White Paper Grant #: PF-260810-18
Time-Based Media Climate-Controlled Storage Planning Grant
Project Director: Barbara Heller
Detroit Institute of Arts
December 27, 2019
Project Goals

Currently, the Detroit Institute of Arts (DIA) needs to create a dedicated storage room to preserve and protect vulnerable and fragile Time-Based Media (TBM) collection, that is, works that have duration as a dimension and unfold to the viewer over time. The TBM digital art collection includes contemporary artworks that are created by artists using video, film, slide, audio, and computer technologies (specific operating systems and software), in addition to the museum’s Research Library and Archives collection that have sound and video recordings and images in analogue and digital formats. The DIA’s Time-Based Media Team has begun to put into place plans and technical infrastructure for the storage, long-term preservation and public access/dissemination. NEH Sustaining Cultural Heritage Collections grant has enabled the DIA to advance plans to create a climate-controlled Time-Based Media (TBM) Cool and Cold Storage rooms to house and preserve the digital art collection and the audio-visual collection that is part of the museum archives.

Major goals of the project were as follows:
1) Identify and assess risks to the most vulnerable priority assets from agents of deterioration and change.
2) Complete a detailed condition assessment using the preliminary TBM collection holdings survey and assess storage needs for the entire collection that addresses their physical storage needs.
3) Determine appropriate storage location within the DIA.
4) Identify new and updated mechanical equipment and infrastructure with consultants, architects and building engineers.
5) Develop a comprehensive plan for the creation of the storage area, including refurbishment work plan and costs, and TBM collections relocation and installation staging procedures and processes.
6) Create budgeted plans for long-term maintenance and care including staffing needs and collection growth.
7) Devise a long-term preservation strategy designed for each type of TBM within both collections.

Project Accomplishments

A feasibility study was conducted to create a climate-controlled storeroom for the DIA art and archival TBM collections. Our TBM Collections span from the 1930s to the present day. It includes 16 Time-Based Media Contemporary artworks that are created by the artist using video, film, slide, audio, computer technologies (specific operating systems and software) and over 4,600 non-art/archival time-based media assets in the form of sound and video recordings in a variety of analog and digital formats. These works of art and non-art assets include both accessioned (over 800) and non-accessioned holdings as well as assets that are digital-born and analog. The 1,520 video and 3,170 audio assets encompass 14 content groups and 20 format types, including video (35mm, Data Crtrg, LD, 2", DVD, 1”, DVCAM, Beta-cam SP, 16mm, SVHS, CD, Hi8, Beta, U-matic, VHS, DV, DAT) and audio (DAT, reel to reel, CD, DVD, DP, cassette tape). The TBM Collection content includes 11 gallery installations, 13 theater performances, 28 artists’ interviews, 49 demonstrations, 55 exhibitions, 91 training videos, 137 workshop videos, 138 feature films, 352 poetry readings, 622 lectures, and 1,595 music performances.

The DIA will need to rehouse and catalogue 10,000 cubic feet of TBM assets in archival boxes/containers. The audio-visual collection consists of 99 square feet of reel to reels and 84 square
feet of video and cassettes in analogue and digital formats which require assessment and preservation. Establishing a specific, climate-controlled storage area for the art and archival assets within the TBM collections will allow the DIA to create and maintain protocols for the physical and intellectual protection of these collections. Appropriate storage for the collections will not only address preventive conservation strategies for each type of TBM item within the collection but will also provide access for future use by museum curators, outside scholars, media, and the public.

**Major Activities and Specific Objectives**

In order to develop plans for protective storage of TBM digital art collection, the DIA was first tasked with gaining a better understanding of the existing building construction and system capabilities in the areas under consideration. The TBM Team undertook the work of (1) assessing and documenting the state of primary building systems, (2) evaluating current conditions of the proposed location(s) for the Cold Room through the use of existing documentation, visual inspection, 3D laser scanning and non-invasive testing/modeling and (3) determining the museum’s capacity to accommodate the physical building changes required to create the appropriate conservation environment(s) for various collection needs.

To guide this work, the DIA engaged the SmithGroup to conduct a feasibility study for the addition of a climate-controlled space for housing of the museum’s TBM collections. Major activities included the following:

- Identify the spaces considered as the most appropriate to house the new Cool and Cold Storage rooms.
- Identify the housing and HVAC systems necessary to achieve these storage conditions.
- Identify the building infrastructure needs (power, HVAC).
- Identify required modifications to the existing building structural system.
- Identify risks associated with this installation.
- Identify overall feasibility of adding the climate-controlled rooms at the DIA.
- Develop an estimation of construction costs.

