

National Park Service
Standard Exhibit Planning, Design, and Fabrication Specifications
Harpers Ferry Center



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Section 1. DEFINITIONS

ABAAS: Architectural Barriers Act Accessibility Standards are the accessibility standards which pertain to the Federal sector. The **ABA**, or Architectural Barriers Act of 1968, requires access to facilities designed, built, altered, or leased with federal funds. (See also “Accessible,” “ADA,” and “Rehabilitation Act.”)

Accessible: In context with the requirements of this contract, **accessible** is defined as in compliance with the combined physical and interpretive accessibility standards as specified in the Programmatic Accessibility Guidelines for National Park Service Interpretive Media, including the Architectural Barriers Act Accessibility Standards (ABAAS), and Sections 504 and 508 of the Rehabilitation Act.

Accessioned Objects: Objects accessioned into the park collection, or objects on loan from other institutions. These items require the highest level of preservation and security criteria. Historic objects also include original period items acquired as part of the exhibit project to enhance interpretation. Park staff determines whether to accession these objects on a case by case basis.

ADA: Americans with Disabilities Act of 1990. This law prohibits discrimination against individuals on the basis of disability. It applies to state and local governments, and public accommodations operated by the private sector. It **does not** apply to Federal facilities. Therefore, the term “ADA” or “ADA compliant” should not be used when referring to accessibility compliance in Federal Government owned and operated facilities. (See also “ABAAS” and “Rehabilitation Act.”)

Artifacts: See “Accessioned Objects.”

As-Built Exhibit Plan: The fabrication contractor updates exhibition content data (e.g., text, content schedules, technical data, etc.) to reflect all changes that occur during fabrication and installation, and provides a record of the “as-built” condition of the exhibits, which may vary from the final design documents prepared by the exhibit planning & design contractor.

As-Built Exhibit Drawings: Final design and detail drawings updated by the fabrication contractor to reflect all changes that occur during fabrication and installation and provide a record of the “as-built” condition of the exhibits, which may vary from the final design documents prepared by the exhibit planning & design contractor.

As-Built Lighting Plan: A final plan drawing for the installed exhibit lighting system showing fixture placement, focusing information, and itemized lists detailing fixture, accessory, and lamp data.

Assistive Listening Systems: Assistive listening uses various devices that amplify volume for persons with mild to profound hearing loss who may or may not use a hearing aid. Assistive listening devices (ALDS) include headsets, ear buds, and hearing aids. The amplified sound is transmitted via radio frequency, infrared, or induction loops to the user’s headset, ear buds, or hearing aid.

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Audio Description: Audio description describes the visual content of video, multimedia programs and exhibits for users who are blind or have low vision. For audiovisual programs, audio description provides the viewer with information that further describes the visual content not provided in the primary audio track and is a separate audio track synchronized with the program's primary audio track. Video description and descriptive video are terms also used for audio description.

AV Treatments: A narrative overview of the proposed production's creative approach and storyline prepared during the exhibit planning and design process. AV treatments typically include a description of the actors and/or participants, their roles and general dialogue or narration, and a general description of the scenes, locations, graphics, artwork, and animation to be used in the production with sufficient detail to provide a sense of the proposed production; the basis of the production plan and script.

AV Equipment: All electronic and ancillary equipment required to present or support the presentation of AV and multimedia programs in an exhibition. AV Equipment is tracked in the Content Management Numbering System, and is inventoried in FMSS where it is designated as "Exhibit Audiovisual System."

Bubble Diagrams: Diagrams that use labeled shapes (bubbles) identifying exhibit themes and concepts to show how they relate to each other and/or to their location on the exhibit floor plan.

Captions: Captions display spoken dialogue as printed words for viewers who are deaf or hard of hearing on television screens, computer monitors, projection screens, caption boards and other visual displays. Captions must also include information regarding on- and off-screen sound effects such as music, laughter, or canon firing. Captions hold secondary benefits for people who are learning a foreign language, learning how to read, watching a program in a noisy area, or understand best by processing visual information. While used as a catch-all term, captions have a unique technical production process.

Closed Captions: Closed captions normally do not appear on screen unless the viewer has selected them to appear. The presentation venue must use closed caption decoder technology. The decoder will allow the otherwise-hidden data within the television signal to be displayed on the user's TV screen or computer monitor. Many newer television models allow viewers to toggle captions on or off with ease. All audiovisual programs shown within the National Park Service must display captions on-screen at all times.

Charette: A meeting to brainstorm and fully explore all possible design directions for presentation and communication of content in the exhibition. Differs from the Exhibit Planning Workshop in that it is more focused on design solutions.

Class A Production Cost Estimate: Detailed cost estimate which includes an itemized breakdown, at a minimum, of labor hours and rates, material costs, shipping, and travel, based on specifications for all exhibit elements found in the Production Documents.

Class B Production Cost Allowance: An intermediate level cost estimate based on allocating an overall cost for each exhibit Scene or Content Group in the exhibition plan, and including allowances for all high-cost exhibit elements currently identified, contingency, shipping, and installation. Class B Production Cost Allowances are used during the Schematic and Design Development phases of work, and become increasingly detailed as the design progresses.

Class C Production Cost Allowance: An initial cost estimate based on the cost of the exhibition per square foot. Class C estimates are used during the Pre-Design phase of work.

Content Development: See Exhibit Planning.

Content Group: A discrete thematic story or information set within an exhibition that, together with adjacent related Content Groups, is part of a larger Scene. A Content Group tells one aspect of the larger story or information presented in the overall Scene.

Content Management: A system to organize and track all media elements to be featured in the exhibition, organized by unique exhibit element number.

