

September 2, 2005

**Protocol for Conservation Treatment
Recovery of Hawaiian Maps and Unique Aerial Photographs from
Univ. of Hawai'i, Manoa Flood Damage**

Protocol for Conservation treatment for the recovery of Hawaiian and Pacific area maps from the University of Hawaii at Manoa flood damage was specified by Lynn Ann Davis, Head of UHM Library Preservation Department, with input in March 2005 from Mary Wood Lee, and May 2005 from paper conservators Debra Evans and Jeffrey Warda. Conservation treatments described in this protocol are in accordance with the Code of Ethics of the American Institute for Conservation (A.I.C.) and are described in detail in the A.I.C. Book and Paper Group Catalog, a compendium of treatment procedures.

BACKGROUND

On October 30 2004 a flood swept through the ground floor of Hamilton Library. Extensive damage was done to the building and contents. A small percentage of materials housed in this area that were selected by Library specialists for recovery and treatment including the cataloging department's Chinese-Japanese-Korean (CJK) card catalog; Hawaiian and Pacific maps (58,637; aerial photographs of Hawaii and the Pacific Islands (90,000); selected government documents; government document card catalog; archival materials; Library books including the Pineapple Research Institute publications. Following the Preservation Department's Disaster Recovery plan all of this material was immediately frozen (-4 degrees F.) in freezer containers to prevent mold growth. Freezing the material bought time to make thoughtful and professional treatment assessments; to hire qualified contractors; and to develop protocol for the treatment of water and mud damaged cultural materials. The UHM Library Preservation Department's disaster recovery plan was effective in stabilizing these materials, the Library's collections on all floors of Phase I and II, and preventing soaring costs due to mold growth in the collections.

One critical element for effective disaster recovery in Hawai'i is that there are no available Paper Conservators. UHM Library does not have the technical expertise needed to develop protocol and provide conservation treatment for valuable maps. This naturally has had an impact on all costs associated with recovery. Since January 2005 the UHM Library contracted with several conservators for the following purposes: to modify paper lab, recommend

purchase of necessary equipment and supplies, recommend the treatment protocols, and train existing staff.

UHM Library also contracted Belfor USA in Fort Worth, Texas to undertake routine disaster treatment of maps and freeze dry books, catalog cards and archival materials. There is a separate protocol for this material. The Head of Preservation has been traveling to Belfor to monitor the work on maps at that location. The materials included:

- Non-Hawaiian and Pacific maps (38,597: maps 34,355 rinsed; 4,242 surface cleaned edges)
- CJK cards (144,000 cards dried and scanned; only scans of cards returned)
- Government Documents books (824 boxes freeze drying only)
- Library books (5 boxes freeze drying only)
- Government catalog cards (10 boxes freeze drying only)
- Archival materials (10 boxes freeze drying only)

UHM Preservation Department completed Stage 1 work on 23 drawers (approx 3,100 items). This Stage 1 treatment included three drawers of folio maps, one drawer of aerial maps, and one drawer of Trust Territory of the Pacific (TTPI) maps. In February and May Conservation consultants completed preliminary work on four drawers of rare maps, and treated five rare maps to prepare them for the UHM Library's Treasures exhibition (September 2005).

The remaining material (19,795 maps and an estimated 40,000 aerial photographs) is in freezers in Hawaii at two locations (UHM and Unicol). A great deal of guess work has to go into determining project variables. The type of map (encapsulated, media, etc.) is based on information from *drawer labels only*. The number of maps per drawer (140) is based on experience at Belfor and FEMA's recommendation. UHM Library does not have an inventory of what maps are in the drawers, and the frozen maps cannot be examined without causing further damage.

UHM will be sending the non-rare Pacific Island maps to Belfor, 70 drawers, approximately 9,940 maps. Every drawer is likely to contain a variety of maps that have different treatment protocols. The Preservation Department staff will oversee transfer of materials from Unicol storage to Belfor containers. Lynn Davis will travel to Belfor to establish any additional protocol for Pacific maps, primarily what types of items they need to return to the freezer for examination and treatment. After maps have been set aside at Belfor, Ms. Davis will travel to

Fort Worth to work with a former UHM technician staff that has relocated to Fort Worth to complete basic treatment of encapsulated maps, blue prints, etc.

PROTOCOL FOR CONSERVATION TREATMENT AT UHM

The UHM Preservation Department will treat the Hawaiian maps and aerial photographs: 72 drawers, approximately 9,855 maps; 40,000 unique aerial photographs. Although this is the smallest portion of the materials to be treated, it is the most significant, heavily used, and unique materials in the UHM map collection. This material also has the greatest preservation challenges, and requires conservation expertise to provide treatment. UHM is fortunate to have a Preservation Department with a paper lab and staff to be able to initiate Stage 1 and 2 treatment of materials as defined in this protocol.

Since the disaster the lab has been modified, specialized equipment and supplies have been acquired to facilitate conservation treatments to return these damaged items to a functional level where they can be handled and used by researchers. In the case of rare maps, this term is interpreted to mean the minimum level of acceptability for exhibition.

The Preservation Department submitted a request for staffing (December 8, 2004) and equipment / supplies (by December 28, 2004). This personnel and equipment / supplies request is still the basis for completing treatment within three years (SEE UHM LIBRARY PRESERVATION DEPARTMENT MATRIX September 2005, and UHM LIBRARY PRESERVATION DEPARTMENT FEMA EQUIPMENT AND SUPPLY REVIEW September 2005). The treatment (approximately 50,000 items (maps, aerial photos) at UHM and Stage 1 treatment of approximately 40,000 items treated by Belfor) requires the following staffing:

- Preservation Department Administration
- Two reassigned Staff (UHM APT B) expertise in Stage 1-2 conservation treatment and conservation documentation
- Five temporary staff (UHM APT A three year appointment)
- Five Student Interns (10 hours a week during semester; up to 30 hrs a week during breaks; three years)
- Paper Conservator (UHM APT C two year appointment)

Conservation treatment protocol for all items has three possible stages:

- Stage 1 is basic treatment once items are unfrozen. This treatment will be carried out by UHM staff, temporary and student workers. They have been trained to set aside any items that require treatment by a Paper Conservator or senior Preservation Department staff.