**Significant Results and Findings**

During the study, four spaces within the DIA were considered as a possible site for TBM digital art and archives storage. Three of the four locations were ruled out due to inadequate space to service HVAC equipment, difficulty accessing fire suppression piping, insufficient expulsion of heat from condensing units, and low ceilings that limit potential vertical storage space. The Multi-Purpose Space in S314, which is currently being used for art storage and the Media Lab, was determined as the best site for TBM storage, given the room’s ample ceiling height and convenient access to existing building systems and the Media Lab. Per the SmithGroup’s assessment, a disadvantage of S314 is the limited structural capacity on the third floor, which has been determined to be 125 lb/sq.ft. with a deflection of L/240. A load density of 200 lb/sq.ft. is recommended for high-density storage of film media collections however, the third floor cannot handle this load, and most high-density storage manufacturers have restrictions on the amount of deflection. With the long rows that the DIA is considering, this could become a limiting factor for this location. To address this
The feasibility study determined that two climate-controlled spaces are required to preserve the TBM digital art collection. Specifically, Cool Storage at 48° F and 35% RH (relative humidity) for films, CDs, magnetic video tapes; and Cold Storage at 18° F and 30% RH for film-based materials, such as reels and still image negatives. The SmithGroup recommends walk-in style coolers in an arrangement requiring access to the Cool Storage room through a vestibule which would serve as a transition room that staggering the opening of doors to limit the infiltration of warmer air into the Cold Storage room. This transition room would enable museum staff to slowly increase the temperature and humidity allowing art to acclimate to warmer temperatures, which would limit the potential of any damaging condensation from forming on the media. Furthermore, access to the Cold Storage room would be strictly through the Cool Storage room, with no direct path from the cold room to the museum. Such a design ensures necessary transitioning of media between environments without risking potential of condensation.

Access doors with safety latches and viewports would enable entry and exit into the storage area. Both the vestibule and storage rooms would be constructed with urethane foam injected metal panels for the floor, roof, and walls. In addition, the storage area would have a clear internal height of 14 feet with planned high-density storage shelving height of 8 feet, limited primarily by the structural capacity of the third-floor structural slab and structural framing, which has been designed to have a capacity of 125 lb/sq.ft.

Both the Cool and Cold Storage rooms are recommended to have dedicated dehumidification systems and cooling units located within the room. These systems will maintain the lower relative humidity in the space, while cooling units located in the conditioned space will maintain the lower temperature. These dehumidification systems typically consist of a refrigeration system consisting of an evaporator located within the cool room and a condensing unit located either within a mechanical room or outside the building. The condensing units have several different heat rejection options including either air side or water side heat rejection. The DIA’s mechanical rooms are currently not designed for this rejected heat, which make the third-floor location convenient for installing the condensing units on the roof.

Like the TBM Storage area, the vestibule would also be equipped with a dedicated cooling unit and dehumidifier with special controls that permit resetting temperature and humidity when transitioning media in and out of the Cool room. If the vestibule’s cooling unit and dehumidifier were to fail, museum staff could leave the door ajar between the Cool room and transition room to condition the vestibule until repairs were completed.

SmithGroup recommends installing dehumidification units as close to the room as possible to limit the process air ductwork connecting the unit with the Cool room. The reactivation air intake and exhaust can be extended to the outside of the building with a small run around loop heat exchanger to recover sensible heat from the desiccant reactivation process. Such an energy recovery approach is suggested for units in northern climates with several months of cold weather. The fans on the cooling
units would be programmed to operate 24 hours each day in order to maintain uniformity of temperature within the Cool and Cold Storage spaces.

The SmithGroup estimates that the rough order magnitude cost for this construction will be approximately $610,000.

**Dissemination of Results**

During the project period, DIA staff participated in the IMLS-funded National Digital Stewardship Alliance (NDSA) document draft that was open for comment via a Google Group, the results of which are now available online at [https://ndsa.org//activities/levels-of-digital-preservation/](https://ndsa.org//activities/levels-of-digital-preservation/). The DIA also contacted Ben-Fino-Radin, Founder of Small Data Industries, author of the AIC article on “Digital Art Storage: What Every Conservator Needs to Know.” Maria Ketcham, the museum’s Director of Research Library, Archives & Collection Information, attended a week-long workshop on Digital Preservation and a webinar given by Arkivum: Bringing Archived Data to Life. Furthermore, a museum-wide Division Tech User Group was established and continues to meet as well as the TBM team. The DIA plans to share the results of the project through scholarly articles and outreach activities with the broader community such as: white papers, case studies on the Society of American Archivists website, peer-reviewed article(s) in journals of library/archives/information management, and through conference presentations related to library, archival, and humanities fields.

In addition, the DIA will eventually share results and lessons learned in a number of professional forums, such as ListServs for the Museum Computer Network, as well as those for museum registrars, interpretive educators, librarians, photographers, and other visual resource professionals and archives. Smithsonian staff would like to collaborate with the DIA about what the museum and others are doing related to practices in conserving, preserving and digitizing time-based media assets and collection. The Smithsonian would also like to partner with the DIA to codify best practices through collaborations with other organizations on a national and international level.