Content Management Numbering System: A system that identifies each exhibit element with a unique number (the Element Identification Number) made up of three parts, separated by hyphens, as follows: Element Type – Scene. Content Group Number – Item Number. For example, IM-02.04-101

COR: Contracting Officer's Representative. For Federal Government contracts, an authorized representative of the Contracting Officer responsible for monitoring the quality and performance of work performed under individual contracts.

Custom Element: General category for three-dimensional content in an exhibition that is not otherwise categorized. Custom Elements may be commercially available items, but more often are specifically created for the exhibition, requiring creative design, and/or artistic development and execution. Examples include sculptures, architectural models, natural history models, reproduction historic objects, dioramas, manipulatives, electrical and mechanical interactive devices, mannequins, and topographic maps. Custom Elements are tracked in the Content Management Numbering System, and are inventoried in FMSS where they are designated as "Custom Three-Dimensional Exhibit Elements."

Custom Three-Dimensional Exhibit Element (FMSS): See Custom Element.

Design Alternatives: Distinct approaches to the exhibit content, its organization and presentation in the given exhibition space. Multiple Design Alternatives (usually three) are developed in the Schematic I phase of work as part of the process used to arrive at a Preferred Design Alternative.

Design Development: The phase of the exhibit development process in which all major content and design details of the project are completed. Technical details required for Production are not included in this phase of work.

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Exhibition: The overall interpretive presentation which may consist of several Scenes. Each Scene may consist of several Content Groups. Each Content Group may consist of a number of individual exhibit elements such as graphic panels, manipulative devices, AV, cases, etc.

Exhibit Audiovisual System (FMSS): See AV Equipment.

Exhibit Case (FMSS): An exhibit component used for display of three-dimensional objects that require controlled environmental conditions and/or additional security. They typically include a transparent window or enclosure called a vitrine, and a base or other support structure. Exhibit Cases are detailed in the exhibit drawings. They are tracked in the Content Management Numbering System, and are inventoried in FMSS.

Exhibit Design: Development of the physical organization of the exhibit space, integration of all exhibit elements into a cohesive presentation, functional characteristics and visual appearance of exhibit elements, and development of technical details for fabrication.

Exhibit Designer: The person who typically takes the lead with design tasks.

Exhibit Developer: The person who typically takes the lead with content development tasks.

Exhibit Evaluation: The process for better understanding the audience by using social science methods to produce effective exhibitions.

Exhibit Lighting System (FMSS): Lighting dedicated to illumination of the overall exhibition, generally using high-quality fixtures and lamps to enhance the visual appearance of the display. Does not include lighting that is internal to individual exhibit elements such as cases. Lighting Systems are detailed in the exhibit drawings and specifications. They are also inventoried in FMSS as an exhibit component. They are not tracked in the Content Management Numbering System.

Exhibit Objective: A statement specific to the intent of each exhibit that directs the entire exhibit development process, including decisions about content, interpretation, media selection, and presentation techniques.

Exhibit Planning: Story development, content research, organization of content, text writing, and other tasks associated with the interpretive content of an exhibit. May also be referred to as Content Development.

Exhibit Planning Workshop: A meeting to review and analyze the space and propose recommendations, review existing planning documents, review and/or develop design criteria, conduct research, review and/or develop themes, goals, and objectives, define target audience, and discuss the desired visitor experience. Differs from the Charette in that it typically does not explore design solutions.

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Exhibit Structure (FMSS): A physical component of an exhibition whose primary purpose is structural rather than interpretive or informational (although it may contribute to interpretation and information through their design). Platforms, rails, bases, and walls are examples. Exhibit structures are detailed in the exhibit drawings. They are not tracked in the Content Management Numbering System, however they are inventoried in FMSS.

FMSS: Facility Management Software System, an NPS system-wide database for managing physical assets. Physical components of an exhibition are inventoried after installation for maintenance purposes within FMSS.

Front-end evaluation: Evaluation conducted at the beginning of a project that seeks input from potential visitors to find out what kinds of information they already know, what visitors would like to know, and explores how exhibits can best present this interpretive information.

Formative Evaluation: Evaluation conducted before the fabrication of exhibits, when mock-up testing can be carried out to reveal problems and successes with proposed designs.

FPO: For Position Only. Placement images in a Graphic Layout used for design and review purposes. FPO images are not suitable for final production purposes.

Graphic Layout: The design of content appearing on the face of a two-dimensional exhibit graphic component. Graphic Layout is an element type in the Content Management Numbering System. It includes the text, images, arrangement, and graphic treatment. It does not include the physical panel or other surface to which the Graphic Layout is applied.

Graphic Pre-Production: All work required to create graphic production files for all Graphic Layouts. These files shall be as complete as possible without having access to the actual graphic production equipment used for output. All production-quality images shall be in place, and any Photoshop treatments applied.

Graphic Production: All work required to print Graphic Layouts, including optimizing graphic production files for the specific production environment, output onto the specified substrate, and any substrate finishing, mounting and laminating required to prepare the output for mounting onto its associated panel or other two-dimensional exhibit graphic component.

Graphic Production Files: Computer files that are complete and ready for output of Graphic Layouts by the exhibit fabricator or their graphics subcontractor.

IDIQ Contract: Indefinite Delivery, Indefinite Quantity Contract. A contract established for the purpose of awarding multiple individual projects over an extended period of time. The IDIQ contract establishes basic parameters for the type of work to be done, hourly rates, mark-up, contractor capabilities, and performance standards. **Task Orders** are negotiated under the IDIQ contract for individual projects and include a detailed scope of work describing the project's technical requirements and schedule.

