



# **National Park Service Standard Exhibit Fabrication Specifications**

Department of Exhibits  
Harpers Ferry Center  
Harpers Ferry, West Virginia

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## Division 1. PROJECT MANAGEMENT

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### 1.1 Introduction

Schedule, coordinate, oversee, and manage work produced and installed under this contract.

### 1.2 Contacts

The Project Manager shall be the single point of contact between the Contractor and the National Park Service (NPS) Contracting Officer's Technical Representative (COTR).

### 1.3 Specific Requirements

The Contractor's Project Manager shall be in contact with the COTR, Harpers Ferry Center, on no less than a weekly basis. The Project Manager shall perform the following work:

- A. **Quality Control** - Provide quality control to ensure that all elements of project work meet the requirements of the contract specifications and that all modifications are implemented. Provide routine inspections of shop-fabricated work and subcontracted work. Oversee quality of all work during installation. Ensure that all work not acceptable or compliant with the specifications is corrected prior to inspection or review by the COTR.
- B. **Schedule** - Track work progress to ensure that the project is completed according to the schedule. Coordinate and confirm the dates for shipment, delivery, and installation of the work at the exhibit site with the COTR.
- C. **Meetings** - Meet with the Contracting Officer and COTR in accordance with this Division, 1.4, Meetings and Inspections, and as specified in individual Task Orders.
- D. **Travel** - In accordance with this Division, 1.5, Travel, and as specified in individual Task Orders.
- E. **Government-Furnished Materials** - Receive all Government-Furnished materials and inspect the materials to ensure that the quality is suitable for use in the exhibit. The Project Manager shall notify the COTR immediately if Government-Furnished materials are not received in sufficient time to meet critical milestones, if damaged, or when use of the material would result in an unsatisfactory product.
- F. **Organize Resource Materials** - Identify and compile all resource material into a production package and ensure that this material is forwarded to the appropriate unit or person within the Contractor's organization for use in the project.

## Division 1. PROJECT MANAGEMENT

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- G. **Submittals** - Coordinate all Contractor's submittals and review them for legibility, accuracy, completeness, and compliance with contract requirements. Forward all submittals to the COTR for review and approval. Receive all reviewed submittals and take appropriate action according to the approval or rejection by the COTR.
1. Approved Submittals - Ensure that all changes, revisions, or additions are noted, and Fabrication Drawings and instructions are updated and forwarded to the COTR.
  2. Rejected Submittals - When submittals are rejected, the COTR will notify the Project Manager, in writing, identifying the reasons for rejection. The Project Manager shall revise and/or correct and resubmit, identifying changes.
- H. **Final Inspection** - Inspect completed work, including that of subcontractors, prior to final inspection by the COTR and shipment to the site. Ensure that all elements of the project are complete and ready for the final inspection. The Project Manager shall notify the COTR prior to the inspection if any elements will not be ready for final inspection as scheduled.
- I. **Delivery and Installation** - Ensure that all work is delivered and installed as scheduled. In the event that the COTR reports problems during or after shipment, delivery, and/or installation, the Project Manager shall:
1. Determine the nature of the reported problem, damage, or production error and provide a proposal for resolution to the COTR for review and approval; and
  2. Ensure that approved corrections or repairs are made in a satisfactory manner within the time scheduled by the COTR.
- J. **Closeout Package** - Compile, prepare, and forward a closeout package to the COTR in accordance with Division 9, Project Closeout.

### 1.4 Meetings and Inspections

The Contractor's Project Manager shall meet with the Contracting Officer and COTR as specified below and in individual Task Orders. After all scheduled meetings, the Project Manager shall prepare and provide written documentation to the COTR enumerating all issues discussed and decisions made relative to the project.

## Division 1. PROJECT MANAGEMENT

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- A. **Postaward Conference** - The minimum agenda for this meeting will include the following:
1. General project review, including discussion of the following:
    - a. Contracting Officer and COTR responsibilities;
    - b. Specifications and other work requirements;
    - c. Special contract requirements;
    - d. Correspondence procedures;
    - e. Subcontractors;
    - f. Delays and extensions;
    - g. Contract modifications;
    - h. Changes;
    - i. Submittals;
    - j. Project schedule;
    - k. Orientation to the park, including key personnel, location, and special conditions onsite; and
    - l. Billing and payment procedures.
  2. Review of exhibit plan and design.
  3. Review of Government-Furnished reference and source materials.
  4. Provide Government-Furnished material to the Contractor, including drawings, plan documents, reference and source materials, and other related materials.
  5. Inspect and measure artifacts, verifying final dimensions.

## Division 1. PROJECT MANAGEMENT

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- B. **Progress Meetings and Inspections** - The COTR will schedule progress meetings to coincide with project work inspections at the Contractor's facility. The minimum agenda for the progress meetings will include the following:
1. Inspection of work in progress and completed work;
  2. Identification of problem areas and discussion of proposed solutions;
  3. Review of schedule;
  4. Discussion of planned progress during succeeding work period; and
  5. Discussion of work standards and practices to maintain quality.
- C. **Pre-installation Meeting** - The COTR will meet with the Project Manager, Installation Team, and others of the Contractor's staff, at the Contractor's facility, prior to shipping and installation of the exhibits. The minimum agenda for the Pre-Installation Meeting will include the following:
1. Inspection of the fully setup staged exhibits as specified in Division 8, Setup and Installation.
  2. Review of existing conditions at the installation site, identifying potential problems and proposed solutions.
  3. Review of installation schedule, including:
    - a. Sequence in which work will be shipped, unloaded, setup, and installed; and
    - b. Projected work schedule onsite, including working days and hours.
  4. Review of Preliminary Maintenance Manual in accordance with Division 9, Project Closeout.

### 1.5 Travel

The Project Manager shall travel to Harpers Ferry Center, Harpers Ferry, West Virginia, to the park site, or to other locations as specified in individual Task Orders in order to attend meetings and perform other duties required under the contract.

## Division 1. PROJECT MANAGEMENT

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- A. **Postaward Conference** - The Project Manager shall travel to Harpers Ferry Center, Harpers Ferry, West Virginia or to the park site in order to attend the Postaward Conference. The location will be specified in individual Task Orders.
- B. **Site Visits** - The Project Manager shall travel to the park to meet with the COTR and review existing conditions prior to fabrication of the exhibits. The Project Manager shall make additional trips to the site as specified in individual Task Orders in order to review conditions that have changed or to examine artifacts not available to be viewed previously. At a minimum, the Project Manager shall perform the following:
  - 1. Assess existing conditions for onsite work. Take detailed measurements of the exhibit space to ensure proper fit of all exhibit elements. The Contractor shall assess locations of heating and ventilation ducts, doors, windows, lighting fixtures, wall switches and controls, security system alarms and sensors, changes in floor level, floor finishes, ceiling beams, building structures and finishes, and other elements which impact on proper fit and operation of the exhibits;
  - 2. Assess existing conditions which impact on the installation of the exhibits, including: unloading areas, doorway clearances, curbs, stairs, elevators, available storage areas, available areas for setup of power tool work stations, offsite facilities for disposal of debris, parking, and local availability of food, gas, hardware, and other supplies and services;
  - 3. Assess existing electrical and lighting systems for determination of their impact on installation and operation of all exhibit elements; and
  - 4. Inspect and measure artifacts, verifying final dimensions.
- C. **Installation** - Travel to the park to oversee installation of exhibits at the site by the Installation Team in accordance with Division 8, Setup and Installation, and to submit the Final Maintenance Manuals to the COTR, in accordance with Division 9, Project Closeout.

## Division 2. FABRICATION DRAWINGS

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### 2.1 Introduction

Provide drawings for review and approval detailing proposed fabrication of all structures indicated in the Government-Furnished Exhibit Design Drawings and other elements as specified in individual Task Orders. Provide drawings documenting fabrication of the completed exhibits, including illustrations describing operational and maintenance procedures.

### 2.2 Specifications

- A. **Review all measurements** relating to the fabrication and installation of work required under this contract.
- B. **Prepare Preliminary and Final Fabrication Drawings.** Incorporate all changes required into Final Fabrication Drawings and all additional elements specified in individual Task Orders that were not included in the Exhibit Design Drawings. Fabrication Drawings shall include the following that are changed from, or in addition to, the Government-Furnished Exhibit Design Drawings:
  - 1. Plan, Elevation, and Section View Drawings indicating final dimensions and layouts;
  - 2. Materials, Finishes, Colors, and Hardware identified, including manufacturer's name and associated color, finish, or product identification number. Provide up-to-date information on all colors, finishes, and products; and
  - 3. Exhibit Elements in Drawings Identified and Numbered in accordance with original Government-Furnished Exhibit Design Drawings and in accordance with Attachment B, Exhibit Numbering System Guidelines.
- C. **Execute Isometric Drawings** to illustrate access into the exhibits for maintenance and repairs by the park staff. Drawings include, but are not limited to, access into all exhibit artifact cases, audiovisual equipment, lighting equipment, and storage areas inside the exhibits. The Isometric Drawings shall be incorporated into the Exhibit Maintenance Manual in accordance with Division 9, Project Closeout.
- D. **Prepare Artifact Mount Drawings**, in accordance with Division 7, Conservation Guidelines.
- E. **Prepare As-Built Drawings** in accordance with Division 9, Project Closeout.



## **Division 2. FABRICATION DRAWINGS**

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### **2.3 Materials**

The Contractor shall provide all materials for the production of work included in this division.

### **2.4 Execution**

#### **A. Drawing Technique - General**

Drawing sheet size shall match the Government-Furnished Exhibit Design Drawings, since the Contractor's Fabrication Drawings will be incorporated with the Exhibit Design Drawings by the NPS upon completion of the project. Because completed drawings are entered into the Government microfilm system, the Contractor shall prepare them so they can be reproduced as clear and legible half-size prints. The Contractor shall use American National Standards symbols. Each drawing shall be identified with the park name, project name, exhibit number, and date of submittal.

#### **B. Preliminary Fabrication Drawings**

The Contractor shall prepare and submit, for review and approval by the COTR, Preliminary Fabrication Drawings in quantities of copies as specified in individual Task Orders.

#### **C. Final Fabrication Drawings**

As specified in individual Task Orders, the Contractor shall prepare and submit Final Fabrication Drawings incorporating all corrections or revisions required by the COTR. If Final Fabrication Drawings are not specified in individual Task Orders, all corrections and revisions shall be incorporated into the As-Built Drawings.

## Division 2. FABRICATION DRAWINGS

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### D. **Isometric Drawings**

The Contractor shall prepare Isometric Drawings for inclusion into the Maintenance Manual in accordance with Division 9, Project Closeout. The Isometric Drawings shall illustrate access into exhibit artifact cases, audiovisual equipment, lighting equipment, storage areas within the exhibits, and any other maintenance and operation procedures which require illustrations to supplement the written instructions. The drawings shall be prepared for an 8-1/2" x 11" format, punched for a three-ring binder. The drawings shall include notations to clearly communicate the step-by-step procedures for operating locking mechanisms, opening access doors, removing silica gel, replacing lamps, and all other relevant maintenance procedures. The Contractor shall be responsible for making the instructions accurate and clear for the park staff. The alternative use of photographic images to illustrate the instructions instead of drawings is acceptable if the images provide equal or greater clarity of information.

### E. **Artifact Mount Drawings**

In Task Orders in which artifact mounting is included in the scope of work, the Contractor shall provide Artifact Mount Drawings for review and approval by the COTR. The drawings shall illustrate all custom hardware to be used to mount artifacts in the exhibit, identifying relevant artifact number, dimensions, materials, and finishes. Where identical mounts are to be used for multiple artifacts, the Contractor may submit a typical drawing that identifies the artifacts referred to by number. Materials and finishes shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines and Division 7, Conservation Guidelines, of these Specifications.

### F. **As-Built Drawings**

The Contractor shall prepare a completed set of As-Built Drawings containing all approved revisions and additions to the Preliminary Fabrication Drawings and any subsequent changes to the original plan. The As-Built Drawings shall be submitted in the Closeout Package in accordance with Division 9, Project Closeout. All original drawings produced under this contract will be the property of the Government.

