. A The Control Panel Display-**

Shall include a read-out (LCD or approved) of the Temperature and Relative Humidity in the vault room, and shall include the following:

a. An operator interface (i.e. touch screen or keypad) that provides pass code controlled access to view or change all operator adjustable parameters. All operating parameters for environmental control and alarm processing shall be entered and displayed digitally on the touch screen or keypad display.

#### **b. (INSERT ONE FOR RFP/RFQ)**

(A) Display of room performance data not required (system will be monitored by 24/7 remote monitoring or dataloggers).

(B) Room performance shall be able to be monitored and displayed in a text and/or graphic mode.

c. Control system shall provide for network-based communications with a remote computer, allowing the operator to view and change room performance and setup. The control system must have available a companion software product that provides variable time-based data logging of room performance, remote set point adjustment, and security controlled access to parameter changes.

d. Control panel shall have no visible hinges or mounting hardware on its exterior. Provide hinged front service door, with a gasket seal to prevent entry of dust. Maximum allowable control panel exterior depth is 6 inches.

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

- e. Control system shall retain all operating data and parameter settings during a power interruption.
- f. Control system shall be based on a programmable logic controller (PLC) or equivalent controller device, allowing for addition or deletion of control functions without modification to the existing hardwired components. System must provide capability to change operating program or unit configuration in the field without the use of any cables or computers, or the need for a specially trained technician. Provide written sequence narrative and print out reports showing PLC or equivalent ladder diagrams, line code and /or logic diagrams of each of the program routines.
- g. Provide 5 spare analog inputs and outputs, and 5 spare digital inputs and outputs for future use. If inputs are universal, provide 10 spare universal inputs.
- h. Provide sufficient I/O to receive enable/disable signals from the existing curatorial facility Building Automation System (BAS) and fire alarm systems. Provide sufficient I/O to report operating status, and alarm status to the BAS System.

#### 2.7. B Safety and Quality Assurance-

The complete control panel assembly shall be tested and certified by a NRTL to be in accordance with NFPA 70 and UL 508. A certifying label from the testing agency shall be applied to the exterior of each control panel.

Provide as-built documentation for every control panel that details the following:

- a. Scaled illustration of the physical component layout of the control panel face and interior with designations for each component that is common to all other documentation. Terminals on each component shall be indicated and the conductors connected to each terminal documented on the drawing.
- b. Schematic of control system in ladder-type format, utilizing IEEE Standard 315 1975 (reaffirmed 1993) symbols and abbreviations, and text indicating the basic function of each logical portion of the schematic.

#### 2.7. C Temperature Control-

Regulation of room temperature shall be integrated into the PLC or equivalent controller device. All heating and cooling functions shall be controlled by this device, with display and edit of all setup and operating parameters available on the touch screen or keypad display. The vault contractor shall deliver the system completely programmed, setup, and tuned for operation at the specified temperatures.

- a. Primary temperature sensor shall be a Resistance Temperature Detector (RTD) mounted in a protective stainless steel sheath. A backup temperature sensor shall be provided, and operational features that will automatically change control loop input to the backup sensor when a failure of the primary is detected.
- b. Temperature control modes shall be run via a simple On/Off output control. Selection of operating mode shall be made with touch screen or keypad display.

#### 2.7. D Relative Humidity Control-

Humidity control and display shall be provided outside the vault with relative humidity performance as specified. Regulation of vault relative humidity shall be integrated into the PLC or equivalent controller device. All dehumidifying functions shall be controlled by this device, with display or edit of all setup and operating parameters available on the touch screen or keypad display. The contractor shall deliver the system completely programmed, setup, and tuned for operation at the specified conditions.

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

a. Relative humidity sensor with protective housing and filter to reduce contamination of the sensor element by the surrounding environment. Sensor accuracy shall be +/-2% over a 30 to 90% relative humidity range.

b. Operator shall be provided the capability to enable or disable dehumidification functions using the touch screen or keypad display.

#### **2.7. E Alarms-**

The vault shall have adjustable multiple high and low limit alarms for temperature and relative humidity. All alarm items shall have the features and functions described herein.

a. Digital edit and display of alarm set point and time delay on touch screen or keypad display.

b. Plain English text message to annunciate the occurrence of each alarm. Each alarm message shall be different from all others. Message shall remain on touch screen or keypad display until operator acknowledges alarm.

c. Audio annunciation of alarm occurrence by a piezo-electric device providing a warble tone with variable sound level.

d. An adjustable time delay which must elapse before alarm response or annunciation is executed. This shall be used to reduce the occurrence of nuisance alarms and allow alarm set points to be closer to the actual room operating condition.

e. Visual indication of alarm by flashing indicator on the touch screen or keypad display. Indicator shall appear to alert operator of an alarm condition, and remain visible until all alarms are cleared. Audio silence function shall not affect indicator status.

f. A reset function shall be provided on the touch screen or keypad display to allow the operator to immediately clear and reset all alarms.