Interpretive writing: A writing approach that draws from technical, informational, scientific, historical, and cultural sources; it incorporates creative techniques and seeks to connect readers emotionally and intellectually to the meanings and significance of the resource(s).

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Life-cycle Costs: An estimate that identifies ongoing costs associated with operating and maintaining the exhibit, including staffing, consumables, maintenance contracts, service-life and long-term replacement costs.

Mock-ups: In planning and design, mock-ups are working models of proposed exhibit elements that are fabricated simply, quickly, and at minimal cost in order to test a concept. In fabrication, 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 are for review only, and not used in the final exhibit.

Multimedia Program Design: Conceptual design, prepared during the exhibit planning and design process, of the structure and content of electronic interactive programs. The purpose of the Multimedia Program Design is for review and approval of the concept, and to provide guidance for the multimedia program developer responsible for creating the program.

Open Captions: Open captions are displayed on the screen automatically as part of the video, without having to be selected by the user.

Original graphic content: Original illustrations, photography, maps, and other two dimensional images created specifically for an exhibit project.

Personal Protective Equipment (PPE) - Clothing, footwear, and hearing and eye protection designed for the health and safety of workers while working in fabrication shops or on construction sites. Examples include hard hats, safety glasses, respirators, and safety-toed shoes.

Pre-Design Phase: The initial phase of a project that logically structures the work that follows; provides a clear understanding of the project's history, the park's resources, and the roles of other project team members and stakeholders; and ensures that its goals are understood and realistically attainable within the budget, schedule, and other specified parameters.

Preferred Design Alternative: The design solution that is chosen from several different alternatives and/or developed either through group consensus or the NPS Value Analysis Process.

Production Documents: The phase of work where technical drawings, specifications, and content details are completed to the level required for exhibit production firms to propose on the project and begin fabrication.

Production Support: Creative and technical support by the original planning and design team during fabrication of the project to ensure adherence to the project's design intent.

Production-ready Files: See Graphic Production Files.

Project Brief: A consolidated overview of project information developed during the Pre-Design phase of work.

Project Goals: The project's interpretive objectives and the desired visitor experience.

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Prototype: 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. Successful prototypes are usually incorporated into the final exhibit along with the other elements of the same design.

Punch List: A list of deficiencies to be corrected by the fabrication contractor before final acceptance of the exhibition. The punch list is generated during an inspection by the COR during a final walkthrough inspection.

Reference Package: A document consisting of written descriptions and graphic depictions that together provide the background information and design intent needed for an artist, craftsman, or technical specialist to produce a custom element. Usually prepared during the Design Development or Production Documents phase of exhibit planning and design.

Rehabilitation Act: The Rehabilitation Act prohibits discrimination on the basis of disability in programs conducted by federal agencies or programs receiving federal financial assistance. It is one of the primary laws specifying accessibility requirements for NPS exhibitions. Section 504 of this law requires access for individuals with disabilities to programs and activities conducted or funded by Federal agencies. Section 508 of this law requires comparable access to information and data delivered through electronic and information technology methods.

Reproduction Historic Objects: Accurate copies of collections objects or period objects fabricated for use in the exhibit. Typically the park does not accession these objects.

Resource Package: A compilation of available, potential, and needed graphics, objects and media elements that may be considered for use in the exhibit. Usually prepared during the Schematic Design phase of exhibit planning and design.

Scene: A major area or section of an exhibition, usually establishing one visual setting, and/or encompassing one major content or informational theme. A Scene consists of a set of individual but related Content Groups, which further break down and organize the content in the Scene.

Schematic Design: The phase of work where several conceptual alternatives for the exhibition are explored and a preferred alternative selected.

Shop Inspection: Government review of completed or in-progress work at the fabricator's facility. At the final shop inspection, completed work is inspected and approved by the COR prior to shipment to the installation site.

Submittal (planning and design): All documents (i.e., drawings, schedules, facsimiles), electronic files, and other materials that together represent the level of development of work at a given time, and provided by the contractor to the COR for review and approval.

Submittal (fabrication): All samples, drawings, proofs, or other intermediate or final stage material provided to the COR for review and approval. Inspections of work at the contractor's shop or installation site are by definition also submittals.

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Subtitles for the Deaf and Hard of Hearing: Subtitles for the Deaf and Hard of Hearing are produced technically in the same manner as subtitles used for translation purposes. But they utilize the same techniques as captions in order to effectively communicate the audio content to users who are deaf or hard of hearing, such as identifying speakers, sound effects, and music.

Summative/Remedial Evaluation: Evaluation conducted after final installation, when the entire exhibition can be evaluated and final adjustments can be made.

Sustainability: Generally refers to minimizing maintenance, operations, and life-cycle costs. The concept has evolved to be defined as design and production practices which balance the needs of the present with those of future generations and include recycling, energy conservation and pollution reduction.

Task Order: See IDIQ Contract.

Two-Dimensional Exhibit Graphic (FMSS): The physical exhibit component consisting of a Graphic Layout image, the surface to which it is applied, and any other closely associated panel, backing materials, and hardware. Two-dimensional exhibit graphic components are detailed in the exhibit drawings and inventoried as physical components in FMSS. It is important to distinguish between the Graphic Layout, which is managed as interpretive / informational content, and its associated Two-Dimensional Exhibit Graphic component, which is managed as a physical component.

Universal Design: The design of products and environments to be usable by all people, to the greatest extent possible, without assistance, adaptation or specialized design. See detailed description in the Programmatic Accessibility Guidelines for National Park Service Interpretive Media.

Value Analysis Process: An organized effort directed by a person trained in NPS Value Analysis Techniques to analyze the functions and effectiveness of the Schematic Design alternatives for the purpose of achieving the essential functions at the lowest initial and life cycle costs consistent with the required performance, reliability, quality and safety.