## Division 3. SAMPLES/MOCK-UPS/PROTOTYPES

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### 3.1 Introduction

Provide samples for all materials, colors, and finishes specified for the exhibits. Fabricate mock-ups and prototypes as specified in individual Task Orders.

### 3.2 Specifications

A. **Samples** - All samples shall be identified with the brand name, number, color name and number, and the manufacturer's name, address, and telephone number. Sample sizes shall be a minimum of 12" x 12" or as specified in individual Task Orders.

1. Finish Samples -

- a. Paint - Paint colors mixed to match the specified exhibit color, applied to substrate of same material to be used in the exhibit. All samples shall be identified with exhibit color number.
- b. Plastic laminate
- c. Wood - Solid wood or wood veneer finish in specified species of wood and thickness and with specified finish, such as stain, sealant, or oil finish.
- d. Metal - Finish and metal specified, including but not limited to, paint, powder coating, patina, and anodized finish.

2. Graphics - Graphic media, including but not limited to, samples of mounted or overlaminated digital and photographic prints, screen printing, porcelain enamel, etched glass, vinyl cutouts, and fiberglass embedments. Graphic media samples shall represent typical images, colors, and typography specified in the exhibit.

3. Glazing - Glass or acrylic glazing, in specified type and thickness.

4. Gasketing for Artifact Cases - One-foot long sample of each type of gasketing to be used

5. Models - Including topographic models, natural history models/dioramas - as specified in individual Task Orders. Samples of models shall represent the actual materials, finishes, and colors from which the model will be made.

### Division 3. SAMPLES/MOCK-UPS/PROTOTYPES

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6. Mannequins - Cast from live models (real people), samples shall include photographs of the people from whom the castings are to be made. Samples of finishes and colors for mannequins shall be provided in the same materials from which the mannequin surface will be fabricated.
- B. **Digital Output Graphic Proofs** - In accordance with Division 6, Graphics.
  - C. **Catalog Cuts** - Catalog cuts shall be provided for all specialized hardware and off-the-shelf items provided by the Contractor, including:
    1. Lighting fixtures and associated hardware;
    2. Electronic and electrical equipment and hardware, including audiovisual equipment, computer systems, control systems, cables, pushbuttons, and ventilation fans;
    3. Security hardware and locks;
    4. Specialized cabinet hardware, including hinges, casters, drawer pulls, door handles, levelers, etc.; and
    5. Specialized fasteners, including cable hanging systems, wall or floor anchors, and other fasteners specified for anchoring or supporting exhibit structures in place.
  - D. **Mock-ups** - Mock-ups are full-scale representations of portions of an exhibit for the purpose of review and testing of exhibit elements that are undeveloped and need further evaluation. Mock-ups shall be fabricated as specified in individual Task Orders. Mock-ups are for review only, and shall not be incorporated into the final exhibit.
  - E. **Prototypes** - Prototypes are portions of an exhibit such as an artifact case or an interactive mechanism that has a particular need to be reviewed and tested prior to fabrication of more elements of the same design. Unless otherwise specified in individual Task Orders, prototypes shall be corrected, in accordance with the review and approval by the COTR, and incorporated into the final exhibit along with the other elements of the same design.

## Division 4. EXHIBIT STRUCTURES

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### 4.1 Introduction

Provide fabrication of all exhibit elements including cabinetry, panels, platforms, artifact cases, vitrines, or other elements which constitute the basic structural elements of the exhibits.

### 4.2 Quality Assurance

Refer to the Architectural Woodwork's Institute (AWI) Quality Standards for cabinetry and laminate work. All manufacturer's printed recommendations for materials, coatings, and adhesives are a part of these specifications. Copies of the publication, AWI Quality Standards, are available from:

Architectural Woodwork Institute  
1952 Isaac Newton Square  
Reston, Virginia 20190  
703-733-0600  
[www.awinet.org/](http://www.awinet.org/)

All materials and fabrication methods for artifact cases, including all structures to be installed inside artifact cases, shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines.

### 4.3 Product Handling

Store lumber and millwork in a dry location. Do not expose wood to extreme changes in temperature or humidity. Protect panels, cases, and other structures from damage during shipping, handling, production, storage, and installation.

### 4.4 Materials

- A. **Wood Products** - As specified on the drawings and in accordance with the following.
1. Plywood - For exhibit finish substrate and structure use American Plywood Association (APA) Grade B or better, Birch veneer plywood, sanded and touch-sanded, 3/4" thick. In areas where moisture is a factor, use marine grade birch plywood. Bending plywood shall be used for curved surfaces.

## Division 4. EXHIBIT STRUCTURES

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2. Medium Density Fiberboard (MDF) - Artifact case interiors and pedestals or platforms for use inside artifact cases shall be fabricated from Medite II, manufactured with a formaldehyde-free binder which meets the requirements of ANSI A208.2-1994, product class MD. Medite is manufactured by:

Sierrapine, Ltd.  
2151 Professional Drive, Suite 200  
Roseville, California 95661  
800-676-3339  
www.sierrapine.com

3. Hardboard - tempered on both sides, as manufactured by:

Masonite Corporation  
1 South Wacker Drive  
Chicago, Illinois 60606  
800-323-4591  
www.masonite.com

4. Framing Lumber - Number 2 Grade Poplar, Douglas Fir, or Number 1 Grade Southern Pine.

**B. Plastics** - As specified on the drawings and in accordance with the following.

1. Artifact Vitrines - Plastic glazing for artifact cases or vitrines shall be clear, UV-filtering cast acrylic sheet, as specified below.

Plexiglas, UF-3, as manufactured by:

Atofina Chemicals, Inc.  
2000 Market Street  
Philadelphia, Pennsylvania 19103-3222  
215-419-7000  
www.atofina.com

## Division 4. EXHIBIT STRUCTURES

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Acrylite OP-2, as manufactured by:

CYRO Industries  
100 Enterprise Drive  
7th Floor  
P.O. Box 5055  
Rockaway, New Jersey 07866  
800-631-5384  
973-442-6000  
www.cyro.com

2. Subsurface Laminated Graphics - Clear, UV-filtering, cast acrylic sheet, as specified above, in thickness and surface texture as specified on the drawings.
3. Specialty Acrylic Sheet - Colored, diffusing, and Non-Glare acrylic, as manufactured by Atofina Chemicals, Inc., or CYRO Industries, as specified above.
4. Moderately Expanded PVC Sheet - Moderately Expanded PVC Sheet **shall not** be used for fabrication of any elements which are to be installed in the interior of an artifact case, including panels, pedestals, or graphic substrates.

C. **Metals** - As specified on the drawings and in accordance with the following.

1. Steel - Steel for fabrication of exhibit structures shall be as recommended by the American Society for Testing and Materials (ASTM) for the application specified.

American Society For Testing and Materials  
100 Barr Harbor Drive  
West Conshohocken, Pennsylvania 19428-2959  
610-832-9585  
www.astm.org

2. Aluminum - Flat plate shall be anodized. Extrusions for structural supports shall be 6060-T or 6063-T52 alloy and anodized or painted, as shown on the drawings.

## Division 4. EXHIBIT STRUCTURES

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3. Miscellaneous - Railings and ornamental metalwork shall be in accordance with recommendations of the National Ornamental & Miscellaneous Metals Association (NOMMA).

National Ornamental & Miscellaneous Metals Association  
532 Forest Parkway, Suite A  
Forest Park, Georgia 30297  
404-363-4009  
[www.nomma.org](http://www.nomma.org)

- D. **Glass** - As specified on the drawings and in accordance with the following. All glass shall be either tempered or laminated safety glass.

1. Laminated Glass - Polyvinyl butyral (PVB) UV-filtering layer between two laminations. All glass to be used as glazing for artifact cases shall be clear, UV-filtering laminated glass.
2. Tempered Glass - Fully-tempered glass which breaks into small cubes if broken.
3. Anti-Reflective Glass - AMIRAN anti-reflective glass, as specified on the drawings. AMIRAN used for artifact case glazing shall be laminated. AMIRAN is manufactured by:

Schott Corporation  
Technical Glass Division  
Three Odell Plaza  
Yonkers, New York 10701  
914-968-8900  
[www.schottglass.com/amiran.htm](http://www.schottglass.com/amiran.htm)

- E. **Gasketing** - The Contractor shall use only silicone gasketing as specified Attachment E, Summary of Exhibit Conservation Guidelines, Section 3, "Sealing of Exhibit Cases". Manufacturers of silicone gasket materials include the following:

Rogers Corporation  
BISCO™ Silicones  
2300 East Devon Avenue  
Elk Grove Village, Illinois 60007-6120  
847-640-0800  
800-237-2068  
[www.rogers-corp.com/bmu/](http://www.rogers-corp.com/bmu/)



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Clean Seal, Inc.  
20900 West Ireland Road  
P.O. Box 2919  
South Bend, Indiana 46680-2919  
219-299-1888  
[www.cleansal.com/sealant\\_solution.htm](http://www.cleansal.com/sealant_solution.htm)

Delta Designs, Ltd.  
P.O. Box 1733  
Topeka, Kansas 66601  
785-234-2244  
800-656-7426  
[www.deltald.com](http://www.deltald.com)

Netherland Rubber Company  
2931 Exon Avenue  
Cincinnati, Ohio 45241  
800-733-6107  
[www.netherlandrubber.com](http://www.netherlandrubber.com)

- F. **Adhesives and Sealants** - As specified on the drawings or as recommended in the manufacturer's specifications for installation of materials. All adhesives and sealants to be used on the internal surfaces of artifact cases or for case furnishings such as platforms, pedestals or panels shall be in accordance with the Attachment E, Summary of Exhibit Conservation Guidelines, Section 3, "Sealing of Exhibit Cases".

1. High pressure laminate adhesive:
  - a. Laminate-to-Substrate - Use a nonpigmented contact cement or the manufacturer's recommended adhesive.
  - b. Laminate-to-Laminate - Use a nonpigmented two-part epoxy or the manufacturer's recommended adhesive.
2. Glass - Silicone SCS1201 clear, white or black, as manufactured by:

General Electric Company  
GE Silicones  
260 Hudson River Road  
Waterford, New York 12188  
518-237-3330  
800-332-3390  
[www.gesilicones.com](http://www.gesilicones.com)

## Division 4. EXHIBIT STRUCTURES

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3. Artifact Case Wood Sealant - Seal all exposed wood inside artifact cases which shares the same air space with the artifacts and desiccant chamber so that artifacts will not be harmed by volatile chemicals outgassing into the air inside the case. Exposed wood inside case furnishings such as platforms, pedestals or panels shall also be sealed. Surfaces already finished with high-pressure laminate do not need additional sealant. Sealants shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, Section 5, "Exhibit Case Construction Materials". Follow manufacturer's specifications for application of the finish.

Polyglase Waterborne Finish, a water-based aliphatic urethane, is manufactured by:

Camger Chemical Systems, Inc.  
364 Main Street  
Norfolk, Massachusetts 02056  
508-528-5787  
www.camger.com

4. Artifact Case Crack and Gap Sealant - To ensure a tight seal, fill all seams which could allow air exchange with outside air using silicone caulk which is neutral curing (does not emit acetic acid during curing).
5. General Purpose Caulk - Clear silicone rubber, standard grade RTV Silicone Number 108, as manufactured by the General Electric Company, as specified in this Division, 4.4, F.,2.
6. Acrylic Cement - Weld-On 40 adhesive, as manufactured by:

IPS Corporation  
455 West Victoria Street  
Compton, California 90220  
310-898-3300  
800-421-2677  
www.ipscorp.com

7. Graphic Mounting Adhesives - In accordance with Division 6, Graphics.
- G. **Finishes** - As specified on the drawings and in accordance with the following. Finishes inside artifact cases shall be in accordance Attachment E, Summary of Exhibit Conservation Guidelines, Section 5, "Exhibit Case Construction Materials".