#### **2.7. F Rate-of-Rise Fire Detector/Alarm- (INSERT ONE FOR RFP/RFQ)**

(A) A heat-of-rise fire alarm shall be linked to the existing parent collection facility Building Automation System (BAS) and connected to the off-site monitoring station staffed 24/7

(B) Other building fire alarm system available at that parent collection facility.

#### **2.7. G Audio Silence-**

Provide an audio alarm silence feature, activated by the operator on the touch screen or keypad display, including all of the functions and features described herein. Regardless of the audio silence method selected, the occurrence of a new alarm condition will cause the audio alarm to sound. Each time the audio alarm sounds, the operator may specify a different silence method or duration. Silence options are as follows:

a. Audio is silenced until the occurrence of the next alarm.

b. Audio is silenced, but will sound again when all alarm conditions clear to alert operator that conditions have returned to the normal range. Operator must then acknowledge the audio ring back at the control panel to silence it.

c. Audio is silenced for a period of time specified by the operator at the time the silence button is pressed. The maximum Silence time is 60 minutes and is digitally set in one-minute increments on the touch screen or keypad display.

#### **2.7. H Remote Alarm Relay Contacts and Monitoring Points-**

Dry alarm contacts and monitoring points shall be provided to the Building Automation System (BAS) as indicated on the control drawings and include connections to the off-site monitoring station staffed 24/7.

## National Park Service

### PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA

#### 2.7. I Safety Limit Controls-

Two layers of safety limit controls shall be provided, referred to herein as primary and secondary layers. Each layer shall have a high and low temperature limit with a separate response action time delay for each defined temperature and relative humidity limit.

#### 2.7. J Primary Layer-

Primary layer shall be implemented as part of the main logic controller, with all the features of alarms described previously in this section. This shall include, but not be limited to, time delay before alarm response is executed, plain English text message indicating the cause of the alarm, audio annunciation and silencing, and immediate resetting capability. An additional feature includes the ability to field select specific heat producing or cooling items that will be de-energized upon the occurrence of the primary limit safety alarm, preventing further heating or cooling of the room. When temperature returns to within the normal range, the affected equipment will automatically restart.

#### 2.7. K Secondary Layer-

a. Secondary layer shall consist of hardwired limit control devices separate from the PLC and all other alarm and control devices. Each shall have its own sensor and switching devices, independent from all others. Limit control relays and contactors shall not be utilized for any other function within the control system. Secondary layer limit control alarm annunciation shall have the same features as primary alarms described above. Provide functions and features as follows:

b. Low Limit: In the event of a low space temperature limit condition within the cold storage room, the safety control will directly open the compressor contactor. Limit control circuit shall have a normally open contact wired in series with the compressor contactor control signal. Systems which rely on low pressure switch action to shutdown compressor will not be accepted. When temperature returns to the normal range the system shall automatically reset. Low limit set point is digitally adjustable.

#### 2.7. L Refrigeration System Control-

Automatically alternate the operation of redundant cooling systems on the cold vault room to provide for one active system and one backup system. Normal alternation of redundant systems shall be based on lead-lag cycle sequence, with an operator accessible function on the operator interface (touch screen) that will force a changeover. Upon occurrence of a temperature alarm or compressor alarm, the active system shall shut down and the backup shall begin to operate. The normal alternation schedule of the units shall be suspended until the operator acknowledges the failure at the control panel. Detected failure of a compressor or a recurrence of a temperature alarm shall initiate parallel operation of the redundant refrigerant system(s).

#### 2.7. M Startup Control-

Control system shall provide functions that allow the power to the vault to be automatically restarted after a power interruption. Equipment startup shall be delayed by a preset adjustable time period specified by the operator based on the equipment manufacturer's specification using the touch screen or keypad display. All alarm activity except hardwired limit controls can be disabled for an adjustable preset time period after power up to allow the restarted vault to achieve its set point conditions without alarming or shutting down due to alarm response activity at a supervisory level. The time period is adjusted on the touch screen or keypad display and a visual indicator on the display will alert the operator while the inhibit function is active.