Visualization Materials: Sketches, renderings, presentation boards, booklets, models, computer simulations, or other media that provide a holistic view of the exhibition, that give a sense of how the exhibition will be experienced by the visitor, and that allow project team members to quickly grasp how individual elements work together.

Walkthrough Inspection: A final inspection of the installed exhibits by the COR and park staff. During a walkthrough inspection, a **punch list** is generated.

Warranty Period: A time period after completion of an exhibit fabrication contract, usually a period of one year from installation and acceptance by the government, when the contractor's work is guaranteed against any defects in workmanship.

Section 2. PROJECT MANAGEMENT

2.1 Introduction

The purpose of the following Project Management tasks is to insure that scheduling, coordination, oversight, and communication is effectively accomplished for all work produced under this contract.

2.2 General Requirements

The contractor shall assign a Project Manager to oversee the Base IDIQ contract and shall also assign a Project Manager for each task order written under this Base IDIQ contract.

2.3 Specific Requirements for Base Contract Project Management

The contractor's Base Contract Project Manager shall be the primary point of contact between the contractor and the National Park Service (NPS) Contracting Officer and Contracting Officer's Representative (COR) for the Base Contract. The Base Contract Project Manager shall perform the following work:

- A. Notify the Contracting Officer of any changes to the contractor's business operations that affect work under this contract, including but not limited to:
 - (1) Changes to contractor's address, telephone, and other contact and business information (e.g., banking account information, email address, etc.).
 - (2) Proposed changes to key personnel.
 - (3) Workload or capacity issues affecting the ability of the contractor to accept additional work.

- B. Communicate with the Contracting Officer and Base Contract COR regarding major or broad issues affecting Task Orders written under this contract, including but not limited to:
 - (1) Clarification of work processes that are acceptable or unacceptable to the government under this contract.
 - (2) Misunderstandings, inconsistencies, or conflicting instructions encountered when working with different parks and different task order COR's.

- C. Prepare and submit an electronic status report every six months which lists all active task orders by number and includes, at a minimum, the name of the park and/or client, type of work being performed and results achieved during the reporting period, identification of any current problems that may impede performance, the proposed corrective action, and the completion date.

2.4 Specific Requirements for Task Order Project Management

The contractor's task order Project Manager shall be the primary point of contact between the contractor and task order COR for individual task orders and shall perform the following work:

- A. The Contractor's task order Project Manager shall have full authority to act for the Contractor on all matters relating to a specific task order. The Project Manager shall maintain contact with the task order COR as necessary, and shall:
 - (1) Be available to take or respond to telephone calls or electronic mail messages during normal hours of operation (8:30 am - 5:00 pm local time).
 - (2) Establish office procedures to ensure that messages are relayed to the Project Manager when out of the office or because of time zone differences.
 - (3) Respond to emergency messages from the COR on the same day they are received. All non-urgent messages from the COR shall be responded to in no more than two business days.
- B. Provide quality control to ensure that all elements of project work meet the requirements of the contract specifications as follows:
 - (1) Provide routine inspections of ongoing work, including review of all submittals prior to delivery.
 - (2) Inform the COR of any issues that could affect work quality or schedule.
 - (3) Ensure that all work is complete and compliant with the specifications prior to submittal to the COR.
- C. Track work progress to ensure that the project is completed according to the schedule. Coordinate and confirm the dates for all submittals and meetings with the COR. Provide a monthly status report to the task order COR that includes the status of the project, issues that are or can affect the schedule and budget, and an updated schedule based on the information at hand.
- D. Meet with the Contracting Officer and COR in accordance with [Section 4](#), Travel, Meetings, Presentations, and as specified in individual task orders.

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- E. Receive, inspect, and inventory all Government-Furnished materials and ensure that this material is forwarded to the appropriate unit or person within the contractor's organization for use in the project. The Project Manager shall notify the COR within seven days after receipt if Government-Furnished materials are not satisfactory for their intended purpose. The Project Manager shall notify the COR as soon as possible, but no later than three business days, if government-furnished materials are lost or damaged while in the Contractor's possession.

- F. The Project Manager shall coordinate and ensure that all specifications for submittals are in accordance with [Section 5](#), Submittals and Reviews, and as specified in individual task orders.

Section 3. EXHIBIT DEVELOPMENT PROCESSES

3.1 Introduction

The exhibit development processes employed depends upon a project's structure and contracting strategy. The first contracting strategy uses two contracts – an **exhibit planning and design contract**, followed by an **exhibit fabrication contract**. The second strategy uses only one contract – an **exhibit design-build contract**. Each approach has its own advantages and disadvantages, but the determining factor is often the budget and schedule. If all funds are available and need to be obligated quickly, design-build is more appropriate; one contract is awarded for the total project. In contrast, the two-contract approach may be used when more time is available and/or total project funding is incomplete. In this case, a contract for only the planning and design portion of the project is awarded first. When the remaining project funds become available, the planning and design documents generated by the first contract are used to solicit and award a second contract for the actual fabrication and installation of the exhibits.

Individual exhibit development contracts -- whether planning and design, fabrication, or design-build -- will refer to the portions of the NPS Standard Exhibit Planning, Design, and Fabrication Specifications relevant to the specific contract.

Full work requirements are specified in the various contracts and the technical specifications referenced within them. The three charts that follow provide a synopsis of each exhibit development process and its associated work requirements.