## Division 4. EXHIBIT STRUCTURES

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1. Plastic Laminates - High pressure decorative laminates shall meet the minimum performance standards of the International Organization of Standardization (ISO) ISO-4586-2 and National Electrical Manufacturer's Association, LD3-1980. Laminate shall be .063 face grade.
2. Paint
  - a. Artifact case interiors - Use paints with a low Volatile Organic Compound (VOC) rating for surfaces inside the artifact chamber, in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, Section 5, "Exhibit Case Construction Materials".
  - b. Aluminum and steel - Polane T Polyurethane Enamel and Primer, as manufactured by:  
  
Sherwin Williams Company  
Chemical Coatings Division  
P.O. Box 6027  
Cleveland, Ohio 44101-1027  
216-566-2000  
www.sherwin-williams.com
3. Powder Coating - As manufactured by:  
  
Tiger Drylac USA  
1100 Commons Boulevard  
Reading, Pennsylvania 19605  
610-926-8148  
www.tigerdrylac.com
4. Fabric - Fabric for use inside artifact cases shall be in accordance with the drawings and Attachment E, Summary of Exhibit Conservation Guidelines, Section 5, "Exhibit Case Construction Materials".

### H. Hardware

1. Rough - Nails, screws, bolts, nuts, washers, anchors, threaded inserts, flush clips, and similar items of proper size and number to secure materials in place. Any fasteners used in areas where moisture is a factor shall be galvanized or aluminum.

## Division 4. EXHIBIT STRUCTURES

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2. Finish - Hinges, key-hole fasteners, concealed hinges, cam locks, slides, push locks and keys, casters, levelers, handles, and knobs as specified in approved drawings and catalog cuts. All doors in exhibit structures which provide access to interior storage cabinetry and audiovisual equipment shall be fastened with concealed hinges and provided with locks. Locks that are installed as multiples shall be keyed alike.

### 4.5 Execution

#### A. Woodworking- General

1. Quality Standards - AWI Quality Standards are by reference made part of this Specification. Unless otherwise clearly detailed or specified, all cabinetry shall be fabricated to conform to AWI Quality Standards, Section 400, for Custom Grade material and workmanship.
2. Cabinetry - All casework shall be plant assembled. Cases too large for access into the exhibit area shall be made in attachable sections with provisions for assembly into the exhibit space.
  - a. Construction Methods - All faceplates, panel ends, and doors shall be of mortise and tenon or doweled fabrication, glued under pressure, with nails only furnishing the pressure. All nails shall be properly set for filling. Filled areas shall be sanded smooth to receive laminate, paint, or other specified finish. Edges of panels and signs shall be filled, sanded smooth, and finished or covered with material matching the panel face. Edges shall not be left unfinished unless otherwise specified on the drawings.
  - b. Shelving - Unless otherwise specified, any shelving used as part of the interior of cabinets shall be 3/4" Birch plywood. At a minimum, audiovisual equipment shelving shall have 12" square center portions of perforated metal to allow ventilation around equipment. The Contractor shall be responsible for ensuring that each shelf is fabricated of material of sufficient strength for the piece of equipment for which it is intended.

## Division 4. EXHIBIT STRUCTURES

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3. Architectural Millwork - Fabricate and assemble units complete in the shop, insofar as their dimensions will permit for transportation and proper handling. All woodwork shall be shop finished and delivered to the installation site with protective covering. Use solid stock for frames, jambs, heads, stops, and edges. Where veneer plywood is used, trim exposed edges with hardwood without face nailings. Accurately fit and align separate parts. Provide ample screw, glue-and-bolt blocks, drawbolts, tongues, grooves, splines, dowels, tenons, mortises, and other means of fastening to render the work substantial, rigid, and permanently secured in the proper position. Provide material to permit scribing to walls, floors, and related work. Provide sufficient allowance for shrinkage occurring after installation. Provide mitered corners at doorframes with hairline joints. Fit and adjust doors to achieve smooth and noiseless operation. Exposed fasteners are unacceptable without prior approval from the COTR. Countersink face nails and face screws, fill with plastic wood or wood plugs, sand flush to surface, and finish without visible markings.
- B. Artifact Case Fabrication** - All materials and fabrication methods for artifact cases, including all structures to be installed inside artifact cases, shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines.
1. Sealed Case Environment - To ensure that artifact case vitrines are as airtight as possible, seal all seams which could allow air exchange with the air outside the artifact and silica gel chambers. Fabrication shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, "Case Details and Illustrations, Section 6, Case Air Seal".
  2. Silica Gel Chambers - Chambers that house silica gel shall be fabricated to maximize exchange of air with the chamber containing the artifacts and minimize exchange of air outside of the case. The chamber shall provide a sealed, stable environment necessary to protect the artifact(s) in the case. Fabrication shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, "Case Details and Illustrations, Section 5, Environmental Control".
- C. Finishes**
1. Substrates - Surfaces scheduled to receive etching, sandblasting, paint, laminate, photo mounts, and graphic prints, shall be made true and even with joints and nail holes filled, and shall be primed, sealed, and properly supported to prevent warping or bending.

## Division 4. EXHIBIT STRUCTURES

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2. Paint - All exposed surfaces to receive paint shall be finished smooth. Finished paint surface shall be without runs, sags, and other imperfections. Match colors specified on the drawings. Colors shall be consistent from surface-to-surface. Paint shall be applied under dry, dust-free conditions, in accordance with the manufacturer's specifications. Edges, crevices, corners, and joints shall be thoroughly cleaned. Painting shall be of uniform thickness. All exposed edges of painted panels shall be filled, sanded, and painted to match the panel face unless otherwise specified on the drawings.
3. Plastic Laminate - All laminate and substrate shall be stored together for at least 72-hours and assembled in an environment of approximately 70-degrees Fahrenheit and 50 percent relative humidity. Face of the substrates shall be sanded smooth and free of grease, wax, dust, or other contaminants which interfere with adhesion. Control of the glue line and its thickness and uniformity of spread shall be given constant attention. Spot bonding shall never be used. Cover all areas where contact is made with adhesive. **IN ALL CASES, THE ADHESIVE MANUFACTURER'S INSTRUCTIONS FOR USE SHALL BE FOLLOWED.** Avoid chipping of laminate by the saw blade. Finish smooth edges on curved cut by sawing the part oversize and finish it by routing, filing, or sanding. When cutting laminate, make certain to prevent hairline cracks or over-cutting at inside corners. Inside corners shall be rounded to prevent corner cracking.
4. Veneer - All veneer shall be ordered in a minimum 3:1 ratio per square foot of plywood substrate required. Face veneer shall be flat sliced with adjacent pieces randomly matched. The maximum width of sapwood per flitch shall not exceed two-inches. Panel face assemble shall be running matched. Veneer millwork shall not be sequence matched. All edges shall be veneer banded on all four edges for final use in the exhibit.
5. Panel Edges and Backs, Concealed Areas - Finish in accordance with the following unless specified otherwise on the drawings.
  - a. Concealed Areas - Those areas completely enclosed by solid opaque framing and skin. No finish required.
  - b. Semi-Exposed Areas - Those areas only visible by opening doors or access panels. Finish with wood sealer.
  - c. Flat Panels, Framed - The back side of plywood or other framed material. A minimum of two coats flat lacquer primer for the surface.

## Division 4. EXHIBIT STRUCTURES

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- d. Flat Panels, Unframed - The back side of plywood or other material without framing such as cabinet doors and applied panels. A minimum of three coats of paint, laminate backing sheet, or other finish equal in density and weight to that specified on the drawings for the exposed surface.
  - e. Edges - All exposed edges of panels, plaques, and graphic prints shall be fitted and sanded smooth. Edges shall be finished to match adjoining surfaces as specified on the drawings.
  - f. Panel Backs - Backs of panels shall be finished with spray-applied lacquer finish or laminate backing sheet in color specified on the drawings.
6. Artifact Case Interiors - All surfaces inside artifact cases which share air exchange with the artifact and silica gel chambers shall be finished in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, "Technical Notes, Section 5. Exhibit Case Construction Materials".
- D. **Plastic** - Follow manufacturer's printed instructions. Cut material to the size specified on the drawings, allowing for expansion and contraction. Welded joints shall be free of gaps and bubbles, continuously sealed, and absolutely clear. All exposed edges shall be hand polished, no flame polishing. Surfaces of acrylic shall be free of scratches, stains, or other imperfections.
- E. **Metal Work** - Fabricate to detail and finish as specified on the drawings. All metals shall be prepared and finished in accordance with the finish manufacturer's specifications. Ease all sharp edges and corners on horizontal or angled panel frames or railings.
1. Welding - Use appropriate welding materials, grind welds smooth, and ease all sharp or ragged edges. Standards for welding shall be as recommended by:

American Welding Society  
550 NW LeJeune Road  
P.O. Box 351040  
Miami, Florida 33126  
305-443-9353  
800-443-9353  
[www.aws.org](http://www.aws.org)

## Division 4. EXHIBIT STRUCTURES

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2. Fasteners - Use appropriate fasteners for fabrication of metal structures, as recommended by the organizations specified under this Division, 4.4, C., Metals.
- F. **Glass** - Material shall be cut to size as specified on the drawings, allowing for expansion and contraction. Surfaces shall be free of scratches, bubbles, stains, rough edges, or other imperfections.
1. Laminated Safety Glass - All exposed edges shall be eased and finely ground to be smooth, with broad surfaces free of imperfections.
  2. Tempered Safety Glass - All exposed edges shall be polished, with broad surfaces free of visible tong marks or any other imperfections.
- G. **Finish Hardware or Fasteners** - Shall be applied and installed so they are fully functional. Screws shall be countersunk to flush level with surface, free of burrs, and at a 90-degree angle to the surface plane.
- H. **Security Hardware** - Provide locks for all access doors to artifacts and audiovisual equipment in accordance with approved drawings and catalog cuts. Conceal locks behind hinged or removable panels with concealed hinges and fastened with cam locks, tamperproof screws, or concealed latches. All locks shall be keyed alike. Unless specified otherwise in the drawings, access doors to chambers not requiring locks (such as silica gel chambers) shall be hinged panels using the same hardware as panels used to conceal the locks. For hardware requiring special tools, such as tamperproof screws and cam locks, the Contractor shall provide a minimum of two of each tool required.



## Division 5. ELECTRICAL/ELECTRONIC

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### 5.1 Introduction

Purchase, fabricate, assemble, install into buildings and exhibit structures, and thoroughly test all electrical, electronic, and mechanical devices; this includes lighting. Install audiovisual equipment into exhibit structures, including electrical components to provide and ensure fully operational audiovisual systems for each exhibit unit.

### 5.2 Quality Assurance

The National Electrical Code (NEC) shall be the required standard for all electrical work. In the event other codes, state and local, are in effect at the final exhibit site, they shall be included as part of this Specification and requirements. All manufacturer's printed recommendations for materials are a part of this Specification. Standards for other trades are included as part of this contract.

Information on the NEC is available at: [www.necdirect.org](http://www.necdirect.org)

### 5.3 Product Handling

Store electrical, electronic, and mechanical components in a dry location. Do not expose to extreme changes in temperature and humidity. Protect components from damage during shipping, handling, storage, and installation. Pack components in containers in which components were shipped from the manufacturer. Exercise care so as not to damage electrical and electronic components. Store in a protected environment.

### 5.4 Testing

Electrical, electronic, and mechanical components of exhibits, including audiovisual equipment and lighting, shall be tested in the Contractor's fabrication shop prior to delivery to the site. The Contractor shall ensure that all equipment is fully operational prior to installation at the site.

### 5.5 Materials

A. **Electrical** - Materials shall be new and U/L approved.

1. Wiring - Wiring for high voltage applications shall be as required under the latest version of the NEC. Provide plenum rated cables of the types specified where required by the NEC or other governing building codes.
2. Conduit - All conduit shall be 3/4" Electric Metallic Tubing unless specified otherwise.

## Division 5. ELECTRICAL/ELECTRONIC

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3. Outlets - Multi-outlet power strips with integral circuit breaker and grounded outlets. Provide an electrical surge suppression system dedicated to each audiovisual system and each interactive electronic exhibit. Size the suppression device to accommodate the audiovisual system maximum load plus 100 percent.