- Stage 2 follows up on basic treatment by completing digital documentation, and treating items as needed. Not all materials require stage 2 treatment. This work will be carried out by reassigned UHM Preservation Department staff that has had additional training to complete this work.
- Stage 3 is only for valuable or rare maps that require conservation treatment. This work will be done by a Paper Conservator. This material is approximately 5% of the UHM maps. Because of the importance of this material and the equipment and expertise required to provide treatment while this is a small percentage of the material it represents the largest overall expense.

UHM Preservation Department did not have the specialized equipment needed to address conservation treatment at the level faced by the October 30th disaster. In addition there was only one other lab in Hawai`i at Bishop Museum, and they had on going commitments and could not lend equipment for the extended period required to complete treatment. The following pieces of equipment were purchased during the emergency recovery period. It took until March for them to arrive in Hawai`i:

- *Humidification dome and suction table; small suction table (Paper Lab)*
The humidification dome and suction table is in the paper treatment lab. It provides a dual function for the treatment of maps. It will be used primarily for Stage 2 and 3 treatments to humidify maps so that they can be flattened to meet the functional goals of the protocol. The Paper Conservation will use the suction table large (without humidification) and small suction table for a variety of treatment on maps that have soluble media, including property stamps that could further damage map.
- *Suction table (Digital Conservation Documentation)*
This cold suction table is in the photographic documentation work area and provides the safest way to position and mount large maps after treatment digital documentation. The table rotates to a nearly 90 degree angle with the suction holding the map in place. This is also provides time saving in preparing items for digital documentation.
- *Stereo Microscope (Research for protocol and on going verification of issues regarding water soluble media and photographic treatment)*
In the initial stages of the recovery, the greatest concern was the stability of the photographs that had been immersed in water and mud, and then frozen. It was not determined until January that the first priority would

be the maps. The Geography and Map consultant has spent nearly a year tracking down possible replacement for the photos. However, initially because of the stability issue the photos were the first priority, and the stereo microscope was essential to determine and document damage to the surface and layers of the photograph. This stereo microscope was selected for the excellence in resolution, ability to document magnified image to share and discuss with other colleagues, as well as (since this is a large investment) the availability of a local (Honolulu) representative that has provided training and service. It is intended to be used for establishing treatment procedures for maps with unstable media, maps that require surface cleaning, and aerial photographs.

- *Leaf casting table and software*

To fill edges and corners of large maps that were lost due to the paper being weakened by water saturation this large leaf casting table was selected to meet the functional requirement of stabilizing the maps so that they can be handled by students and researchers without causing further damage. The leaf caster provides the ability to set up production and consistently to treat similar types of maps with paper loss caused by the disaster. The software increase accuracy of the amount of paper fiber required for fills.
- *Digital Camera for Conservation Documentation*

Careful research went into the selection of a digital camera to meet the needs of documenting large maps. The Preservation Department explored a wide range of options available in the ever changing world of digital standards for documentation. We selected the camera that would capture an image at a resolution equal to the highest resolution color film. The large image size of the Canon (36MB file) is very useful for documenting large items like maps. The other issue is that the camera has a full frame sensor. The imaging area has the same dimensions used by full framed 35mm SLRs, and allows the photographer to use the sharpest fixed lenses that are designed for the least amount of distortion and the most appropriate for copywork. The lenses have the same focal length as traditional film lenses making it more easy to move between digital and film, and a better selection of lenses. After discussion with the UHM Map consultant we felt we had selected the best camera available for documenting maps (in terms of image quality) and would also retain its value for a longer period of time.

Originally the Preservation Department was looking for an off-site facility. UHM was unable to find a facility on campus to allow responsible oversight of treatment of valuable and unique materials. Therefore the Preservation Department continues to be modified to accommodate treatment of materials according to the following estimated schedule (June 1, 2005 – July 1, 2008):

- June 2005: Two reassigned Preservation Department (APT B) set up work stations for Stage 1- 2 treatment and digital documentation
- June 2005: Train Student interns (hiring and training student interns is an on-going part of the project because students graduate!)
- July 2005: Hiring and training temporary staff (3 APT A in place by October 2005)
- July 2005 – December 2006: Integrated Pest Management (monitoring damaged building and treatment of incoming books using alternative facility due to damaged treatment facility). Scheduled until new utility building and pest management freezer is replaced.
- October 2005 – March 2006: Complete Stage 2 treatment of material in Preservation Department (approximately 3,100 items) and designate materials for Stage 3 treatment by Paper Conservator; move materials to purchased freezer; complete surface cleaning of PRI materials, books and archives; dispose of aerial photos that have been identified for replacement; initiate treatment Stage 1-2 treatment of maps (approx 2,500 maps) in on-site freezer.
- October 2005 – January 2006: Research to revise protocol for treatment of aerial photos and encapsulation (Head of Preservation, and student intern). Bring two Photograph Conservators to site to work on protocol.
- November 2005 – June 2008: Hire and training temporary staff to work on collection management treatment for maps (1 APT A foldering and database documentation).
- November 2005 – June 2006: Actively recruit paper Conservator
- November 2005 – March 2006: Work in Fort Worth on protocol and treatment of Pacific island maps (Head of Preservation and consultant).
- February 2006: Hiring and training temporary staff to work on photograph treatment (1 APT A)
- April 2006 – June 2008: Complete stage 1-2 treatment on maps and photos
- July 2006 – June 2008: Hire Paper Conservator and complete Stage 3 treatment of maps (APT C)

The protocol includes the following sections:

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1. PROJECT ADMINISTRATION AND STAGE 1-2 SUPERVISION

A. Time estimate for Project Administration and Supervision : 10% total project personnel costs

B. Project Administration:

- Writing and updating protocol for treatment at UHM
- Revising protocol and reviewing off site work at Belfor USA in Fort Worth
- Writing job descriptions and hiring and supervising project staff and consultants
- Recruit Paper Conservator by working with graduate programs in conservation
- Establishing goals and reviewing progress for all work at UHM agreed upon in protocol
- Creating and maintaining treatment records and written reports on all aspects of the project
- Order supplies and maintain equipment
- Attending meetings
- Reporting progress to UHM Library Administration
- Interacting with FEMA staff on project progress

C. Supervision (all materials):

- Training staff to complete tasks
- Reviewing drawers prior to starting work to identify type of map or photograph to be worked on
- Make work assignments for staff
- Work with photographer to document materials as specified in protocol
- Review completed work and back up data files
- Make weekly reports to project administration on progress and issues
- Provide project administration monthly data for written reports.