#### 2.7 N Alarm and Set point Logging-

Control system shall internally record a time and date stamped record of each alarm occurrence and each operating parameter change.

a. The log of the most recent ten alarms shall be displayed on the touch screen or keypad display when requested by the operator. If other than plain text messages are used to describe the alarm log information, provide help screens that will enable the operator to interpret the data.

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

b. The log of the most recent ten operating parameter (set point) changes shall be displayed on the touch screen or keypad display when requested by the operator. If other than plain text messages are used to describe the logged information, provide help screens that will enable the operator to interpret the data. Logged parameter changes shall include all environmental and alarm parameters.

#### **2.7 O Recorder- (INSERT IF OPTION FOR VAULT)**

Furnish and install electronic temperature and relative humidity recorder on the vault. Instrument shall have a chart range of 0 °F to +100 °F and 0 to 100% RH. Chart calibration and divisions shall be °F and percent of saturation.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

Cold storage vault, associated equipment and services shall be installed, commissioned and tested by an independent commissioning agent.

A complete set of instructions covering both assembly of the vault and installation of refrigeration equipment shall be submitted for approval prior to installation.

### **3.2 VAULT INSTALLATION CONTRACTOR FIELD SERVICES**

Furnish contractor's equipment representatives who are trained to perform the services specified. The representatives shall furnish and services on the following matters:

- a. Erection, alignment, and testing.
- b. Charging equipment with refrigerant and oil.
- c. Starting equipment and training government personnel as to its proper care, operation, and maintenance.

### **3.3 TESTS**

Perform the tests for the vault and provide everything required. Notify the Contracting Officer's Representative (COR) 10 days before performing the tests. Tests shall be supervised by a manufacturer's trained equipment representative.

#### **3.3 A Start-Up and Operational Tests-**

Start up and initially operate the systems upon completion of the installation of the equipment and refrigerant piping. Adjust the safety and automatic controls to place them in operation and sequence. Notify the Commissioning Authority 10 days in advance of each system startup. Record manufacturers recommended readings hourly. Operational tests shall cover a period of not less than 24 hours.

#### **3.3 B Performance Tests-**

Upon completion of the operational tests the systems shall be performance tested. Test duration shall not be less than 48 hours. Tests shall include the following information to be in the report with conclusions regarding the adequacy of the systems:

- a. Time, dates and duration of tests.
- b. Inside dry-bulb temperature and relative humidity maintained in each room during the test employing digital data logger, with output resolution of 0.1 °F and 1% Rh. Permanent data loggers inside the vault shall be compared and tested for accuracy against portable data loggers provided by the contractor. Data records, each consisting of the readings of all sensor values at a point in time, shall be initially logged at minimum 15 second intervals. All logged values shall be raw, with no averaging or other filtering. A minimum of 4 different locations within the room shall be logged. All sensors shall be positioned to avoid obstructions, dead space (little air flow with resulting under-compensation) or near door and fans (excessive airflow that would cause over-compensation).

## **National Park Service**

### **PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

- c. Outside dry-bulb temperature and relative humidity logged to same instrument as inside temperatures, at same frequency.
- d. Evaporator and condenser entering and leaving temperatures taken hourly with the compressors in operation. Pressure on the high and low side of the compressor should also be monitored.
- e. The make, model and serial number of each evaporator and condensing unit.
- f. Voltmeter and ammeter readings for condensing unit compressors.

#### **3.4 OPERATING INSTRUCTIONS**

Provide a framed and glazed control chart indicating a layout of the refrigeration and air handling systems, including piping, valves, wiring, and control mechanisms, including settings and set points of the controls and devices. Install control chart where directed. Submit printed instructions covering the maintenance and operation of refrigeration, air handling and dehumidification equipment. Tag shutoff valves in accordance with the printed instructions. Provide special tools as necessary for repair and maintenance of the equipment. Provide a part list and list of vendors of equipment and parts. A minimum of three sets of all pertinent operation manuals and documents should be submitted in hard copy as well as submitted in electronic form.

#### **3.5 INSTRUCTING OPERATING PERSONNEL**

Upon completion of the work and at a time designated by the Contracting Officer's Representative (COR), provide instruction for Government personnel and contract maintenance staff related to the operation and maintenance of each system. The period of instruction shall be 4 hours and if additional time is required state the charge. Submit a training itinerary to the Contracting Officer Representative (COR) and the Commissioning Authority at least 14 days before training begins. The itinerary shall include a list of people conducting the training with a description of their background and area of expertise and a copy of any materials that will be used for the instruction.