### B. Lighting

1. Fixtures - Provide fixtures and accessories as specified in individual Task Orders.
2. Lamps - As required to make illuminated exhibit elements complete and fully functional.
3. Controls - Lighting dimmer controls as manufactured by:

Leviton Manufacturing Company, Inc.  
59-25 Little Neck Parkway  
Little Neck, New York 11362-2591  
718-229-4040  
www.leviton.com

4. Controls for Artifact Case Lighting - Materials and devices to filter UV (ultraviolet) light and control or modify overall light levels inside artifact cases shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, Technical Notes, Section 4, and Case Details and Illustrations, Section 2. Fluorescent lighting for illumination of artifact case interiors shall be filtered through one of the UV-filtering acrylics specified in Division 4, 4.4, B., 1., Sealed Case Environment.

### C. Audiovisual Equipment

The Contractor shall purchase and/or install audiovisual equipment as specified in individual Task Orders. Cables, connectors, racks, and mounting accessories required for the proper installation and operation of the equipment shall be provided by the Contractor unless specified otherwise.

## Division 5. ELECTRICAL/ELECTRONIC

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1. Cables -

- a. Line level audio cables, balanced and unbalanced: Belden 8451 or West Penn 291, as manufactured by:

Belden  
2200 U.S. 27 South  
Richmond, Indiana 47374  
800-235-3361  
765-983-5200  
www.belden.com

West Penn  
2833 W. Chestnut Street  
Washington, Pennsylvania 15301  
800-245-4964  
412-222-6420  
www.westpenn-cdt.com

- b. Loudspeaker Level Audio Cables, Low Impedance: 20 feet or less - West Penn 225; 30 feet or less - West Penn 226, as manufactured by West Penn, this Division, 5.5, C., 1., a., Cables.
- c. Loudspeaker Level Audio Cables, High Impedance: West Penn 225, as manufactured by West Penn, this Division, 5.5, C., 1., a., Cables.
- d. Composite Video Cable: Belden 8241, as manufactured by Belden, this Division, 5.5, C., 1., a., Cables.
- e. Control Cables: West Penn 222, as manufactured by West Penn, this Division, 5.5, C., 1., a., Cables.
- f. Portable Video or Audio Cables, as manufactured by:

Canare  
531 5th Street #A  
San Fernando, California 91340  
818-365-2446  
www.canare.com

## Division 5. ELECTRICAL/ELECTRONIC

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2. Connectors -
  - a. Balanced Audio Connectors - Switchcraft QG series, ITT-Cannon XLR, or Neutrik USA NC series, as manufactured by:  
  
Switchcraft  
555 N. Elston Avenue  
Chicago, Illinois 60630  
773-792-2700  
[www.switchcraft.com](http://www.switchcraft.com)  
  
ITT Cannon  
666 E. Dyer Road  
Santa Ana, California 92705-5612  
714-557-4700  
800-854-3028  
[www.ittcannon.com](http://www.ittcannon.com)  
  
Neutrik USA  
195 Lehigh Avenue  
Lakewood, New Jersey 08701  
732-901-9488  
[www.neutrikusa.com](http://www.neutrikusa.com)
  - b. Unbalanced Audio Connectors - as manufactured by Canare, this Division, 5.5, C., 1., f., or by Neutrik USA, this Division, 5.5, C., 2., a.
  - c. Video Connectors - Kings 2025-59-9, as manufactured by:  
  
Kings Electronics  
1685 Overview Drive  
Rock Hill, South Carolina 29703  
803-909-5000  
[www.kingselectronics.com](http://www.kingselectronics.com)

## Division 5. ELECTRICAL/ELECTRONIC

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3. Pushbuttons - EAO series 14 with plastic lens and diffuser, anodized aluminum front ring, and no lamp required. Pushbuttons for "Play Selection" or "Push to Play" shall be momentary action. Pushbuttons for "Push for Captions" or "Captions" shall be alternate action or maintained type. EAO pushbuttons are manufactured by:

EAO Switch  
198 Pepe's Farm Road  
Milford, Connecticut 06460  
203-877-4577  
www.eaoswitch.com

4. Timer Control and Custom Circuit Board - as manufactured by:

Bayside Controls  
173 Ludlow Avenue  
Northvale, New Jersey 07647  
201-767-1509

### D. Mechanical

1. Ventilation Fans - Fans shall be provided as necessary to prevent the temperature inside the enclosure from exceeding 30 degrees above the ambient temperature of the adjacent space. Provide fans of type and quantity as necessary to replace the enclosed volume of air a minimum of every two minutes. No individual fan shall contribute more than 35 dBA of noise to the environment.
2. Thermostat - Provide line voltage thermostat as necessary to achieve the temperature control specified under this Division, 5.5, C., 1., Cables.

## 5.6 Execution

- A. **Electrical** - The Contractor shall obtain all requirements pertaining to the most recent state and local codes:

1. Power - Circuits within each installed exhibit structure shall be distributed from one four-gang box mounted inside the exhibit structure. The box shall be connected to the power source (120 volt AC) through flexible conduit. Power supplies for the lighting systems and lighting shall be hard wired to the power source (120 volt AC) through flexible conduit. Provide sufficient extra length of flexible conduit to accommodate movement of power supply on sliding access shelf. All connections to power sources shall be made at the locations specified on the drawings.

## Division 5. ELECTRICAL/ELECTRONIC

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The Contractor shall evaluate power supply versus power demand to determine appropriateness of existing circuits and ensure that power cables do not cause interference with audiovisual signal cables.

It shall be the responsibility of the Contractor to advise the COTR if total power service requirements for any exhibit structure exceeds 15 amperes.

2. Coordination - Provide secondary distribution lines and one three-prong grounded female receptacle within each applicable exhibit unit for hook-up of electrical equipment.
3. Craftsmanship - Circuits shall be clearly and neatly labeled with special operating and maintenance instructions mounted on descriptive panels with each applicable exhibit unit. Run wiring exposed to minor potential physical damage in Electric Metallic Tubing. Run inaccessible wiring in conduit. All conduit, junction boxes, fixtures, and equipment shall be neatly and securely attached to support members and concealed.
4. Access - Ensure serviceability to each and every piece of equipment. Provide cutouts and access panels to facilitate maintenance. Avoid alterations to exposed surfaces.
5. Support - Furnish additional support such as clip angles, plates, brackets, thrust blocks, bushings, and bearings necessary to reinforce exhibit structures, and devices relative to "hands-on" use and abuse of each exhibit.
6. Termination of Wiring - Conductors shall be terminated at ends where attached to components using crimp-type lugs if the component possesses screw-type terminals. Where the component has only soldering lugs, connection shall be by good quality electrical joint using rosin core solder. Connection of conductors and wiring, one to another, shall be by the application of screw -type terminal strips and spade lug connectors. Such terminations shall be located in a National Electrical Manufacturers Association (NEMA) rated enclosure. All crimp connections shall be accomplished by ratchet type production crimp tools. The use of any adhesive insulating tape is not acceptable.
7. Surge Suppression - For each audiovisual exhibit, provide an electrical surge suppression system dedicated to that exhibit. Size the suppression device to accommodate the audiovisual system maximum load plus 100 percent.

## Division 5. ELECTRICAL/ELECTRONIC

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### B. Lighting

1. Interior Exhibit Structure - The Contractor, in conjunction with the COTR, shall review the lighting levels and heat output to ensure that proper environment of case interior is met during the first inspection of the case fabrication at the Contractor's facility.
2. Track - During the exhibit installation, the Contractor shall install and connect all lighting to power source. The Contractor shall install, aim, adjust track lighting and accessories, and adjust lamp wattage and beam spread after the exhibits and artifacts are in place. Provide final placement and aiming of lighting fixtures onsite after installation of exhibits and case contents, including measurement and adjustment of exhibit lighting levels. This detailed information shall be included in the Maintenance Manuals, Division 9, 9.4, 10., Electrical and Mechanical Instructions.
3. Ceiling Recess or Wall Mount - During the exhibit installation, the Contractor shall install and connect all lighting fixtures to the power source. The Contractor shall install, aim, and adjust lighting fixtures and accessories, and adjust lamp wattage and beam spread after the exhibits and artifacts are in place.
4. Remote Source Lighting -
  - a. Optimum performance and safety shall be critical in developing the remote source lighting system. The efficiency of light transmission depends on the constituent materials, the quality of the bond between the core and cladding, hardware connectors, and polishing of fiber ends. Selection of fiber and illuminator shall result in a minimum Color Rendering Index (CRI) rating of 90 and a maximum lighting loss of four percent per running foot length. Methods of reducing footcandle levels without affecting color temperature shall include the use of mechanical diagrams, lighting screens installed at the lighting source, or neutral density filters mounted on or attached to the lenses. Fiber runs shall not exceed 25-feet. Illuminators shall utilize lighting sources with a minimum lamp life rating of 1500-hours.
  - b. During the exhibit installation, the Contractor shall install and connect all remote source lighting system components to the power source. The Contractor shall install, aim, and adjust lighting system components and adjust lenses and accessories after the exhibits and artifacts are in place.

## Division 5. ELECTRICAL/ELECTRONIC

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### C. Audiovisual Equipment

1. Shop Fabrication - The Contractor shall be responsible for ensuring that audiovisual equipment will fit and operate with the exhibit structures.
  - a. The Government will ship one type of each piece of Government-Furnished audiovisual equipment to the Contractor's facility, within two weeks of the Postaward Conference. The Contractor shall demonstrate the fit and operation of the equipment to the COTR during a site inspection at the Contractor's facility.
  - b. When specified, the Contractor shall install pushbuttons in the exhibit structures and wire them to be fully operational at the time of the final inspection. The pushbutton assembly shall fit snugly into the panel with the outermost ring sitting flush against the panel surface. The Contractor shall label the attached wiring to clearly identify what component activates when pushed.
  - c. The Contractor shall test all audiovisual equipment to ensure operation.
  - d. The Contractor shall ensure that all audiovisual equipment has adequate heat ventilation while operating in the exhibits, and there is access to the equipment for Government staff to perform maintenance or repairs.
  - e. The Contractor shall ship audiovisual equipment and hardware in their possession to the park.
2. Installation - The Contractor shall install all audiovisual components in the exhibits. The Contractor shall connect all audiovisual components as required to assemble the systems and connect them to the appropriate power source.
  - a. Installed equipment shall be easily accessible for cleaning, adjustment, replacement, and routine maintenance.
  - b. Switches, connectors, jacks, receptacles, outlets, cables, and cable terminations shall be logically and permanently marked as to their function. Custom panel nomenclature shall be engraved, etched, or screened. The Contractor shall submit a schedule and diagrams of the proposed identification marks to the COTR for review and approval.



## Division 5. ELECTRICAL/ELECTRONIC

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- c. With the exception of portable equipment, all boxes, conduits, cabinets, equipment, and related wiring shall be firmly mounted in place. Mounting shall be plumb and square.
- d. Care shall be exercised in wiring the systems to avoid damage to cables and equipment. All joints and connections shall be made with rosin core solder or with mechanical connectors approved by the COTR. Crimp type connections shall be accomplished with manufacturer recommended ratchet type crimping tools. Cables shall be free of splices between terminations at the specified equipment.
- e. Wires and cables shall be formed into harnesses that are tied and supported in accordance with accepted engineering practice. Care shall be taken to bundle and secure all cables that interconnect electronic devices integral to the exhibit with destinations outside the exhibit. Where applicable, harnessing and bundling of cables shall also accommodate movement of exhibit on casters to provide access to the rear or interior of the exhibit.
- f. Harnessed cables shall be combed straight. Harnesses with intertwining members are unacceptable. Each cable that breaks out from a harness for termination shall be provided with a service loop. Cables shall be formed in either a vertical or horizontal relationship to equipment, controls, components, or terminations.
- g. Power cables, control cables, and high level cables shall be run on the left side of an equipment rack, as viewed from the rear. All other cables shall be run on the right side of an equipment rack, as viewed from the rear.
- h. Cables, except video cables, which must be cut to an electrical length, shall be cut to the length dictated by the run. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.
- i. Cables shall not be installed with a bend radius less than that recommended by the cable manufacturer.
- j. Cables, regardless of length, shall be marked with wrap-around numbers and shall be shrink wrapped at both ends. There shall not be any unmarked cables in the system. Marking codes used on cables shall correspond to codes shown on drawings, run sheets, and patch panels.