2. LAB MAINTENANCE

A. Time estimate for lab maintenance:

- Lab maintenance is essential to work performance and will be the responsibility of one entry level technician.
- **Estimated time .5 hours per day**
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B. Supply estimate for lab maintenance

- Minor tools and supplies

C. Lab maintenance performed:

- Regular cleaning of large stainless steel sink
- Application and removal of particulate filter screen across sink
- Mud clean-up on tables and floors
- Disposal of damaged map drawers, containers and wrappers
- Construction of polyester film trays for large maps
- Regular cleaning of all surface work areas
- Grating of erasers for dry cleaning
- Drying of papers and blotters for re-use
- Cleaning of polyester web supports for re-use
- Preparation of calcium hydroxide solution
- Ordering of essential equipment and materials
- Completion of checklist forms for accelerated condition and treatment reporting
- Installation and de-installation of set-up at shared copy stand in order to produce photo-documentation

3. CONSULTANT TO PROVIDE CONSERVATION TREATMENT FOR MAPS AT BELFOR

A. Time estimate: .5 hr per map (approx. 940 maps) / 470 hrs.

B. Protocol for Consultant:

- Air dry blue prints and any other maps that have water soluble media.
- Remove maps from encapsulation.
- Rinse removing mud using established protocol.
- Air dry.

B. Belfor

- Provide workspace and supplies for consultant
- Pack and ship maps

4. INTEGRATED PEST MANAGEMENT FUNCTIONS: MONITOR & MAINTAIN ENVIRONMENT IN COLLECTION AREAS OF DAMAGED BUILDING; PROVIDE ALTERNATIVE MEANS OF PEST EXTERMINATION FOR LIBRARY MATERIALS

A. Time estimate Integrated Pest Management Functions: 2 hrs per day (300 days)

B. Supply estimate for lab maintenance

- Fans
- Dehumidifiers
- Hygrotherographs
- Data-loggers
- PC

C. Integrated Pest Management Functions performed:

- Monitor Rare Books, Closed Shelves and Maps in Phase 1 & 2 using Image Permanence Institute (IPI) Data-logger system and hygrothermographs
- Prepare reports on environment
- Control environment with fans and dehumidifiers
- Take materials to Bishop Museum for pest extermination for Library materials

5. RESEARCH ON FLOOD DAMAGED MATERIALS TO IMPROVE TREATMENT PROTOCOL

A. Time estimate research: 8 hrs per week (Faculty) for 3 months; plus student assistant 10 hrs per wk

B. Supply estimate for research

- Stereo-Microscope with camera
- PC/laptop

C. Consultants to contribute to research

- Gary Albright (Photograph Conservator, private practice; previously with Northeast Document Conservation Center)
- Lynn Gilliland (Photograph Conservator, Smithsonian)

D. Research pertinent to the conservation treatment of aerial photographs.

Problem: Stability of structure and preventing image loss.

Discussion: There has been no documented experience of dealing with large scale damage by water saturation and mud to aerial photographs. These photographs were printed on three different types of paper: fiber paper; RC paper; and an earlier type of plastic coated paper used by the U.S. government after WWII. Not only does every type of paper respond differently to water saturation and mud, but there are other variables including: batch of paper; brand of paper; chemical processing; affect of freezing on paper.

Approach:

- Review existing literature.
- Document with stereo microscope and describe damage to photos recovered and rinsed in October 2004. Document similar photos at Bishop Museum that were not damaged by disaster. Share data with photo conservators Gary Albright (private practice; previously with Northeast Document Conservation Center) and Lynn Gilliland (Smithsonian).
- Develop treatment grid for types of photos that document particular geographic areas designated for treated. Generally these photos will be from the same batch and brand of paper, and processed around the same time. Damage and response to treatment should be similar.

Outcome:

- Use research to improve identification of problems to improve treatment protocol.

- Present research at Association of Art Conservators meeting June 2006.
- Write up research for publication by ILFA, FEMA or in a professional journal.

E. Research pertinent to post treatment encapsulation of maps to prevent water breaching sealing

Problem: Maps were encapsulated (sealed with tape or ultrasonic weld) between mylar. This reversible treatment was intended to protect the maps from damage.

Discussion: An estimated 95% of the encapsulated materials were breached by the power of water. These materials sustained serious damage due mud staining and sever cockling of the paper as it expanded within the mylar structure.

Approach:

- Review existing literature.
- Do statistical analysis of encapsulated items in UHM map collection; how many sustained water damage, and what type of seal was used.
- Document damage to maps due to breaking of seal.
- Develop protocol for encapsulation of maps to decrease probability of damage by seal breaking

Outcome:

- Use research to improve identification of problems to improve treatment protocol.
- Write up research for publication by ILFA, FEMA or in a professional journal.

6. COLLECTION MANAGEMENT DOCUMENTATION OF MAPS & AERIAL PHOTOGRAPHS

A. Time estimate for collection management documentation of maps and aerial photographs:

- .20 hours per map
- .10 hours per photo

B. Supply estimate for collection management documentation of maps and aerial photographs:

- Lap top/PC

C. Collection management documentation performed:

- Enter information from maps into Excel database
- Update databases with treatment information (e.g. encapsulation removed) and location of map (e.g. map drawer no. in preservation or returned to Geography and maps).
- Photos will be entered into Excel database by folder information and count rather than by item.

7. FOLDERING MAPS (UHM and Belfor) and Aerial Photos

A. Time estimate for foldering maps:

- .20 per 10 items

B. Supply estimate for foldering maps:

- Archival map folders for groups of 1-10 maps (Map Collection supply budget)
- Boxes for aerial photos (Map Collection supply budget)
- Minor tools and equipment

C. Foldering:

- Keep information with groups of materials
- Transfer correct information to folder
- Place item (s) in folder
- Place folder in box, designated drawer or send to Geography and maps.