Museum / Visitor Center Exhibit Planning and Design Process

Summary Description (For full requirements see NPS museum interpretive exhibit planning and design contract and specifications)

Pre-Design

Pre-Design focuses on preparing a solid foundation for all work that follows, insuring that the project is logically structured and its goals are understood and realistically attainable. Project team members and stakeholders are identified and their roles defined. Pre-Design includes pre- and post- contract award phases:

Pre-Contract

Scoping study at site (if required)

In-house team reviews project status

- Planning documents
- Goals and objectives
- Budget, schedule, admin. requirements

Project scope of work developed

P&D contract is awarded

Post-Award

Contractor reviews gov. furnished materials

On-site orientation and planning workshop

Identify existing media resources

- Prepare resource package abstract.

Develop project brief

- Project overview, including updated information and understandings
- Identify interpretive themes and objectives
- Analyze project goals, media budget, schedule, and all other known issues affecting the development and successful completion of the project

Front-end evaluation (if required)

Schematic Design

Alternative schemes are explored for organizing both the interpretive content and physical layout of the exhibits. By the end of Schematic Design, a preferred alternative has been selected and major stories, exhibit elements and presentation techniques are illustrated and described. Schematic Design includes two sub-phases:

Schematic I

Content research

Resource package I (organized by themes)

SDI report with design alternatives

- Bubble diagrams
- Written description of exhibit scenes
- Preliminary sketches
- Class B cost estimates and life-cycle cost goals

NPS value analysis process (if required)

Schematic II

SDII report developing preferred alternative

- Content outline consisting of scenes and content groups
- Floor plan with scenes and content groups identified
- Conceptual elevations / renderings / visualizations
- Universal design and accessibility approaches
- Resource package level II organized according to scenes
- Updated class B and life-cycle cost estimates for preferred alternative

Design Development

All major details of the project are accounted for. Design and content are integrated into coherent media presentations. Complex media elements requiring further development are fully described. The exhibit's physical structure and operational characteristics are established. Design Development includes two sub-phases:

Design Development I

Draft DDI content outline (by content group)

- Text titles and descriptions
- Graphic layout drafts
- Graphic style, typography, color, finishes
- Major exhibit elements documented

Draft DDI exhibit drawings

- Detailed exhibit plan; arch. requirements
- Content group elevations / visualizations

DDI comprehensive report

- Updated content outline with draft script
- Updated exhibit drawing package
- Material, color, finish sample board

Design Development II

Draft DDII content & specification package

- Content schedules
- AV media treatments and equip specs
- Specialty element reference packages

Draft DDII graphic layout package with text

Draft DDII exhibit drawings (plan elev. detail)

Draft DDII class B and life-cycle cost estimates

Update DDII documents per comments

Formative evaluation if required

Production Documents

Technical drawings and specifications are completed, communicating details necessary for potential exhibit fabricators to understand, price, and begin work on the project. Pre-Production planning and design tasks are initiated and coordinated with the exhibit fabrication schedule. This phase includes these major tasks:

Production Docs I

PD exhibit drawings

PD content & specification package

- Content Schedules and supporting material
- Technical Specs / cut sheets for AV equip, lighting, exhibit specialties

PDI graphic layout package

Revised material and finish samples

Class A production estimate and updated life-cycle cost estimate

Production Docs II

Develop completion schedule

Acquire / prepare production scans

Proofread / correct production text

Prepare production-ready files

Revise exhibit drawings / content & specifications package as necessary

Provide content data in database readable format

Prepare Use-Rights Documentation Package with signed original content licenses

Production Support

Work in this phase includes creative and technical support during fabrication of the project, including Planning and Design Follow-ons required to complete development of specific exhibit elements, and Fabrication Support to insure adherence to the project's design intent. Specific tasks vary by project and may include:

Planning and Design Follow-ons

Prepare all design and content revisions required for production.

Create original graphic content including:

- Original illustrations
- Original photography
- Original and adapted maps

Provide creative direction to specialty contractors including:

- Illustrators
- Photographers
- Model makers
- AV and interactive producers

Fabrication / Installation Support

Review and comment on exhibit fabricator's submittals including:

- Shop drawings
- Samples

Participate in shop inspections

Installation support including:

- On-site art direction
- Focusing of lighting fixtures

Update content schedules / data fields

Support summative / remedial evaluation



Museum / Visitor Center Exhibit Fabrication Process

Summary Description (For full requirements see NPS museum interpretive exhibit fabrication contract and specifications)