## Division 5. ELECTRICAL/ELECTRONIC

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- k. Terminal blocks and connectors shall be provided for all cables that interface with racks, cabinets, consoles, or equipment modules.
- l. System components and related wiring shall be located to minimize electromagnetic and electrostatic hum, spurious oscillation, and wiring length, and shall provide proper ventilation, safety, and convenience for the operator.
- m. The Contractor shall verify all circuits and extensions for correct connection, continuity, and phasing. The Contractor shall make all adjustments and modifications so that all systems are operational.

### D. Mechanical

- 1. General - The Contractor shall install mechanical devices in accordance with manufacturer's written instructions in the exhibit structures and wire them to be fully operational at the time of final inspection.
- 2. Heat Ventilation - The Contractor shall determine total heat loads of all active equipment used in the exhibit structures. The Contractor shall provide convection vents and/or cooling fans, and thermostats as necessary as required to prevent the equipment's environment temperature from rising no more than 30-degrees Fahrenheit over the ambient temperature of the exhibit room.
  - a. Fans shall be selected and installed to provide the maximum amount of airflow with the minimum amount of noise, in accordance with this Division, 5.5, C., Audiovisual Equipment.
  - b. Convection vents shall be located to maximize intake of cool air as close to the floor as possible and exhaust of warm air out of the top of the exhibit. Convection air flow inside the exhibit shall flow unimpeded through casework containing the audiovisual and lighting equipment.
  - c. Ballasts for fluorescent fixtures and illuminators for fiber optic systems shall be located where heat ventilation can be maximized and shall be as remote as possible from artifact cases and audiovisual equipment.

## **Division 6. GRAPHICS**

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### **6.1 Introduction**

Provide fabrication of all exhibit graphics. Unless otherwise specified in individual Task Orders, Government-Furnished graphic layouts will be furnished to the Contractor in a digital format with low resolution placement images.

### **6.2 Specific Requirements**

- A. Work includes review and preparation of all Government-Furnished material, including verification of fit and cropping of images within graphic layouts and verification that all required files and fonts are furnished with digital files.
- B. Provide adjustments to graphic layouts, color corrections, high-resolution scanning of graphic images, insertion of high-resolution scans into digital layouts, preparation of digital files for specified output, negatives, internegatives, typesetting, production of film positives for screen printing, and proofreading.
- C. Submission of intermediate proofs, samples, and revised layouts for review and approval by the COTR.
- D. Work includes production of all final graphic media. Media includes, but is not limited to, digital output processes, photographic prints and transparencies, screen printing, porcelain enamel graphics, fiberglass embedded prints, photo-etched or sandblasted materials, painted backdrops, and cut-out lettering.
- E. Production of original artwork.
- F. Provide professional care and handling of source materials, and return of all Government-Furnished materials to the COTR.

### **6.3 Product Handling**

All Government-Furnished source materials shall be returned to the COTR unaltered and undamaged. The Contractor shall provide protection from loss and physical damage at all times. Certified mail and written receipts shall be used in transferring sources to and from photographic and graphic processors. No retouching or other alteration on Government-Furnished prints or negatives is permitted.

## **Division 6. GRAPHICS**

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### **6.4 Review of Material**

Upon receipt of the Government-Furnished graphic materials and digital files, the Contractor shall review all graphic, photographic and text materials prior to production. All photographic and text identification numbers shall be checked against the layouts to ensure that they correspond properly. The Contractor shall verify that the proposed cropping, orientation, and dimensions of images will fit within the layout as designed. Government-Furnished photographic negatives or prints to be scanned by the Contractor shall be checked to verify that a high quality image can be obtained at the final resolution and size required. Digital files shall be checked against the drawings and the exhibit plan to ensure that all layouts and required fonts are provided and that the material is complete and ready for production. The Contractor shall check the digital files against Government-Furnished color samples and correct the digital files as necessary to ensure that the final output colors shall match the samples. Any errors, inconsistencies, omissions, or incorrect identification shall be brought to the attention of the COTR.

### **6.5 Materials**

#### **A. Digital Storage Media**

Digital files generated or copied by the Contractor during production shall be on a Mac-formatted CD-ROM. Other media shall be approved in advance by the COTR. Identification of each disk shall be in accordance with this Division, 6.6, A., 2., Identification of Material.

#### **B. Software**

Software applications for graphic files generated by the Contractor which are acceptable include Quark XPress, Adobe Illustrator, Adobe Photoshop, and Macromedia Freehand. Other software shall be approved, in advance, by the COTR.

## Division 6. GRAPHICS

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### C. Digital Output

#### 1. Direct Digital Photographic Prints

- a. Durst Lambda output of digital files on C-prints, Duratrans, or Duraflex by Eastman Kodak Company.

Durst Lambda direct digital photographic printers as manufactured by:

Durst Phototechnik AG  
Vittorio-Veneto-Strasse 59  
1-39042 Brixen, Italy  
39/0472/810110  
www.durst-online.com

- b. LightJet output of digital files on C-prints, Duratrans, or Duraflex by Eastman Kodak Company.

LightJet direct digital photographic printers as manufactured by:

Cymbolic Sciences  
Gretag Professional Imaging Division  
665 West Stuart Road  
Bellingham, Washington 98226  
800-251-5863  
www.cymbolic.com

- c. C-prints, Duratrans, and Duraflex as manufactured by:

Eastman Kodak Company  
Rochester, New York 14650  
800-242-2424  
516-659-0410  
www.kodak.com

## Division 6. GRAPHICS

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2. Scotchprints - 3M Scotchcal Electrostatic Permanent Graphic Film 8641 (ES) on .063 clear anodized aluminum substrate or as specified on the drawings. Overlamine with 3M Scotchcal Protective Overlamine, Luster 8910 (ES). Scotchprints are manufactured by:

3M Commercial Graphics Division  
3M Center, Building 220-6W-06  
St. Paul, Minnesota 55144-1000  
800-374-6772, extension 214  
www.3m.com

3. Archival Inkjet Prints - Archival inkjet prints, using archival inks, and output on glossy paper at 1440 dpi. The Contractor shall submit a sample for review and approval of the proposed inkjet process, in accordance with Division 3, A., 2., Graphics. The Contractor shall include the manufacturer's technical specifications for review and approval.

D. **Photographic Prints** - Custom color, museum quality paper C-prints and Duratrans transparencies as manufactured by Eastman Kodak Company, in accordance with this Division, 6.5, C., 1., Direct Digital Photographic Prints.

E. **Substrates** - Mount graphic and photographic prints to substrates as specified on the drawings.

1. Aluminum - .063 clear anodized aluminum.
2. Cast Acrylic Sheet - In accordance with Division 4, 4.4, B., Plastics.

F. **Adhesives**

1. Print Mounting Adhesive - Mount photographic prints with MACtac Permacolor, Permatrans Mounting Film, IP2100 Series. MACtac adhesives are manufactured by:

MACtac  
4560 Darrow Road  
Stow, Ohio 44224  
800-762-2822  
www.mactac.com

## Division 6. GRAPHICS

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2. Plaque Adhesive - Apply cut-outs and plaques 3M VHB Double-Coated Foam Tape, as manufactured by:  
  
3M Industrial Specialties Division  
3M 220-8E-04  
St. Paul, Minnesota 55144  
800-227-5085  
612-733-4813  
[www.3m.com/bonding/](http://www.3m.com/bonding/)
- G. **Protective Coating** - Photographs and graphics shall be overlaminated with a protective coating as specified on the drawings.
1. Overlaminating Film - Overlamine and wrap edges using MACtac Permacolor Permagard Premium Overlaminating Film, IP7300 Series Lustre finish, as manufactured by MACtac, in accordance with this Division, 6.5, F., Adhesives.
  2. Non-Glare Acrylic - Subsurface laminate prints to Acrylite Non-Glare Acrylic as manufactured by CYRO Industries, in accordance with Division 4, 4.4, B.,1., Artifact Vitrines.
  3. Lustex - MACtac Permacolor Permafex Lustex Overlaminating Film, IP6000 Series, with textured lustre finish, as manufactured by MACtac, in accordance with this Division, 6.5, F., Adhesives.
- H. **Screen Printing**- The Contractor shall use compatible screen printing ink and solvent approved by the COTR for each substrate.
- I. **Vinyl Cut-Out Letters and Shapes** - 3M Scotchcal Film Series 220, in colors as specified on the drawings, as manufactured by:  
  
Gerber Scientific Products  
151 Batson Drive  
Manchester, Connecticut 06040  
800-222-7446  
860-643-1515  
[www.gspinc.com](http://www.gspinc.com)

## Division 6. GRAPHICS

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### J. **Graphic Panels for Exterior Use**

For graphic output manufactured for exterior use, including fiberglass embedment, porcelain enamel, and other processes, the Contractor shall submit samples in accordance with Division 3, A., 2., Graphics. The Contractor shall include the manufacturer's technical specifications for review and approval by the COTR.

### K. **Archival Storage Materials**

1. Digital files shall be archived on CD-ROM.
2. Negatives, transparencies, and prints shall be stored in archival protectors as specified below, as manufactured by:

Light Impressions  
P.O. Box 22708  
Rochester, New York 14692-2708  
800-828-6216  
[www.lightimpressionsdirect.com](http://www.lightimpressionsdirect.com)

- a. 4" x 5" negatives and color transparencies, place in TransView Sleeves, clear, Item Number 5313, and HD PolyChron Envelopes, Item Number 5637.
- b. 8" x 10" prints, place in a HD PolyChron Envelope, Item Number 5639.
- c. 8" x 10" negatives and color transparencies, place in TransView Sleeve, clear, Item Number 5315 and HD PolyChron Envelope, Item Number 5639.
- d. Place negatives, transparencies and prints in Archival Top Loaders, Item Number 3225, for inclusion in binder.

## 6.6 Execution

### A. **Handling of Source Material**

The Contractor shall provide proper professional care and handling of source materials and shall be responsible for their return to the COTR.



## Division 6. GRAPHICS

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1. Binder - The Contractor shall assemble photographic source materials in black three-ring binders using archival sleeves, as identified in this Division, 6.5, K., Archival Storage Materials. Each prepared image shall be inserted into an 8-1/2" x 11" archival quality polypropylene sleeve punched with three holes to fit into a three-ring binder. CD-ROMs shall be placed in binder sheets with pockets for two CD-ROMs.
2. Identification of Material
  - a. Digital Files - Digital files shall be archived on CD-ROM, including high-resolution scans of graphic images and final versions of graphic layout files which have been modified by the Contractor to make them production-ready. Each CD-ROM shall contain a "Read Me" or text file which shall be printed out and included in the three-ring binder. The "Read Me" files shall contain the following information about all files included on that CD-ROM:
    - (i) List of all file names, making clear the location of that file in the exhibit. The Contractor shall name the file using the appropriate graphic numbers in the name which correspond to the "G" number (graphic) or "D" number (composite graphic layout file) in the exhibit plan to which it applies. File names shall end in the appropriate program extension so that they are understood by personal computers (PCs).
    - (ii) Software program used, including the version number.
    - (iii) Location of any linked files. The linked files shall be included on the same CD-ROM whenever possible.
    - (iv) All fonts used.
  - b. Labeling of CD-ROM - Each CD-ROM shall be label with basic information on the project name and CD-ROM contents or CD-ROM number keyed to the printed "Read Me" files located in the three-ring binder. An example of a label on the CD-ROM is as follows:

Manassas NBP  
Henry Hill VC  
Production Files  
Digital Graphics  
CD # 1 of 15

## Division 6. GRAPHICS

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- c. Labeling of Photographic Material - The graphic number shall be written in clear, concise print with film pen on a small, foil-backed archival label. Typed labels are acceptable. The label shall be placed in the lower right corner of each sleeve. Labels shall not be placed directly on photographs, negatives, or transparencies.
3. Graphic List - An updated Graphic Schedule which shall include: image and graphic numbers, photograph title, type of image, and source.
4. Handling of Photographs - Photographic material shall be handled wearing white cotton gloves or powder-free latex examination gloves.

### B. Samples

Provide samples for all graphic media to be produced as specified in individual Task Orders, in accordance with Division 3, Samples/Mockups/Prototypes. Processing and finishing of graphic and photographic media shall be executed to ensure a continuous and compatible series of images throughout the exhibit, consistent with reviewed and approved samples.