8. ENCAPSULATION OF MAPS

A. Time estimate for encapsulation of maps:

- 1 hour per map
- Approximately 2,500 maps from UHM and Belfor

B. Supply estimate for encapsulation of maps:

- Mylar for encapsulation of selected maps
- Apollo buffered paper
- Ultrasonic welder
- Minor tools

C. Encapsulation procedures will be updated after completion of research:

- Measure map
- Print out data on map to enclose in encapsulation
- Cut paper to fit within back of map
- Sandwich map and paper within 2 sheets of mylar
- Complete weld with Ultrasonic welder
- Trim map edges
- Round Corners

9. TREATMENT OF 19th AND EARLY 20th CENTURY MAPS (40.7%)

A. Time estimate for treatment of 19th and early 20th c. maps:

- Estimate for Stage One treatment: 3 hours per object.
- Estimate for Stage Two treatment: 1.25 hours per object

B. Supply estimate for treatment of 19th and early 20th c. maps:

- Newsprint
- Drying racks
- Blotters
- Corrugated boards for drying under weight
- Boards for distribution of weight when drying
- Paper fiber for leaf casting
- Minor tools

C. Flood damaged 19th and early 20th c. maps have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Imbedded dirt deposits
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Collection stamps that have bled through the paper and migrated laterally
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on maps while wet
- Severe cockling from drying without restraint
- Pronounced uneven planar distortions from paper expansion in polyester encapsulations
- Creases
- Surface abrasion and media loss
- Corner and edge loss (not pre-existing)

D. Many of the 19th and early 20th c. maps also have the following pre-existing conditions:

- Pressure sensitive tape attachments
- Folds
- Corner losses

E. Hand-colored 19th and early 20th c. maps may have some or all of these additional problems:

- Media that has bled into adjacent areas
- Areas with loss of colorants due to the above

F. Functioning level:

- Conservation treatment consists of two Stages to meet the minimum required to bring the 19th and early 20th c. maps to a functioning level. In some cases an additional Stage is required. Functional level is interpreted to mean a level where the maps can be safely handled by researchers, and where the content is not obscured by dirt deposits, staining and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in map treatments, except where necessary to reach the minimal functional level.

G. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

19th and early 20th c. maps receive the following treatment, in the order listed, as part of the initial treatment:

- Digital photo-documentation of each damaged flat file drawer before contents are removed and selected damaged items
- Digital photographic documentation before treatment, with details taken to document significant damages
- Thawing of groups of maps (the amount in one flat file drawer) for ~2 hours at 65 degrees F.
- Removal from damaged holders (folders and polyester encapsulations)
- If uncertain if media is stable examine for bleeding under microscope.
- Removal of mud by rinsing with a soft stream of tap water, with the map on a sheet of polyester web, supported on a slanted acrylic sheet
- Use of the following tools to aid mud removal: foam and soft brushes, brushes, sponges, and paint edgers
- Air drying on clean paper
- Flatten between blotters under weight

STAGE TWO TREATMENT:

19th and early 20th c. maps receive the following treatment as part of the secondary stage of flood recovery:

- Surface cleaning of areas with severe soil embedding
- Large dome and suction table for humidification of maps and drying between blotters under appropriate weight
- Mending of tears with Japanese tissue and wheat starch paste
- Local manipulation and flattening of creases and folded edges, using direct moisture and/or damp blotters, followed by weighted blotters
- Leaf caster to replace corner and edge loss been caused by extended exposure to water and mud
- Friction flattening of humidified map between Japanese paper and blotters, under weight
- Digital photographic documentation after treatment, with details taken to document significant damages

10. TREATMENT OF 20th CENTURY MAPS (51.9%)

A. Time estimate for treatment of 20th c. maps:

- Estimate for Stage One treatment: 1 hours per object.

B. Supply estimate for treatment of 20th c. maps:

- Blotters
- Newsprint
- Drying racks
- Blotters
- Corrugated boards for drying under weight
- Boards for distribution of weight when drying
- Paper fiber for leaf casting
- Minor tools

C. Flood damaged 20th c. maps have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Imbedded dirt deposits
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Collection stamps that have bled through the paper and migrated laterally
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on maps while wet
- Creases
- Surface abrasion and media loss
- Corner and edge loss (not pre-existing)

D. Many of the 20th c. maps also have pre-existing conditions that will be noted and only addressed if necessary to stabilize map. This will be done on UHM staff time:

- Pressure sensitive tape attachments
- Folds
- Corner losses

E. Functioning level:

- Conservation treatment consists of two stages and the minimum required to bring the 20th c. maps to a functioning level. In some cases, an additional stage is required to return maps to a functional level. Functional level is interpreted to mean a level where they can be safely handled by researchers, and where the map content is not obscured by dirt deposits, stains and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in map treatments, except where necessary to reach the minimal functional level.

F. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

G. 20th c. maps receive the following treatment, in the order listed, as part of the initial treatment:

- Thawing of groups of maps (the amount in one flat file drawer) for ~2 hours at 65 degrees F.
- Digital photo-documentation of each damaged flat file drawer before contents are removed and selected damaged items
- Removal from damaged folders
- If uncertain if media is stable examine for bleeding under microscope.
- Removal of mud by rinsing with a soft stream of tap water, with the map on a sheet of polyester web, supported on a slanted acrylic sheet
- Use of the following tools to aid mud removal: foam and soft brushes, brushes, sponges, and paint edgers
- Air drying on clean paper
- Flatten between blotters under weight
- Digital photo-documentation of selected items representing typical after treatment examples.
- Surface cleaning of areas with severe soil embedding
- Large dome and suction table for humidification of maps and drying between blotters under appropriate weight
- Mending tears with Japanese tissue and wheat starch paste
- Leaf caster to replace corner and edge loss been caused by extended exposure to water and mud

11. TREATMENT OF ENCAPSULATED 20th CENTURY MAPS WITH WATER DAMAGE (18.5%)

A. Time estimate treatment of encapsulated 20th century maps with water damage:

- Estimate for Stage One treatment: 2 hours per object.
- Estimate for Stage Two treatment: 1.25 hours per object

B. Supply estimate for treatment of encapsulated 20th century maps with water damage:

- Newsprint
- Drying racks
- Blotters
- Corrugated boards for drying under weight
- Boards for distribution of weight when drying
- Paper fiber for leaf casting
- Minor tools

C. Flood damaged encapsulated 20th century maps with water damage have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Imbedded dirt deposits
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Collection stamps that have bled through the paper and migrated laterally
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on maps while wet
- Pronounced uneven planar distortions from paper expansion in polyester encapsulations
- Severe cockling from drying without restraint
- Creases
- Surface abrasion and media loss
- Corner and edge loss (not pre-existing)

D. Many of the encapsulated 20th century maps with water damage also have the following pre-existing conditions:

- Pressure sensitive tape attachments
- Folds
- Corner losses

E. Functioning level:

- Conservation treatment conducted is the minimum required to bring the 20th c. maps to a functioning level. In the case of these maps, this term is interpreted to mean a level where they can be safely handled by researchers and where the map content is not obscured by dirt deposits and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in map treatments, except where necessary to reach the minimal functional level.

F. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

G. Encapsulated 20th century maps with water damage receive the following treatment as part of the stage one:

- Digital photo-documentation of each damaged flat file drawer before contents are removed and selected items
- Thawing of groups of maps (the amount in one flat file drawer) for ~2 hours at 65 degrees F.
- Removal from damaged holders (encapsulation)
- Removal of mud by rinsing with a soft stream of tap water, with the map on a sheet of polyester web, supported on a slant of acrylic sheet
- Use of the following tools to aid mud removal: foam and soft brushes, sponges, and paint edgers
- Air drying on clean paper
- Flatten between blotters under weight
- Digital photo-documentation of selected items representing typical after treatment examples.
- Local manipulation and flattening of creases and folded edges, using direct moisture and/or damp blotters, followed by weighted blotters
- Surface cleaning of areas with severe soil embedding
- Large dome and suction table for humidification of maps and drying between blotters under appropriate weight
- Mending of tears with Japanese tissue and wheat starch paste

12. TREATMENT OF ENCAPSULATED 20th CENTURY MAPS WITHOUT WATER DAMAGE (1.4%)

A. Time estimate treatment of encapsulated 20th century maps with water damage:

- Estimate for Stage One treatment: 1 hour per object.

B. Supply estimate for treatment of encapsulated 20th century maps without water damage:

- Minor tools

C. Flood damaged encapsulated 20th century maps without water damage have some or all of the following problems related to flood:

- Surface mud on exterior of encapsulation
- Mud within exterior edge of encapsulation

D. Many of the encapsulated 20th century maps without water damage also have the following pre-existing conditions:

- Pressure sensitive tape attachments

E. Functioning level:

- Conservation treatment conducted is the minimum required to bring the 20th c. maps to a functioning level. In the case of these maps, this term is interpreted to mean a level where they can be safely handled by researchers and where the map content is not obscured by dirt deposits and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in map treatments, except where necessary to reach the minimal functional level.

F. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators. Written instructions are provided for certain procedures.

STAGE ONE TREATMENT:

G. Encapsulated 20th century maps without water damage receive the following treatment as part of the stage one:

- Thawing of groups of maps (the amount in one flat file drawer) for ~2 hours at 65 degrees F.
- Cleaning surface mud off of encapsulated map.

- Use of the following tools to aid mud removal: foam and soft brushes, sponges, and paint edgers
- Clean exterior edge of encapsulation with cotton swabs.
- Digital photo-documentation of selected items representing typical treatment

13. SURFACE CLEANING OF MAPS WITH WATER SOLUBLE MEDIA (2.8%)

A. Time estimate surface cleaning of maps:

- Estimate for Stage One treatment: 5 hours per object.

B. Supply estimate for treatment of maps requiring surface cleaning:

- Minor tools
- Newsprint
- Brushes
- Minor tools

C. Flood damaged maps with soluble media that require surface cleaning have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Imbedded dirt deposits
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Collection stamps that have bled through the paper and migrated laterally
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on maps while wet
- Severe cockling from drying without restraint
- Creases
- Surface abrasion and media loss
- Corner and edge loss (not pre-existing)

D. Many of the damaged maps with soluble media that require surface cleaning also have the following pre-existing conditions:

- Pressure sensitive tape attachments
- Folds
- Corner losses

E. Maps with soluble media that require surface cleaning may have some or all of these additional problems:

- Media that has bled into adjacent areas
- Areas with loss of colorants due to the above

F. Functioning level:

- Conservation treatment conducted is the minimum required to bring the maps to a functioning level. In the case of these maps, this term is interpreted to mean a level where they can be safely handled by researchers and where the map content is not obscured by dirt deposits and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in map treatments, except where necessary to reach the minimal functional level.

G. Instruction of library technician staff:

Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

H. Maps requiring surface cleaning receive the following treatment as part of the stage one:

- Digital photo-documentation of each damaged flat file drawer before contents are removed, document selected items
- Thawing of groups of maps (the amount in one flat file drawer) for ~2 hours at 65 degrees F.
- Air dry maps
- Vacuum maps with large quantities of loose dirt deposits
- Use industrial cheese grater to make crumbs
- Materials recommended for surface cleaning: solid Magic Rub white vinyl erasers, coarsely ground Magic Rub eraser crumbs
- Surface clean front of map first, then reverse
- Use shaker to dispense crumbs
- Crumbs will become brown with dirt almost immediately; experience will tell when to add fresh crumbs
- Wash hands; use flattened palm of hand; gloves will interfere with sensitivity
- Manipulate crumbs lightly over media, being especially careful with graphite media
- Test paper surface in an inconspicuous area to ascertain safety of using erasers
- Augment crumb cleaning with solid eraser cleaning in areas of greater soil
- Take care to avoid streaking from aggressive use of solid eraser
- In general, rub eraser parallel to the direction of dirt that has a linear pattern

- Use care and a sharply edged solid eraser to removal dirt from creases
- Use broad soft brush to brush crumbs off map into collection box off the edge of the table
- Surface cleaning treatment should be recorded for each map. The fact that a map has been surface cleaned may not be obvious upon simple visual inspection.
- Digital photo-documentation of selected items representing typical before and after treatment examples.
- Mending of tears with Japanese paper and wheat starch paste

14. TREATMENT OF ENGRAVED AND OTHER OLDER RARE MAPS (5%)

A. Time estimate for second stage of flood recovery for engraved and other older rare maps

- Estimate for Stage Two treatment: 1.5 hours per object
- Estimate for Stage Three treatment: 10 hours per object (Paper Conservator)