Postaward	Submittals	Fabrication	Building Prep	Installation	Closeout/Warranty
<p>The Postaward Meeting and Site Visit provide important information and direction to the exhibit fabrication contractor to supplement the information in their contract documents. It is usually accomplished in one work day.</p>	<p>Shop drawings, proofs, and samples are submitted by the contractor for approval. Regular communication between the contractor and client is critical as details for most exhibit elements must be agreed upon prior to shop fabrication to avoid costly rework later.</p>	<p>Most exhibit elements are fabricated either in the contractor's shop or by specialty subcontractors. Complex project management skills are required to coordinate production of graphics, 3-D structures, electronic media, lighting, and curatorial elements.</p>	<p>Most changes to the building structure, finishes, and utilities fall outside the scope of the typical exhibit fabrication contract. However, detailed coordination between the exhibit contractor and those responsible for building prep work is required to insure a successful installation.</p>	<p>During this phase, the goal is to deliver the exhibit elements in as complete a state as possible and minimize the amount of on-site work to be done. Installations are costly and labor-intensive. The contractor must carefully coordinate the sequence of installation so that delays are minimized.</p>	<p>New exhibits typically include a one-year contractor's warranty for defects in materials and workmanship. A contingency fund may be established to resolve latent design defects. Important media resources acquired to create exhibit elements are archived during the closeout period.</p>
Typical Agenda for Postaward Meeting	Typical Submittals	Typical Elements to be Fabricated or Purchased	Typical Building Preparation Elements	Typical Work during the Exhibit Installation	Typical Work in the Closeout, Warranty Period
<p>Conduct a general review of the project, including schedule.</p> <p>Review exhibit design. Discuss contractor concerns or questions.</p> <p>Provide government-furnished reference materials to contractor.</p> <p>Conduct a review of these references</p> <p>Contractor documents exhibit space by taking measurements, reference photographs, and notes on existing conditions. Potential problems are identified.</p> <p>Contractor inspects, measures, and takes reference photographs of artifacts to be mounted by the contractor.</p>	<p>Fabrication details (shop drawings). These add required construction detailing not included in the original design drawings.</p> <p>Color and materials samples. There may be slight changes in colors and materials from the original design, associated with the fabrication drawings.</p> <p>Catalog Cuts - Manufacturer's information from printed or on-line catalogs.</p> <p>Graphic Proofs - Print-outs of digital graphics for review of text and visual effect of colors, photos and art. Proofs may be in a different output than the final media, or at a smaller scale. Consequently, other samples may be needed to check actual colors or other characteristics.</p> <p>Audiovisual technical drawings - Requirements for power and signal wiring and other technical details for AV equipment installation.</p>	<p>Preparation of production digital graphic files and output of digital graphics.</p> <p>Fabrication of structures, including artifact cases, panels, walls, platforms, information desks, benches, audiovisual kiosks, etc.</p> <p>Models, including scale models, sculpted or cast human figures, natural history models, taxidermy or freeze dried animals, architectural models, mechanical interactive exhibits.</p> <p>Fabrication of custom artifact mounting hardware.</p> <p>The contractor acquires audiovisual hardware and tests it in their shop, prior to installation.</p>	<p>Demolition / removal of old exhibits or other furnishings.</p> <p>New finishes for walls, floors, ceilings, and trim work as required.</p> <p>Changes or additions to electrical circuits, outlets, conduit, fire alarms, emergency exit lights, security system, and other work requiring a licensed electrician.</p> <p>Changes or additions to room lighting, such as installation of track lighting for the exhibits.</p> <p>Preparation of space for audiovisual equipment closet; installation of conduit for audiovisual equipment wiring.</p> <p>Changes to HVAC system to increase capacity when needed, and to move vents, ducts, or thermostats to accommodate new exhibit structures.</p>	<p>Minor building prep work not previously completed by others.</p> <p>Delivery of exhibits. Set up staging area for unloaded exhibit elements.</p> <p>Install large structures, such as platforms, walls, cases, etc.</p> <p>Install large graphic panels and murals.</p> <p>Install smaller graphics, AV equipment, models, interactive exhibits.</p> <p>Clean work site of debris and dust, clean artifact cases, install artifacts, perform all other conservation requirements, and seal cases.</p> <p>Aim and adjust lighting fixtures.</p> <p>Walk-through inspection of completed exhibits. Develop punch-list.</p> <p>Supply maintenance manual and train staff in exhibit operation and maintenance.</p> <p>Correct punch-list items.</p> <p>Photograph completed exhibition.</p>	<p>Contractor submits a closeout package including all Government-furnished materials, and materials generated by the contractor to create the exhibits, such as digital layouts, and "as-built" fabrication drawings. A duplicate copy of the maintenance manual is included in the closeout package.</p> <p>Graphic source material is checked to verify completeness, and filed for future exhibit rehabilitation.</p> <p>Quality issues with the exhibits are addressed under warranty. Other exhibit enhancements may be accomplished through a contract modification.</p> <p>A project inventory, including technical and cost data, is prepared to facilitate entry of the new asset into the Facility Management Software System database.</p>



Museum & Visitor Center Exhibit Design/Build Process

Summary Description (For full requirements see NPS design-build exhibits contract and specifications)

Pre-Design

Review planning documents.
Conduct scoping study at site.
Identify existing media resources.

- Develop Resource Package Abstract.

Evaluate architectural space.
Conduct Exhibit Planning Workshop.

Develop Project Brief including:

- Current overview of project, including updated information and understandings.
- Analysis of all project goals in terms of their effect on the development and successful completion of the exhibit.
- Analysis of the media budget (including Class C cost estimate), project schedule, and all other known parameters affecting the development and successful completion of the project.

Conduct Front-End Evaluation.

Schematic Design

Schematic Design includes two sub-phases:

Schematic I

Conduct content research.
Develop Resource Package Level I.
Conduct Charette.

Develop Design Alternatives including:

- Bubble diagrams.
- Written descriptions.
- Preliminary sketches.
- Class B and life-cycle cost estimates.

Schematic II

Participate in NPS Value Analysis process.
Develop Preferred Alternative including:

- Written exhibit walkthrough.
- Overall design approach.
- Floor plan with individual exhibit areas & major elements identified.
- Sample elevations.
- Conceptual renderings / visualizations.
- Resource Package Level II (content to be used in each exhibit identified).
- Updated Class B and life-cycle cost estimates for Preferred Alternative.

Design Development

Design Development includes two sub-phases:

Design Development I

Develop design including:

- Detailed floor plan and elevations.
- Sample graphic layouts / typography.
- Material, finish, and color proposals.
- Architectural modifications.

Develop content including:

- Text Level I (titles and descriptions).
- Identify major images and artifacts.
- Describe AV and interactive elements.
- Describe major content specialty elements such as natural history models, taxidermy, topographic maps, architectural models, sculpted or cast human figures, custom mechanical and electromechanical devices.
- Establish Content Management System (i.e., database, numbering system).