### C. Proofs

1. Digital Imaging - Provide output of all graphic layout files in quantities as specified in individual Task Orders. Proofs shall be output at size required so that all exhibit text is readable. Proofs shall be full-color and include final, high-resolution scanned images.
2. Photographic Prints - The COTR will inspect finished photographic prints and murals at the Contractor's facility prior to mounting and overlaminating and again after mounting and overlaminating, prior to their use in the exhibit. This includes direct digital photographic prints.

### D. Image Quality

1. Acceptance and Inspection - All Government-Furnished source material shall be inspected by the Contractor for final determination as to acceptability and use as intended output media. If found to be unacceptable, the Contractor shall notify the COTR prior to processing or use of the material.

## Division 6. GRAPHICS

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### 2. Digital Imaging

- a. Scanning - The Contractor shall scan artwork, photographs, and other material to be used for digital output at the resolution recommended for the particular output device used, based on the final size of the image.
- b. Output - Colors in the final image shall match color samples, original artwork, or photographic images. The Contractor shall provide test samples of portions of the image at final image size, for review and approval by the COTR, to determine if the image resolution and colors are acceptable. The Contractor shall save the original scan on digital storage media in accordance with this Division, 6.6, A, 2., a., Digital Files.

### 3. Photographs

- a. Quality Control - The Contractor shall be responsible for the quality and durability of photographic images produced and installed. The Contractor shall bear the costs associated with replacement or repair of those images that are unsatisfactory after installation because of improper techniques, use of inferior materials, improper handling, mounting, or installation.
- b. Image Quality - Color prints and display transparencies shall have a high color saturation and sharpness and shall maintain appropriate color balance. Sepia tone prints shall be produced from black and white source negatives digitally scanned and output with specified tone. The Contractor shall adjust specified cropping to achieve a correct finished size. Crop for subject matter and best overall composition. Allow for necessary bleed. The Contractor shall ensure the proper backlighting of display transparencies, including proper diffusion sheeting, proper lighting intensity, and even distribution of lighting.
- c. Consistency - Tonal value of prints shall be consistent throughout the exhibit for each type of print: color, black and white, sepia tone, and hand-tinted. The Contractor shall ensure that continuous images line up from panel-to-panel and colors remain consistent.

## Division 6. GRAPHICS

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### 4. Screen Printing -

- a. Durability - The Contractor shall determine, through testing, which type of screen printing ink is the most durable and long lasting for each substrate. All screen printed images shall adhere completely to the substrate and shall not chip, flake, or pop off the substrate. Image and text shall be cured in accordance with manufacturer's specifications until they are completely dry. All surfaces to be screen printed shall be clean and free of grease, dirt, wax, or other coatings which can prevent the ink from adhering to the substrate. Plastic laminate surfaces shall be wiped with alcohol and lacquer thinner or other solvents as recommended by the manufacturer to remove wax coating on surface.
- b. Quality of Printing - Perfect register, exact measurement, proper color match, opaque, and crisp images shall be required. Ghosting, ragged, and soft edges are not acceptable. All borders shall be consistent width throughout panels. Weight of graphic images, text, or other images used in a "set" shall be consistent throughout the exhibit.
- c. Color Contrast - Upon review and approval of samples by the COTR, color adjusting may be required in order to ensure high contrast between type, color, and background.

### E. **Typesetting**

The Contractor shall proofread all label text, identify any obvious errors, and notify the COTR. The Contractor is responsible for making corrections and/or changes to label text identified by the COTR upon review of graphic layout proofs. The Contractor is responsible for the correctness of all Contractor-generated changes or corrections.

### F. **Mounting**

1. Substrates - Exhibit photographic prints shall be mounted directly on anodized aluminum, unless otherwise specified on the drawings. Prior to use, all aluminum shall be washed clean of residual manufacturing chemicals, dirt, oil, or foreign substances to ensure a good bond. Cut panels evenly, to the correct dimensions, and finish edges. Aluminum shall be anodized prior to use as a photo substrate to provide corrosion resistance.

## Division 6. GRAPHICS

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2. Mounting to Substrate - The Contractor shall use a cold roll system press to mount photographs in accordance with the manufacturer's specifications. Photographs shall be securely mounted to substrate surface, free from wrinkles, blisters, scratches, rips, tears, adhesive residue, or other imperfections. Trim photographs square and clean, and lightly ease all aluminum edges with fine grit sandpaper on sanding block, held at 45-degree angle. Corners shall be well fastened and eased, with no untrimmed pieces left. Substrate and photograph shall remain flat, true, and even after mounting.
3. Protective Coating - The Contractor shall apply clear film overlaminates so that it is wrapped around photograph and aluminum sandwich and adhered to back of aluminum substrate for a two-inch overlap. Overlaminates shall only be applied after all aluminum and photographic paper edges are trimmed clean and square. The Contractor shall ensure that the clear film overlaminates provides a continuous bond with the photographic paper. The overlaminates shall be free of bubbles, scratches, dirt, indentations, and impressions from packing material used for transport and storage of overlaminated photographs.
4. Application to Exhibit Structure - The Contractor shall apply photographs to, or install on, exhibit structures and panels as specified on the drawings. Exact measurement and precise alignment shall be required.
5. Graphic Cutouts - Unless specified otherwise on the drawings, the Contractor shall fabricate graphic cutouts by sandwiching the graphic output print between a substrate and a non-glare acrylic or Lustex overlaminating film. Unless specified otherwise on the drawings or in the Scope of Work, graphic cutouts shall be made in accordance with the following:
  - a. Subsurface laminate the output print to non-glare acrylic or Lustex, as specified in this Division, 6.5, F., Adhesives. Acrylic shall be in accordance with this Division, 6.5, G., 2., Non-Glare Acrylic. Lustex shall be in accordance with this Division, 6.5, G., 3., Lustex;
  - b. Adhere the overlaminated print to the substrate specified on the drawings;

## **Division 6. GRAPHICS**

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- c. Cut out the image, following the crop lines as specified on the graphic references;
- d. Sand all edges smooth, free from tears, snags, and loose pieces. All edges shall be tightly adhered. Finish exposed edges of substrate, filling holes and removing imperfections. Finish exposed edges of substrate in accordance with the drawings.

## Division 7. CONSERVATION GUIDELINES

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### 7.1 Introduction

Provide design and fabrication of artifact mounts, installation of artifacts into exhibit cases, and silica gel humidity ballast for conditioning of exhibit cases.

### 7.2 Quality Assurance

All materials and fabrication methods for mounting of artifacts, artifact cases, and all structures or materials to be installed inside artifact cases, shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines.

### 7.3 Artifact Categories

- A. **Artifacts** are those objects which can be considered non-replaceable for cultural, scientific, or historic reasons, which are one-of-a-kind, which have a high monetary value, or which are delicate because of their condition, materials, and construction. Artifacts shall be handled, mounted, and installed in accordance with the guidelines contained in this Division.
- B. **Reproductions, Replicas, Props, Models, or Facsimiles** are those objects which are replaceable and which were fabricated or purchased for the exhibit. These objects are not required to be mounted and protected in accordance with the guidelines contained in this Division, but shall be mounted and installed in accordance with fabrication details approved by the COTR as specified in Division 2, Fabrication Drawings.

### 7.4 Specific Requirements

- A. Travel to the park and/or Harpers Ferry Center Conservation Lab to inspect, measure, photograph, and produce templates needed for artifact mount production.
- B. Handling of artifacts which are irreplaceable because of cultural, scientific or historic value, or have a high monetary value.
- C. Design individual custom mounts for artifacts and production of preliminary and final mount drawings for review and approval by the COTR.
- D. Ensure fit of all artifacts within the casework as designed by review of artifact dimensions and adjustments to casework dimensions as required.
- E. Storage of replaceable objects at the Contractor's facility during the fabrication process and transportation of the objects to the installation site.

## Division 7. CONSERVATION GUIDELINES

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- F. Fabrication of custom mounts for artifacts.
- G. Installation of custom mounts, mounting systems, and artifacts on panels, platforms, and in cases.
- H. The Contractor shall be responsible for setting up a facility at the exhibit installation site to modify or alter pre-made case elements and artifact mounts.
- I. Reassemble and clean cases after artifacts are mounted.
- J. Install silica gel humidity ballast into artifact cases.
- K. Adjust lighting on artifacts and test light levels to ensure footcandle limits are not exceeded.

### 7.5 Artifact Handling

#### A. **Damage**

The Contractor shall utilize extreme care and abide by the Specifications set forth in this Division. Should the Contractor break, chip, fracture, scratch, or otherwise damage any artifact, the Contractor shall immediately notify the COTR. The Contractor shall not attempt any repair, treatment, or preservation procedure. The Government will execute any repairs.

#### B. **Security**

The Contractor shall be responsible for safety and security of artifacts in their possession. During the time the artifacts are being photographed, measured, fit, or installed in a Government facility, the Contractor shall handle the artifact with care and shall ensure that it is returned to the authorized personnel when work is not in progress or has been completed. The security of artifacts stored in a Government facility is the responsibility of the Agency. The Contractor shall not leave artifacts in an exposed and unsecured area.

#### C. **Storage**

The Contractor shall store only replaceable objects at their facility. The Contractor shall store the objects in a lockable, protected area to eliminate damage and theft. Access to the objects shall be limited to the Contractor and his staff. All objects shall be locked up when not in use. All non-replaceable artifacts will remain at a Government facility during the design and fabrication of the mounts. The Contractor shall measure, examine, and fit mounts of non-replaceable artifacts either at the Harpers Ferry Center Conservation Lab, park site, or other Government storage facility as specified in individual Task Orders.



## Division 7. CONSERVATION GUIDELINES

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### D. Transport

The Contractor shall only transport replaceable objects to the installation site which were stored at their facility during fabrication of the exhibits. The Government will provide transportation of non-replaceable artifacts to the installation site.

### 7.6 Materials

A. **Artifact Case Materials** - In accordance with Attachment E, Summary of Exhibit Conservation Guidelines and Division 4, Exhibit Structures.

B. **Silica Gel** - In accordance with Attachment E, Summary of Exhibit Conservation Guidelines, Section 2 under "Technical Notes", and Section 5 under "Case Details and Illustrations."

### C. Artifact Mounts

1. General - The Contractor shall use the same type and quality of materials for mounting artifacts and replaceable objects. Fabrication materials shall be of the highest quality and shall be non-damaging to the displayed artifacts. All mountmaking materials that will be used for onsite mounting shall be available at the final inspection for review and approval by the COTR.

2. Materials Considered Safe for Use with Artifact Mounts - In accordance with Attachment E, Summary of Exhibit Conservation Guidelines, "Narrative Guidelines", D:3, "Design and Fabrication of Conservation Mounts". The following are commonly used acceptable mount materials:

a. Plastic - Rigid acrylic and polycarbonate.

b. Metal - Brass, with silicone rubber, acrylic resin, or foam barrier between the artifact and the metal.

c. Cushioning Material - Polyethylene foam, polyester felt, fabric-covered polyester batting, 100 percent cotton fabric, acid-free buffered tissue paper.

### D. Packing Materials

The Government will non-replaceable transport artifacts to the installation site. Packing materials for non-replaceable artifacts is Not In Contract.

## Division 7. CONSERVATION GUIDELINES

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### 7.7 Execution

#### A. Artifact Case Fabrication

In accordance with the Attachment E, Summary of Exhibit Conservation Guidelines, Attachment A, National Park Service Standard Exhibit Fabrication Specifications, Division 4, and the drawings.

#### B. Mount Fabrication

In accordance with the National Park Service Exhibit Conservation Guidelines, "Narrative Guidelines", D:3, "Design and Fabrication of Conservation Mounts," and the drawings.