B. Flood damaged engraved and other older rare maps have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Imbedded dirt deposits
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Collection stamps that have bled through the paper and migrated laterally
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on maps while wet
- Severe cockling from drying without restraint
- Pronounced uneven planar distortions from paper expansion in polyester encapsulations
- Creases
- Surface abrasion and media loss
- Corner and edge loss (not pre-existing)

C. Hand-colored engraved rare maps have some or all of the following additional problems:

- Media that has bled into adjacent areas
- Displacement or removal of pigment binders, resulting in extremely friable pigments on the surface of the paper
- Redistribution of colorants, obscuring design elements
- Areas with loss of colorants due to the above

D. Functioning level:

- Conservation treatment conducted is the minimum required to bring the rare maps to a functioning level. In the case of rare maps, this term is interpreted to mean the minimum level of acceptability for exhibition. This level also involves bringing the maps back to a condition whereby they can be safely handled by researchers. Pre-existing conditions will be

documented. They are not covered by FEMA and will not be addressed in map treatments, except where necessary to reach the minimal functional level.

STAGE TWO TREATMENT:

E. Engraved rare maps and other older rare maps receive the following treatment (when initial treatment does not require a Paper Conservator) as part of the stage one:

- Digital photo-documentation of each damaged flat file drawer before contents are removed
- Digital photographic documentation before treatment, with details taken to document significant damages
- Thawing of groups of maps (the amount in one flat file drawer) for ~2 hours at 65 degrees F.
- Removal from damaged holders (folders and polyester encapsulations)
- Removal of mud by rinsing with a soft stream of tap water, with the map on a sheet of polyester web, supported on a slant of acrylic sheet
- Use of the following tools to aid mud removal: foam and soft brushes, sponges, and paint edgers
- Air drying on clean newsprint

STAGE THREE TREATMENT (where required; trained paper conservator):

G. Additional conservation treatment steps are required on many of the maps. Treatment procedures include the following:

- Condition reports and examination, including solubility testing of media
- Surface cleaning of areas with severe soil embedding
- Large dome and suction table for humidification of maps and drying between blotters under appropriate weight
- Examination with a stereo-microscope
- Reduction of soluble collection stamps - application of organic solvents locally over blotters on the suction table or vacuum suction disk
- Washing in tap water
- Washing in tap water with one or both of the following additives: calcium hydroxide (to pH 8) and ammonium hydroxide (to pH 9)
- Light bleaching indoors using fluorescent light banks
- Mechanical reduction of accretions
- Local reduction of imbedded dirt particles - application of methyl cellulose poultice to wet paper, followed by gentle agitation with a soft brush

- Mending of tears with Japanese tissue and wheat starch paste
- Friction flattening of humidified map between Japanese paper and blotters, under weight
- Local manipulation and flattening of creases and folded edges, using direct moisture and/or damp blotters, followed by weighted blotters
- Leaf caster to replace corner and edge loss been caused by extended exposure to water and mud
- Lining maps that are extremely fragile due to extended exposure to water and mud
- Digital photographic documentation after treatment, with details taken to document significant damages

H. Colored media on some of the maps may require the following additional treatments:

- Fixing of friable media prior to subsequent conservation treatment
- Consolidation of friable media could be done with brush application of an appropriate consolidant or binder. It can also sometimes be done with the consolidant delivered as an untrasonic mist.
- Removal of stray friable media by pouncing with tiny balls of *Groomstick* or adhesive from 3M 415 tape
- Color compensation in areas of media loss (curatorial consultation required)

I. Discussion of conservation problems and solutions pertinent to the engraved rare maps damaged in the Oct. '04 flood:

Problem: Stability of colored media.

Discussion: In a sense, since all maps were washed with water to remove mud deposits in the initial stage of flood recovery, they have all been “pre-tested” for media solubility. The flood itself caused a great deal of media bleeding and loss. Technicians present during the mud removal washing reported little additional bleeding occurring from that process. Therefore, it might be expected that remaining colored media would be stable at present. However, testing indicates that some colorants remain quite soluble and will require fixing or control of moisture if they are to undergo wet treatment. In some more unusual cases it appears that there has been a displacement or removal of pigment binders from heavily applied watercolors, resulting in extremely friable pigments on the surface of the paper. Media consolidation may be necessary in these cases.

Problem: Staining of paper from displacement of media colorants.

Discussion: This is a frequent problem, especially when red media has bled. Conservation treatments to mitigate the problem include work on suction table with water and with alcohol. Isopropyl alcohol (99%) was used because it is readily available in the lab. Surface cleaning with solid vinyl Magic Rub eraser and cleaning with Magic Rub eraser crumbs was also tried. When this damage has occurred, there are large areas of extensive unstable color, which preclude the kind of washing that would be necessary if bleaching (chemical) treatments were to be undertaken. Therefore, bleaching is considered inappropriate in most cases without use of a suction table. No successful treatment for the stains from bleeding media was discovered.

Problem: Migration of ink from collection stamps and ball-point pen notations.

Discussion: This is a problem common to most all objects with soluble stamps or ink notations. The Preservation Department currently does not have a wide selection of organic solvents for testing ink solubility, but the solvents available were tested for their efficacy in reducing stains from bleeding stamps and ink inscriptions. These solvents were acetone, isopropanol, xylenes, and toluene. A suction disk was employed, but none of the solvents listed were successful in reducing the stains.

Problem: Imbedded dirt deposits.

Discussion: This is a problem common to many of the maps. The damage has the appearance of tide stains composed of brown particulate matter. In many cases the damage is disfiguring and distracts from the information presented in the maps. The imbedded dirt appears to be something removable by surface cleaning or by washing. In fact, it is quite intractable unless certain additional measures are taken. These steps can be taken if the map does not have soluble components and is suitable for wet treatment.

J. Recommended Treatment:

- Surface clean map with solid vinyl Magic-Rub erasers and eraser crumbs.
- On a polyester film overlay, using an indelible marker (such as a thin Sharpie) note areas of imbedded dirt. This is useful because the damaged areas will become less visible when the map is wet.
- Humidify and wash map.