Design Development II

Develop all content in detail including:

- Text Level II (all text in draft form).
- Specify all graphic images.
- Specify all artifacts.
- Finalize AV / interactive treatments.
- Develop Reference Packages for all content specialty elements.

Enter all content information into Content Management System.
Create Graphic Layouts for all exhibits.
Update Exhibit Design Drawings.
Identify audiovisual and interactive equipment requirements.
Refine Class B and life-cycle cost estimates.
Conduct Formative Evaluation.

Content Specialties

Artifact Preparation

Acquire and prepare artifacts used in exhibit including:

- Finalize Artifact Schedule.
- Follow NPS Conservation Guidelines.
- Coordinate acquisition, storage, and transportation of artifacts as specified in the contract.
- Contract or assign conservators for consultation and treatment of artifacts.
- Repair damage and stabilize condition of artifacts as required.
- Establish artifact environmental requirements and coordinate with display case design and fabrication.
- Establish artifact mount requirements and coordinate with mount maker.

Custom Elements

Produce custom elements such as natural history models, taxidermy, topographic maps, architectural models, sculpted or cast human figures, custom electronic elements, specialty lighting, mechanical and electromechanical devices.

Tasks include:

- Provide project management.
- Finalize Reference Packages.
- Contract or assign specialty fabrication teams.
- Provide creative direction.
- Coordinate integration of custom elements with exhibit structures.

Typical Building Preparation Elements

In most cases, construction involving building structure, finishes, and utilities falls outside the scope of exhibit design/build work. However, on occasion, contracts may include one or more of these elements:

- Demolition / removal of old exhibits or other furnishings.
- New finishes for walls, floors, ceilings, and trim work as required.
- Modifications or upgrades to electrical,

AV Programs

Produce original audiovisual and electronic interactive programs including:

- Provide project management.
- Contract or assign AV production team.
- Provide creative direction.
- Coordinate AV equipment requirements.

Original Art

Produce original illustrations, maps, and photographs including:

- Provide project management.
- Finalize Reference Packages.
- Contract or assign illustrators, cartographers, and/or photographers.
- Provide creative direction.

Image Acquisition

Acquire all pre-existing images that are required for the exhibition including:

- Research image sources.
- Negotiate and purchase use rights, and provide documentation.
- Obtain reproductions (photos, scans) of suitable quality for exhibit use.
- Return originals to owners as required.

Pre-Production

Complete all design and content revisions required for production.
Prepare detailed fabrication and installation schedule.
Inspect exhibit space and document any problems affecting exhibit installation.
Prepare Class A Production Budget and updated life-cycle cost estimate.
Prepare all graphic production files and generate printed proofs; inspect for content errors and technical quality.
Prepare production color and material samples.
Prepare shop drawings with fabrication details for all exhibit structures.
Prepare audiovisual technical drawings.
Prepare technical specifications and cut-sheets.
Prepare any required prototypes or mock-ups.

Production

Output and mount final production graphics.
Fabricate exhibit structures, including artifact cases, panels, walls, platforms, information desks, benches, audiovisual kiosks, etc.
Integrate custom elements such as natural history models, topographic maps, cast human figures, taxidermy, mechanical interactive exhibits with exhibit structures.
Fabricate custom artifact mounting hardware.
Acquire audiovisual hardware; install AV software; test system operation.
Prepare exhibits for shipment to site.

Installation

Finish any remaining, minor building prep work.
Deliver exhibits. Set up staging area for unloaded exhibit elements.
Designer provides on-site art direction as required.
Install all large structures, such as platforms, walls, cases, large graphic panels and murals.
Install smaller graphics, AV equipment, models, interactive exhibits.
Clean work site of debris and dust, clean artifact cases, install artifacts, perform all other conservation requirements, and seal cases.
Aim and adjust lighting fixtures.
Walk-through inspection of completed exhibits.
Develop punch-list.
Supply maintenance manual and train staff in exhibit operation and maintenance.
Correct punch-list items.
Photograph completed exhibition.

Closeout & Warranty

Contractor submits closeout package including:

- All Government-furnished materials.
- Graphic production digital files.
- "As-built" fabrication drawings.
- "As-built" Content Management System data.
- Copy of maintenance manual.
- Other Contractor generated materials as required in contract.

Graphic source material is checked to verify completeness, and filed for future exhibit rehabilitation.
Quality issues with the exhibits are addressed under warranty.
Summative / Remedial Evaluation and exhibit enhancements may be accomplished through a contract modification.
Photographs, planning and design documents, budget documents, and exhibit closeout materials are kept on file by client for future reference.



Section 4. TRAVEL, MEETINGS, AND PRESENTATIONS

4.1 Introduction

National parks are located throughout the United States and its territories. Most exhibit planning and design projects require that the contractor travel to national parks to conduct site visits, present submittals, and participate in review and development work sessions. Based on a particular project's requirements, the contractor shall travel to other sites as well to research, conduct evaluations, and participate in meetings with subject matter experts, partners, and stakeholders.

4.2 General Requirements

A. Travel

- (1) The contractor shall coordinate all travel with the COR.
- (2) The contractor's labor rate is one-half the hourly rate while in travel status to and from a site.
- (3) The contractor shall provide all equipment they require while on travel and at the job site (for example, measuring instruments, computers, projectors, ladders, lifts, etc.).
- (4) The contractor shall provide for all of their own transportation while on travel.
- (5) The contractor shall adhere to government per diem requirements while on travel.

B. Meetings and Presentations

- (1) Develop agenda in coordination with COR.
- (2) Discuss with COR expectations for work to be presented.
- (3) Identify key participants for meeting.
- (4) Facilitate meetings, unless otherwise specified by the COR.
- (5) Document discussions and outcomes.
- (6) Determine along with COR whether documents will be submitted in advance or at the presentation meeting.