#### **3.6 WARRANTY**

- a. Contractor shall warrant entire installation of controlled environment rooms to be free from defects in materials and workmanship for 3 years after start-up. Warranty shall cover parts, labor, and travel necessary to replace or repair components found to be defective.
- b. In addition to the above warranty, Contractor shall provide a concurrent 10- year warranty for parts only covering the room enclosure and door hardware. Warranty shall provide for replacement of defective parts only, excluding abuse.
- c. Contractor shall provide a concurrent 5-year compressor replacement warranty at a minimum. Warranty shall cover the replacement of any compressor that fails due to defects in material or workmanship and shall not be in effect if misuse or abuse is in evidence. Replacement covers compressor parts only. In addition, the Contractor shall provide a 1-year parts and labor replacement warranty at a minimum on the compressor effective from the start up date. Provide estimate for extended warranties.

## Addendum

The items in this section identify broad goals the National Park Service strives to attain that should be incorporated in the vault system design process.

### 1.1. A Sustainability –

The National Park Service strives to serve as a national example of sound environmental, energy efficient and sustainable design development. The cold storage vault shall achieve a high level of environmental performance, durability and low energy use. LEED (Leadership in Energy and Environmental Design) criteria applicable to the vault design shall be used in the design process. The lifecycle performance of maintenance of materials, building components and the mechanical systems shall be addressed early in pre-design. Life cycle cost techniques shall be used to determine the level of insulation and system efficiency.

### 1.1. B Regional Factors –

Evaluation of the location for the proposed cold storage vault may identify site-specific conditions that contribute positively to the sustainability and energy efficiency of the vault. These conditions include the interior temperature and Rh levels of the collection facility, the collection facility construction type, existing environmental controls and site management. In most NPS situations, the outside environment will be stable if the vault is placed inside a collection storage area, and relatively stable if the vault is placed in office type conditions. The temperature and relative humidity controls for the cold vault system shall allow NPS to adjust the climate set points within the broader environmental parameters specified for the cold vault. This ability will allow NPS the future option to adjust the vault climate within the required temperature and Rh set points.

1.1. C Climate Fluctuation- Minimizing the amount of air intrusion will directly minimize the fluctuation of Rh. The use of an air-lock entrance vestibule air lock, (where available space permits this option), will reduce the amount of air exchanged with the surrounding interior space of the collection facility, thus minimizing short-term Rh fluctuations. The expected daily use of vaults at each site may range from a high of one door opening per hour during a standard 8 hour work day to a low of one door opening per standard 8-hour week day.

The existing facility climate is listed in Section 1.1. F

### 1.1. D Air Lock (Vestibule): (INSERT ONE FOR RFP/RFQ)

(Insert one of the below)

- (A) An air lock is not required and/or cannot be accommodated at this site due to space limitations. Other means to address air intrusion (plastic curtains, etc.) may be proposed by vendors for NPS consideration for vaults without Rh control.
- (B) **[WACC VAULT SPEC]** An air lock (not exceeding 7 Ft. 6 In.W x 17 Ft. 6 In. L) can be accommodated at this site. The air lock will function to minimize air exchange between the vault interior and surrounding facility in order to enhance energy efficiency and maintain the vault climate. The air lock shall be ABAAS-accessible with 36 in. W doors. The dimensions of the air-lock shall allow one person in a wheel chair along with a cart (3'Lx 2'Wx 3'H) to move through the vestibule into the vault with adequate space for door swings to close one door behind before opening the next door. The airlock climate will be uncontrolled (dead space). The ambient conditions of the air-lock will vary during use as air-exchange occurs with the vault and ambient outside facility space. Air-locks shall be constructed of (insert one of the following)
- (A) The same materials and techniques as the vault itself.
- (B) Frame construction, insulated and with a vapor barrier on the walls and ceiling. **[WACC VAULT SPEC]**

**National Park Service**

**PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

PHOTOGRAPHS OF THE PROPOSED COLD STORAGE VAULT LOCATION

**National Park Service**

**PERFORMANCE SPECIFICATION FOR A COLD STORAGE VAULT TO BE USED FOR FILM-BASED PHOTOGRAPHIC MEDIA**

EXISTING CURATORIAL FACILITY FLOOR PLANS