1. Mount Design Drawings - The Contractor shall provide drawings of proposed mounts for artifacts, including identification of materials and fastening hardware, to the COTR for review and approval prior to fabrication, in accordance with Division 2, Fabrication Drawings.
2. Mounting Systems - When work requires design of a modular or flexible component display system for use in the exhibit, the system shall be designed so that as much as possible of the individual parts can be pre-fabricated and fit together onsite. Artifact mount design shall be coordinated with the general design of the exhibit.
3. Mount Design Guidelines
  - a. Mounting design and materials shall be in accordance with Attachment E, Summary of Exhibit Conservation Guidelines, "Narrative Guidelines", D:3, "Design and Fabrication of Conservation Mounts." Materials shall be compatible with the artifact and shall be inert, cushion the artifact, and have smooth edges. Replacement and repair of existing mounts shall be of like design and materials unless otherwise specified on the drawings.
  - b. Mounts shall provide adequate support to prevent physical stress or unbalanced weight distribution on the artifact. The center of gravity and original intended use shall be considered.
  - c. Mounts shall not be permanently attached to any artifact. Each artifact shall be easily removable from its mount in the event of curatorial maintenance or emergency.
  - d. Fastening system shall be based on mechanical design and use no adhesives or sticky substances.

## Division 7. CONSERVATION GUIDELINES

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- e. Mounts shall be designed to minimize vibration and abrasion.
- f. Mounts shall protect artifacts from theft.

### 4. Mount Fabrication

- a. Original artifacts shall never be drilled, trimmed, tacked, nailed, screwed down, or glued down. The Contractor shall not use "museum wax", silicone rubber, or adhesive tapes.
- b. Original clamps, hooks, strings, and straps already attached to the artifacts shall not be used for support or to take weight off of the artifact.
- c. Mounts shall not utilize fabrics or materials that contain unstable dyes which could transfer colorants to artifacts.
- d. Sharp edges shall be removed from materials in close proximity to the displayed artifacts.
- e. An artifact shall never be forced to fit in a bracket, cradle, or other mount. The mount shall support, not compress; straps or brackets shall fit snugly, not tightly.
- f. Clamps and brackets shall be padded with non-abrasive, inert materials.
- g. Replacement mounts shall be of the like kind and materials unless otherwise specified on the drawings.

### C. **Artifact Handling**

- 1. Do not smoke, eat, or drink while working with artifacts.
- 2. Avoid haste while handling artifacts; use both hands when carrying an artifact.
- 3. In moving any artifact or group of artifacts, avoid travel shock.
- 4. Clean hands prior to handling artifacts. Wear white, line-free, clean cotton gloves when handling artifacts.
- 5. Wear no jewelry that may scratch artifacts.
- 6. Use more than one person in moving a cumbersome or heavy artifact.

## **Division 7. CONSERVATION GUIDELINES**

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7. Know the nature of the artifact you are going to handle: structural compositions, weak, and strong elements.
8. Limit the number of artifacts put in a carrying box. Never put lightweight and heavy artifacts in the same container. Always use separation battens, padding, or some kind of cushioning material between pieces when more than one artifact is put in a single box.
9. Never discard any packing or padding material until it has been thoroughly searched, especially in the case of breakage of the unpacked artifacts is known to have occurred.
10. All Government tags shall remain with the item for identification; when possible, tags shall remain tied to the item. Do not discard any tags removed from artifacts to be displayed; return them to the COTR.

### **D. Transportation**

In the event that replaceable objects are sent to the Contractor from the Government, the package will contain an inventory list. If for any reason this list is missing, the Contractor shall contact the COTR immediately. When unpacking the objects, the Contractor shall examine each object and indicate on the list that the individual item(s) have been received, note the condition of the object(s), and return a copy to:

Registrar's Office  
National Park Service  
Harpers Ferry Center  
P.O. Box 50  
Harpers Ferry, West Virginia 25425-0050

When shipping or returning objects or mounts, the Contractor shall include a copy of the shipping list and shall make an additional listing of the mounts. The object(s) shall be repacked in the original packing material and container. For shipping packages to the Registrar's Office, the address is as follows:

Registrar's Office  
National Park Service  
Harpers Ferry Center  
5 Willow Spring Drive  
Charles Town, West Virginia 25414  
304-535-6716

## Division 7. CONSERVATION GUIDELINES

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### E. Installation

1. Handling - Handling of artifacts at the installation site shall be in accordance with this Division, 7.7, C., Artifact Handling. Provide a clean, undisturbed work area at the exhibit site away from visitor access and any conditions which could be harmful to the artifacts, such as extremes of temperature and humidity, direct sunlight, smoke, and materials unsafe for direct contact. All identification tags removed from artifacts when they are mounted in the exhibit shall be turned over to the COTR. **Do not discard any identification tags** or remove them prior to final installation of the artifact. Place removed tags in a box or other small container designated for that purpose as specified by the COTR onsite.
2. Rehabilitation - When repairing or replacing an existing mount, care shall be taken not to damage, disturb, or otherwise impact negatively on other artifacts in a display. If the repair or replacement of a mount calls for complete removal of all artifacts in a case, the Contractor shall not undertake this task. Arrangements shall be made with the COTR prior to disassembly of an artifact case so that artifacts removed from an artifact case during repair of a mount can be secured by park staff.
3. Installation of Silica Gel - As specified in individual Task Orders, the Contractor shall furnish and install silica gel humidity ballast for the artifact cases in accordance with this Division, 7.6, B., Silica Gel, and in accordance with Division 4, 4.5, B., 2, Silica Gel Chambers.

Silica gel shall be conditioned to the required relative humidity level, provided in the required quantity per case, and packaged in bags or containers in accordance with Attachment E, Summary of Exhibit Conservation Guidelines. Conditioned silica gel shall be kept in the container from the manufacturer or in a vapor-proof bag, tightly closed, until immediately before installation into the artifact case, so as to maintain the conditioned humidity level as long as possible prior to installation.

4. Artifact Case Lighting - As specified in individual Task Orders, the Contractor shall aim and adjust all lighting on artifacts in accordance with required footcandle levels furnished by the COTR for each object. The Contractor shall use an approved light meter to check the light intensity on each object or group of objects. No light levels shall exceed the footcandle limit.

## Division 7. CONSERVATION GUIDELINES

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5. Clean and Close Artifact Cases - Upon completion of artifact mounting, adjustment of lighting, installation of silica gel, and all other objects to be installed in the case, the Contractor shall clean the inside of the case one last time using a clean cloth. No spray cleaner shall be sprayed inside the case. The Contractor shall close and lock the case as soon as possible in the installation process so as to limit exposure of the artifacts to unconditioned air, excess light, insects, and damage or theft in the installation work area.

## **Division 8. SETUP AND INSTALLATION**

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### **8.1 Introduction**

Provide setup and installation of all exhibit elements so that they are complete, fully operational, and ready for use.

### **8.2 Specific Requirements**

- A. Pre-Installation Meeting at the Contractor's facility.
- B. Staging of the exhibits and audiovisual components at the Contractor's facility, for inspection by the COTR prior to final packing or crating for installation.
- C. Packaging and shipping of exhibit elements and materials to the site.
- D. On-site installation of exhibit elements and materials.
- E. Walk-through Inspection of completed exhibits, with operational training for park staff.

### **8.3 Materials**

#### **A. Wood Crates**

The Contractor shall fabricate or supply wood crates, using CDX plywood and pine framing in thickness required, bases on size of crate. Crates shall be fastened using galvanized nails and screws for crate top.

#### **B. Packing Materials**

The Contractor shall pack materials using polyethylene air bubble cushioning material such as "bubble pack", flexible corrugated packing material, polyfoam peanuts, and/or heavy blankets.

#### **C. Installation Tools and Materials**

The Contractor shall provide all installation tools and materials in sufficient number to accomplish the job, such as a vacuum cleaner, ladders, tools, trash bags, cleaning materials, interior and exterior protective covers, barriers, and "No Admittance" signs.

## Division 8. SETUP AND INSTALLATION

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### 8.4 Execution

#### A. Pre-Installation Meeting

The Contractor's Project Manager and members of the Contractor's installation team shall meet with the COTR at the Contractor's facility to discuss the project and review work at the time of the exhibit staging.

#### B. Staging and Acceptance

1. Setup - Prior to shipping the exhibit elements to the site for installation, a thorough inspection of the completed and functioning exhibits will be made by the COTR at the Contractor's facility. The Contractor shall place all exhibit units in exactly the same configuration and dimensioned area as they will be installed. Focal points specified on the floor plan shall be laid out on the floor with masking tape.
2. Demonstration - All units shall be fully operational at the time of final inspection. Exhibit units with built-in lighting, electrical, mechanical, and audiovisual equipment shall be connected to power sources. The Contractor shall demonstrate that each operation is fully functional, in accordance with Division 5, Electrical/Electronic.
3. Maintenance Manual - One copy of the Preliminary Maintenance Manual shall be submitted to the COTR for review and approval at the final shop inspection.

#### C. Wrapping and Packing

1. Structures - Structures shall be blanket-wrapped with all attached exhibit elements protected.
2. Audiovisual Equipment - Audiovisual equipment shall be shipped in original shipping box from manufacturer with all original packing materials in place.
3. Graphics - During storage prior to the installation and during transportation to the installation site, the Contractor shall use flat, smooth-surfaced materials between graphics which are mounted and protected with overlamine film. The Contractor shall ensure that dust, dirt, sawdust, bubble wrap, styrofoam sheet or peanuts, and the rear surfaces of other graphic panels do not come in contact with the face of overlaminated prints and leave impressions in the overlamine surface. Mounted prints with patterns impressed into the overlamine film are unacceptable.



## Division 8. SETUP AND INSTALLATION

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4. Screen Printed Graphics - All screen printed surfaces shall be protected with brown paper secured with masking tape until completion of final on-site setup.

### D. Shipping

The Contractor shall pack and crate all materials which shall be shipped by their own or commercial carrier in such a manner that they will arrive at the designated site undamaged. If exhibit elements are damaged in transit, the Contractor shall bear the full responsibility for repair or replacement.

### E. Installation

1. Installation Team - The Contractor shall provide adequate personnel to install the exhibits, including the Project Manager. The Contractor shall provide all required tools and materials in sufficient number to accomplish the job.
2. Cleanup - The Contractor shall maintain all areas in a clean condition on a daily basis and provide means of preventing dirt or waste material from being tracked into adjacent areas of the building.
  - a. The Contractor shall provide bags and containers for storage of trash. The Contractor shall be responsible for removing waste materials generated during installation from the park. The Contractor shall not dispose of their waste in dumpsters or containers which belong to the Government or to other contractors working on-site.
  - b. Drilling and cutting shall be completed prior to the installation of artifacts, models, original art, and audiovisual equipment to avoid excessive dust and debris that may damage the sensitive items. On-site work shall be phased so that drilling, cutting, rough carpentry, sanding, and use of finishes or adhesives is accomplished, followed by a thorough cleanup and allowance for dust to settle and fumes to dissipate. Protective paper or plastic floor coverings which are torn or thoroughly soiled shall be replaced with clean material. Then, installation of the sensitive materials and equipment can proceed.
  - c. The Contractor shall thoroughly clean exhibit surfaces to remove handprints, dust, and miscellaneous markings generated during the installation.

## Division 8. SETUP AND INSTALLATION

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- d. The Contractor shall handle all acrylic, glass, and graphic panels with clean gloves to minimize handprints of natural skin oils. Panels shall be thoroughly cleaned until all dust, prints, and smears are removed from the face and rear surfaces. Acceptable materials for cleaning acrylic are specified in Division 9, 9.3, B., 3., Cleaning Materials.
  - e. The Contractor shall provide labor, materials, equipment, and supplies for final cleaning of the exhibit site, including vacuuming the entire exhibit space. For carpeted spaces, vacuuming equipment shall be appropriate for professional cleaning of carpeting; shop vacuums are not acceptable. The use of equipment belonging to the Government is not acceptable.
- 3. Storage - Exhibit elements shall be stored at the exhibit site during installation. Prior to the installation, the Contractor shall plan how storage shall be accomplished so as to provide protection of the exhibit elements and minimize disruption of park operations. The Contractor shall discuss their plan with the COTR for review and approval prior to the installation.
  - 4. Existing Work - The Contractor shall request authorization from the COTR prior to cutting, drilling, altering, or removing material within the building. Work that is replaced shall match existing work. Anything damaged or defaced within the building due to the Contractor's error during installation shall be restored to the original condition by the Contractor. Restoration work shall be coordinated with the COTR.
  - 5. Protection - The Contractor shall provide adequate protection for parts of the building, its contents, and occupants wherever work under this contract is being performed. This includes dust protection where required and protective coverings for interior surfaces and furnishings adjacent to the work area. The Contractor shall provide cardboard, plastic, or heavy kraft paper for the floor of the exhibit and adjacent work areas. The Contractor shall provide barriers and post "No Admittance" signs. The Contractor shall also ensure that artifacts are not left unattended and that they are stored in a secure location when the work site is unattended.