- Transfer map from the bath, supported on polyester web or film support, to a clean table or acrylic sheet. Keep the paper as wet as possible by spraying with a Dahlia sprayer.
- Apply a poultice of methylcellulose (~4% w/v A4C) to area of imbedded dirt. Flood water over the area with sprayer. Using a soft Japanese stencil brush or watercolor fan brush, gently massage the area to release the dirt. Care must be taken to avoid disrupting the surface texture of the paper. Weakly sized paper will be far more susceptible to damage than heavily sized paper. AKD or alum/rosin internal sized paper will also be more susceptible to damage than gelatin surface sized paper.
- If necessary, a small amount of non-ionic detergent (Orvus WA paste or Triton X-80ND) can be added to the methylcellulose (MC) poultice for further dirt removal. Stir the detergent into the MC before applying.
- If the brush application of MC is not able to satisfactorily remove the dirt, hand-rolled cotton swabs can also be effective but are more abrasive to the paper surface texture. Apply the poultice/detergent to the area with a soft brush, add water and load the swab with poultice/detergent. Roll or brush with gentle agitation to avoid disrupting the paper.
- Thoroughly rinse the object on a slanted surface with running water. Agitate the treated areas with a clean soft brush (watercolor fan) while running water down the surface.
- Immerse in conditioned water to rinse more thoroughly.
- Remove from bath and wick away excess water by sandwiching the object between two large bath towels. Maintain for roughly 30 minutes.
- Transfer the object to a drying screen and allow to air dry between two sheets of polyester web.
- The above steps may need to be repeated in order to achieve an appropriate level of dirt removal as the dirt is difficult to see when the object is wet.

15. AERIAL PHOTOGRAPHS (40,000 RC paper and fiber paper)

A. Time estimate for treatment of aerial photographs:

- Estimate for Stage One treatment: .25 minutes

B. Supply estimate for treatment of aerial photographs:

- Stereo-microscope
- Blotters
- Newsprint
- Minor tools

C. Flood damaged aerial photographs (RC paper) have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on photos while wet
- Cockling from drying without restraint
- Creases
- Surface abrasion and media loss
- Dirt deposits imbedded in gelatin emulsion
- Deterioration of structure of RC paper due to extended emersion in water, and/or freezing

D. Functioning level:

- Conservation treatment consists of careful washing to meet the minimum required to bring photos to a functioning level. Functional level is interpreted to mean a level where the photos can be safely handled by researchers, and where the content is not obscured by dirt deposits, or staining.

E. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

F. Aerial photographs receive the following treatment as part of the stage one (to be updated when research is completed):

- Thawing of box of photos for ~2 hours at 65 degrees F.
- Digital photo-documentation of selected items representing typical before treatment examples.
- Removal from damaged holders (folders and polyester encapsulations)
- Maintain folder documentation with each batch of photos
- If photograph is unstable, dry on racks and examine with a stereo-microscope
- Removal of mud by rinsing with a soft stream of tap water, with the photo on a sheet of polyester web, supported on a slanted acrylic sheet
- Rinse photos in two baths of clean water. Do not let photos sit in water.
- Gently blot water off of photos.
- Air dry on drying racks
- Place blotters on top once photos are partially dry to prevent them from curling
- Digital photo-documentation of selected items representing typical after treatment examples.

16. OVERSIZE AERIAL PHOTOGRAPHS (1,085 FIBER & RC BASE)

A. Time estimate for treatment of oversize aerial photographs:

- Estimate for Stage One treatment: .30 minutes

B. Supply estimate for treatment of oversize aerial photographs:

- Stereo-microscope
- Blotters
- Newsprint
- Minor tools

C. Flood damaged oversize aerial photographs have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on photos while wet
- Cockling from drying without restraint
- Creases
- Surface abrasion and media loss
- Dirt deposits imbedded in gelatin emulsion
- Deterioration of structure of paper due to extended emersion in water, and/or freezing

D. Functioning level:

- Conservation treatment consists of careful washing to meet the minimum required to bring photos to a functioning level. Functional level is interpreted to mean a level where the photos can be safely handled by researchers, and where the content is not obscured by dirt deposits, or staining.

E. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

F. Aerial photographs receive the following treatment as part of stage one (to be updated when research is completed):

- Thawing of box of maps for ~2 hours at 65 degrees F.
- Digital photo-documentation of selected items representing typical before treatment examples.
- Removal from damaged holders (folders and polyester encapsulations)
- Maintain folder documentation with each batch of photos
- If photograph appears unstable, dry on racks and examine surface with a stereo-microscope
- Removal of mud by rinsing with a soft stream of tap water, with the photo on a sheet of polyester web, supported on a slanted acrylic sheet
- Rinse photos in two baths of clean water. Do not let photos sit in water.
- Gently blot water off of photos.
- Air dry on drying racks
- Place blotters on top once photos are partially dry to prevent them from curling
- Digital photo-documentation of selected items representing typical after treatment examples.

17. PINEAPPLE RESEARCH INSTITUTE (PRI)

A. Time estimate for treatment of PRI materials:

- Estimate for Stage One treatment: 10 hours per cubic foot

B. Supply estimate for treatment of PRI materials:

- Minor tools
- Newsprint

C. Flood damaged PRI materials have some or all of the following problems related to flood:

- Heavy depositions of dirt
- Imbedded dirt deposits
- Surface soil
- Accretions – localized accumulations of debris
- Tide stains, some containing visible particulate dirt
- Severe patterns of discoloration related to long-term localized contact with water
- Collection stamps that have bled through the paper and migrated laterally
- Transfer of media or collection stamps from adjacent collection materials
- Tears due to stresses placed on paper while wet
- Creases
- Corner and edge loss (not pre-existing)

D. Functioning level:

- Conservation treatment conducted is the minimum required to bring the PRI materials to a functioning level. In the case of these materials, this term is interpreted to mean a level where they can be safely handled by researchers and where they are not obscured by dirt deposits and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in treatments, except where necessary to reach the minimal functional level.

E. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

F. Surface cleaning of PRI materials as part of the stage one:

- Vacuum maps with large quantities of loose dirt deposits
- Use industrial cheese grater to make crumbs
- Materials recommended for surface cleaning: solid Magic Rub white vinyl erasers, coarsely ground Magic Rub eraser crumbs
- Surface clean front of map first, then reverse
- Use shaker to dispense crumbs
- Crumbs will become brown with dirt almost immediately; experience will tell when to add fresh crumbs
- Wash hands; use flattened palm of hand; gloves will interfere with sensitivity
- Test paper surface in an inconspicuous area to ascertain safety of using erasers
- Augment crumb cleaning with solid eraser cleaning in areas of greater soil
- Take care to avoid streaking from aggressive use of solid eraser
- In general, rub eraser parallel to the direction of dirt that has a linear pattern
- Use care and a sharply edged solid eraser to removal dirt from creases
- Use broad soft brush to brush crumbs off paper into collection box off the edge of the table
- Surface cleaning treatment should be recorded for each group of PRI material. The fact that the material has been surface cleaned may not be obvious upon simple visual inspection.
- Mending of tears with Japanese paper and wheat starch paste

18. GOVERNMENT DOCUMENTS AND LIBRARY BOOKS FROM BELFOR

A. Time estimate for Gov Docs and Library Bks from Belfor:

- Materials freeze dried by Belfor
- Estimate for Stage One treatment at UHM: .25 per book (approx. 100 bks)

B. Supply estimate for treatment of Gov Docs and Library Bks from Belfor:

- Newsprint
- Minor tools

C. Flood damaged 1 Gov Docs and Library Bks from Belfor have some or all of the following problems related to flood:

- Deposits of dirt
- Surface soil

D. Functioning level:

- Conservation treatment conducted is the minimum required to bring the books to a functioning level. In the case of these books, this term is interpreted to mean a level where they can be safely handled by researchers and where they are not obscured by dirt deposits and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in treatments, except where necessary to reach the minimal functional level.

E. Instruction of library technician staff:

Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

F. Surface cleaning of PRI materials as part of the stage one:

- Vacuum maps with large quantities of loose dirt deposits
- Use industrial cheese grater to make crumbs
- Materials recommended for surface cleaning: solid Magic Rub white vinyl erasers, coarsely ground Magic Rub eraser crumbs
- Surface clean front of book first, then reverse
- Use shaker to dispense crumbs
- Crumbs will become brown with dirt almost immediately; experience will tell when to add fresh crumbs
- Wash hands; use flattened palm of hand; gloves will interfere with sensitivity

- Test paper surface in an inconspicuous area to ascertain safety of using erasers
- Augment crumb cleaning with solid eraser cleaning in areas of greater surface soil
- Take care to avoid streaking from aggressive use of solid eraser
- In general, rub eraser parallel to the direction of dirt that has a linear pattern
- Use care and a sharply edged solid eraser to removal dirt from creases
- Use broad soft brush to brush crumbs off map into collection box off the edge of the table
- Surface cleaning treatment should be recorded for each book. The fact that a book has been surface cleaned may not be obvious upon simple visual inspection.

19. UNIVERSITY OF HAWAII (UHM) ARCHIVES FROM BELFOR

A. Time estimate for treatment of UHM Archives:

- Materials freeze dried by Belfor
- Estimate for Stage Two treatment: 2 hr cubic ft.

B. Supply estimate for treatment of UHM Archives:

- Newsprint
- Minor tools

C. Flood damaged UHM Archives from Belfor have some or all of the following problems related to flood:

- Archives were somewhat protected from mud by boxes and bags since they had just been removed from the freezer for pest extermination.
- Deposits of dirt
- Surface soil

D. Functioning level:

- Conservation treatment conducted is the minimum required to bring the archives to a functioning level. In the case of these archives, this term is interpreted to mean a level where they can be safely handled by archives staff and where they are not obscured by dirt deposits and tight creases. Pre-existing conditions will be documented. They are not covered by FEMA and will not be addressed in treatments, except where necessary to reach the minimal functional level.

E. Instruction of library technician staff:

- Skilled library conservation technicians are instructed in various procedures in order to safely carry on selected treatments in the absence of supervising conservators.

STAGE ONE TREATMENT:

F. Surface cleaning of PRI materials as part of the stage one:

- Vacuum exterior each archival folder to remove with large quantities of loose dirt deposits
- Use soft brushes to clean individual folders.
- Mark location in folder and set aside any damaged non-paper materials.
- Digital photo-document process.

20. EQUIPMENT AND MATERIALS

A. Large equipment used for the conservation treatments outlined including the following:

- Large washing sink
- Lights over washing sink
- Suction disk for treatment on small maps, archives
- Suction table with dome for humidification and treatment of large maps
- Ultrasonic humidifier for suction table with dome
- Suction table with rotating access for mounting maps for after treatment digital documentation.
- Leaf caster to replace corner and edge loss been caused by extended exposure to water and mud
- Stereo-microscope to examine surface to determine stability of media
- Drying Racks
- Work Tables
- Lab chairs
- Fumigation hood (if needed for chemical treatment)
- Ultra-sonic welder for encapsulation
- Board shears to cut paper and mylar
- Light bleaching station
- Storage for blotters, board and reemay
- Digital camera and lights for before and after treatment documentation
- PCs (three) and laptops (three) for work stations (travel to Belfor, offsite work; treatment areas; stereo-microscope; conservator; administration) to document treatment and write reports.
- Vacuum for surface cleaning

B. Small equipment used for the conservation treatments outlined including the following:

- Stainless steel trays
- Large Acrylic trays
- Acrylic sheets and slanted supports
- Small brushes, spatulas, scalpels
- Japanese smoothing brush
- Glassware
- Industrial cheese grater
- Stirring hot plate
- Scale
- Floor mats
- Opti-visors

C. Materials employed for the conservation treatments outlined including:

- Wheat starch paste
- Calcium hydroxide
- Distilled water for ultrasonic humidifier
- Methylcellulose A4C
- Ammonium hydroxide
- Isopropanol
- Polyester film (Mylar) 2mil, 3mil, 4mil, 5mil
- Polyester web (Reemay)
- Japanese tissue
- Blotters, normal and thick
- Newsprint
- Magic-Rub erasers
- Magic-Rub eraser crumbs, pre-made (for training May 2005)
- Groomstick
- Triton X-80ND

NOTE: Supply & Equipment list has not been updated. See FEMA Review Spreadsheet for current information.