### F. **Walk-Through Inspection**

Upon completion of the on-site work, the Contractor shall conduct a final walk-through inspection of the exhibits with the COTR and park staff. The Contractor shall notify the COTR ahead of time when the walk-through can be scheduled and shall assemble installation team members with the appropriate expertise to demonstrate the equipment and answer questions.

## Division 8. SETUP AND INSTALLATION

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1. The inspection shall identify punch-list items (items that need to be corrected by the Contractor). The Contractor shall record and maintain a list of the punch-list items as they are identified by the COTR.
2. The Contractor shall demonstrate operation of all electrical, mechanical elements, and audiovisual components in the exhibit. The exhibit shall be fully operational at the time of the walk-through inspection.
3. The Contractor shall demonstrate access into exhibit structures for maintenance purposes, including artifact cases, silica gel chambers, lighting chambers, and all other electrical and electronic equipment, including audiovisual equipment.

### G. Operational Training Session

After inspection and acceptance of the installed exhibits, the Contractor shall conduct an operational training session for the COTR and park staff, using the Maintenance Manual as an instructional aid.

1. During the training session, the Contractor shall provide the following to the COTR, in accordance with Division 9, Project Closeout.
  - a. Two copies of the Final Maintenance Manual. The manual shall incorporate all changes or corrections to the Preliminary Maintenance Manual reviewed by the COTR during the final shop inspection.
  - b. Maintenance Kit, in accordance with Division 9, 9.3, B., Maintenance Kit.
2. The training session shall include, but not be limited to:
  - a. Day-to-day cleaning of the exhibits;
  - b. Minor repair and touch-up procedures;

## **Division 8. SETUP AND INSTALLATION**

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- c. Access into exhibit structures, including operating locks and tamperproof hardware, opening hinged doors, removing and replacing cover panels, removing and inserting silica gel desiccant, changing lamps in lighting fixtures, and removing and replacing mounted artifacts, models, and mannequins; and
- d. Start-up and shutdown procedures for audiovisual equipment, lighting, and other electrical equipment, including troubleshooting in the event of a power outage, lightening surge, or other potential hazard.

## Division 9. PROJECT CLOSEOUT

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### 9.1 Introduction

Prepare and organize all exhibit production material for submittal to the COTR and closeout of the project.

### 9.2 Specific Requirements

#### A. Maintenance Manual

Assemble a Maintenance Manual for use as a reference by the park in their day-to-day cleaning, operation, and minor repair of the exhibits, and as a reference for future rehabilitation of the exhibits. Provide two copies of the Final Maintenance Manual to the COTR and submit one copy in the Closeout Package.

#### B. Maintenance Kit

Assemble a kit of materials for use by the park containing materials for cleaning and touch-up of the exhibits and keys and tools for operating locking mechanisms in the exhibits.

#### C. Closeout Package

Assemble, organize, and submit all Government-Furnished references and graphic sources, along with all materials generated during the production process including drawings, digital files, and one copy of the Final Maintenance Manual.

### 9.3 Materials

#### A. Maintenance Manuals

Black, three-ring binders to hold 8-1/2" x 11" format paper, white and black illustration boards, plastic sleeves, pockets, and tabbed identification dividers.

#### B. Maintenance Kit

1. Container - A heavy-duty plastic storage container, with a lid.
2. Touch-up Materials - Bottles or cans of each paint, stain, wax, or other finish used on the exhibit, with tightly fitted lids or caps, and clear identification of the contents on firmly attached labels. For each type of finish, provide appropriate solvents and brushes or other tools as required to apply the finish. The quantity of materials shall be enough to last the park approximately one year.

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3. Cleaning Materials - Cleaning materials as required for cleaning each type of surface in the exhibit, including glass, acrylic, plastic laminate, metal, and wood. Provide appropriate applicators for use with each type of cleaning product. All cleaning materials shall be listed in the Maintenance Manual, with manufacturer's address, telephone number, and website address (if applicable). If the exhibit includes acrylic glazing or surfaces, provide the following materials for cleaning acrylic:

- a. Brillianize, as manufactured by:

The Brillianize Company  
Kleenmaster Products  
4966 Industrial Highway  
Benicia, California 94510  
800-445-9344  
707-751-0656  
www.brillianize.com

- b. WypAll Plus All-Purpose Wipers, as manufactured by:

Kimberly-Clark Corporation  
World Headquarters  
351 Phelps Drive  
Irving, Texas 75038  
972-281-1200  
www.kimberly-clark.com

4. Keys and Tools - All keys to exhibit locks and specialized tools, including screwdrivers for tamperproof screws, wrenches for roto locks, and allen (hex) wrenches, or any other specialized tool which shall be used for case access, mobility, or security. Provide two copies of each key and tool. Each key and tool shall be identified with the exhibit project name and number.

### C. **Closeout Package**

1. Digital Media - Materials in accordance with Division 6, 6.5, K., Archival Storage Materials.
2. Photo Negatives and Sources Materials - Materials in accordance with Division 6, 6.5, A.

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3. As-Built Drawings - Materials in accordance with Division 2, Fabrication Drawings.
4. Maintenance Manual - Materials in accordance with this Division, 9.3, A., Maintenance Manual, and B., Maintenance Kit.

### 9.4 Execution

#### A. Assembly of Maintenance Manual

Pages shall be 8-1/2" x 11" sheets, punched and inserted into black three-ring binders. The spine of the binder shall be labeled "Maintenance Manual" and the name of the project, site, and month/year of installation. Organize the manual in sections in accordance with 9.4, B, and separate each section with labeled and tabbed dividers. Organize content of Maintenance Manual to facilitate easy use as a reference document. Include page numbers or headers, and organize information in a logical manner.

#### B. Content of Maintenance Manual

1. Title Page - Provide a title page with the name of the exhibit, the site, and installation date.
2. Index - Provide a list of contents.
3. Contract Information - Provide name, address, and telephone number for all contractors who produced work for the exhibit, identifying the portion of the work which they provided.
4. Cleaning Instructions - Provide instructions for cleaning all exhibit structures, finishes, graphic panels, tactile models, and screen printed material. Include brand names of recommended cleaning materials. Provide the name, address, telephone number, and website (if applicable) of the manufacturers or distributors of the cleaning products. Listed cleaning products shall correspond with supplies included in the Maintenance Kit furnished by the Contractor. "Not to be Used" materials and techniques shall be identified.
5. Repair Instructions - Describe specific techniques for repairing damage to exhibit surface materials such as: wood and painted finishes, screen printed areas, plastic laminates, faux finishes, fabric, metal, acrylic, polycarbonate, and glass.

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6. Artifact Care and Handling - Provide information or direction for care, maintenance, and cleaning of the artifact mounts, including how to detach the object from the mount. Provide copies of all final artifact mount drawings.
7. Product List and Catalog Cuts - List brand names of off-the-shelf products purchased for use in the exhibit and the name, address, telephone number, and website address (if applicable). Provide legible machine copies of catalog cuts. However, if copy of original cannot be produced without loss of readability, original catalog cuts shall be provided. Include at least one original copy of the manufacturer's information packed with Contractor-Purchased off-the-shelf equipment, inserted into 8-1/2" x 11" clear plastic sleeves, punched for three-ring binders.
8. Warranties - Provide manufacturer's warranties for all off-the-shelf equipment purchased by the Contractor.
9. Access Instructions - Provide visuals clearly and sufficiently illustrating access to artifacts, desiccant, lighting equipment, mechanical devices, and audiovisual equipment within the exhibits. The illustrations shall include the exhibit number(s), step-by-step instructions, and any other information relevant to opening or dismantling the structures. The illustrations shall be accomplished in one or both of the following ways:
  - a. Isometric or exploded view drawings.
  - b. Digital photographs combined with text, showing a person following the step-by-step instructions. Include close-up views of specialized locks or hardware, identified by captions.
10. Electrical and Mechanical Instructions - Provide maintenance and operation instructions for all lighting, electrical, and mechanical equipment provided by the Contractor as follows:
  - a. As-Built Lighting Plan
    - (i) As-Built Drawings of the exhibit lighting plan which shows final fixture placement.
    - (ii) Identification of the manufacturer and model number of all fixtures, including any specialized equipment such as gels, diffusers, and louvers.



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- (iii) Specific instructions for re-lamping.
  - b. Wiring Diagrams - Include final wiring diagrams for all equipment. Include a copy of Government-Furnished instructions for repair or replacement of audiovisual equipment.
  - c. Catalog Cuts - Catalog cuts and manufacturer's printed instructions for all ceiling lighting fixtures, lighting tracks, lighting track fixtures, lamps, connectors, transformers, adapters, power strips, clocks, sensors, timers, ventilation fans, thermostats, motors, switches, pushbuttons, fibers, lenses, illuminators, dimmer controls, or other electrical, mechanical, or lighting equipment.
11. Color and Finish Samples - Provide actual samples of all materials used in the exhibit such as: woods, veneers, masonry, metal trim, laminates, fabrics, carpets, paints, and inks. Material shall be mounted on 8-1/2" x 11" white illustration board, clearly labeled with the color name and number, the manufacturer's brand name, and other pertinent product identification, keyed to the drawings for location. One 8-1/2" x 11" mounted sample shall be provided for each type of digital output print. One 8-1/2" x 11" sample shall be provided for each screen printing ink color and substrate combination used in the exhibit. Samples of specialized techniques such as sandblasted or etched graphics or finishes shall also be provided.
12. Exhibit Plan - A copy of the Graphic Schedule and Facsimiles, Artifact Schedule and Facsimiles, and Label Schedule shall be included. All revisions and updated information shall be clearly noted.
13. Exhibit Drawings - Include one copy of one-half (1/2) size exhibit drawings and insert into the Maintenance Manual.

### C. **Maintenance Kit**

Cleaning materials, touch-up materials, and tools shall be clearly identified and correspond with instructions in the Maintenance Manual for their use.

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### D. Closeout Package

1. Digital Media
  - a. Exhibit Plan Database - Stored on CD-ROM.
  - b. Graphic Layouts - Stored on CD-ROM in accordance with Division 6, 6.6, A., Handling of Source Material.
  - c. High-resolution Scans of Art and Photos - Stored on CD-ROM in accordance with Division 6, 6.6, A., Handling of Source Material.
2. Photo Negatives and Sources - Assembled and organized in accordance with Division 6, 6.5, K., Archival Storage Materials, and 6.6, A., Handling of Source Material.
3. Artwork - Digital artwork shall be stored on CD-ROM in accordance with Division 6, 6.6, A., Handling of Source Material. Government-Furnished and Contractor-Produced artwork, sketches, and layouts shall be placed in acid-free folders or wrapped in acid-free paper. Identify all artwork by project name and graphic number.
4. Drawings
  - a. Design Drawings - Government-Furnished exhibit drawings.
  - b. As-Built Drawings - In accordance with Division 2, Fabrication Drawings.
5. Maintenance Manual - A total of three copies shall be provided by the Contractor; one copy shall be included in the Closeout Package; two copies shall be supplied to the COTR during the Operational Training Session. The Final Maintenance Manual shall incorporate review comments made by the COTR during review of the Preliminary Maintenance Manual at the Final Shop Inspection.
6. Government-Furnishes References - The Contractor shall return all Government-Furnished reference materials.
7. Samples - All samples, models, or mock-ups required as submittals to the COTR for review are the property of the Government, including samples returned to the Contractor for reference or stored in the Contractor's shop. The COTR will inform the Contractor which samples are no longer of use and can be discarded and which shall be included in the Closeout Package.

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### E. Storage of Exhibit Resource Materials at the Contractor's Facility

1. During Fabrication - The Contractor shall ensure that all Government-Furnished books, negatives, archival, and resource materials are stored in a safe place and remain in the same condition as they were received.
2. After Project Completion - The Contractor shall store copies of digital files used during the project at their facility for a minimum of one year following the installation of the exhibit.