- (7) For telephone / video / web-based meetings and presentations, the Contractor shall provide and manage the remote meeting application, provide instructions to all participants for joining, and shall host the meeting.

4.3 Specific Requirements for Design Charettes, Exhibit Planning Workshops, and Public Meetings

- A. Plan and facilitate the activity. Communicate with the COR, park and/or client to set the date, time, and meeting locations. Coordinate travel and meeting locations and times. Submit agenda to the COR for review and approval, one business day or as coordinated with the COR, prior to the activity. At a minimum, provide a description of the goals, an agenda, a list of materials to be provided by the contractor for use by the participants, and any special facilities or government-furnished Equipment or materials needed. Ensure that the facility and materials are ready. Record and collect all relevant information, comments, ideas, and products generated.
- B. Attend activity planned and facilitated by others. Coordinate travel, times, and locations with the COR. Discuss the contractor's role, and review the background information provided. Take notes during the activity.
- C. Prepare and submit a report using information and materials collected during the activity summarizing the proceedings.

4.4 Specific requirements for Value Analysis

- A. Where specified in individual task orders for National Park Service value analysis studies, the contractor shall utilize facilitator(s) with Certified Value Specialist (CVS as certified by SAVE International) or approved equal. The facilitator shall demonstrate expertise in conducting value analysis at early design phases. The facilitator shall also demonstrate expertise in utilization of value methods in decision making, e.g., choosing by advantages or other method of evaluating non-monetary benefits; allowing the NPS to make benefit cost decisions and comparisons.
- B. The Contractor shall travel to a specified site, or be available through a web conference to participate in a Value Analysis workshop.
- C. Provide information regarding the interpretive intent and proposed visitor experience desired.
- D. Provide a Class B Production Cost Estimate.
- E. Explain and verify estimated budget costs of the media elements.
- F. Provide an estimate of life-cycle costs and reliability of elements.

- G. Participate in the discussion regarding alternatives to the proposed interpretive plans.
- H. Document the results of the Value Analysis Workshop using the recommendations and revisions contained in the government-furnished report to develop the selected design alternative.

4.5 Specific Requirements for Exhibit Fabrication Meetings

- A. Postaward Conference - The minimum agenda for this meeting includes the following:
 - (1) General project review, including discussion of the following:
 - (a) Contracting Officer and COR 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) Provide government-furnished material to the contractor, including drawings, plan documents, reference and source materials, and other related materials.
 - (3) Review of exhibit plan and design.
 - (4) Review of government-furnished reference and source materials.
 - (5) Inspect and measure artifacts, verifying final dimensions.
- B. Progress Meetings and Inspections - The COR will schedule progress meetings to coincide with project work inspections at the contractor's facility. The minimum agenda for the progress meetings includes the following:
 - (1) Inspection of work in progress and completed work;
 - (2) Identification of problem areas and discussion of proposed solutions;

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- (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 COR 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 includes the following:
- (1) Inspection of the fully setup staged exhibits as specified in Section 27, Shop Fabrication.
 - (2) Review of existing conditions at the installation site, identifying potential problems and proposed solutions. Discuss safety, work zones, and control of dirt/debris at the site in accordance with Section 28, Installation.
 - (3) Review of installation schedule, including:
 - (a) Sequence in which work will be shipped, unloaded, setup, and installed;
 - (b) Projected work schedule onsite, including working days and hours; and
 - (c) Schedule for final walkthrough inspection, completion of punch list work and operational training sessions.
 - (4) Review of preliminary maintenance manual in accordance with Section 29, Operational Training and References

4.6 Travel During Exhibit Fabrication and Installation

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.

- A. Postaward Conference - The Project Manager shall travel to Harpers Ferry Center, Harpers Ferry, West Virginia, to the park site, or to other locations in order to attend the postaward conference. The location will be specified in individual task orders.

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- B. Site Visits - The Project Manager shall travel to the park to 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;
 - (4) Inspect and measure artifacts, verifying final dimensions; and
 - (5) Meet with the general contractor, as specified in individual task orders, to exchange contact information for future coordination of work and to review and inspect the ongoing progress of the general contractor's work as it relates to the exhibits.
- C. Installation - The Project Manager shall travel to the park to oversee installation of exhibits at the site by the Installation Team. At the conclusion of the installation, the Project Manager shall participate in the walkthrough inspection of the completed on-site work by the COR in accordance with Section 28, Installation, and onsite training for the park personnel on maintenance of the new exhibits, as specified in Section 29, Operational Training and References.

Section 5. SUBMITTALS AND REVIEWS

5.1 Introduction

Submittals and reviews are the key communication points between the contractor and the COR which document a project's overall progress and any remedial actions necessary to produce complete and acceptable deliverables. For the purpose of this contract, a submittal is defined as all samples, documents (i.e., drawings, schedules, facsimiles), electronic files, and other materials that together represent the level of development of work at a given time, and shall be provided by the contractor to the COR for review and approval. At any point in the exhibit planning and design process the COR may require informal submittals of the contractor's work in progress to document the current status and level of development of the project.

5.2 General Requirements.

- A. Coordinate all of the contractor's submittals and review them for legibility, accuracy, completeness, and compliance with contract requirements.
- B. Cross-reference all details that occur multiple times in a single or in multiple documents for consistency and accuracy.
- C. Unless otherwise specified elsewhere in this contract or in the individual task order, provide three hard copies and one electronic pdf copy of each document.
- D. Submittals shall be delivered to a minimum of two locations via overnight delivery service unless otherwise specified in the task order. All submittals shall be accompanied by a transmittal describing the contents.
- E. Submittals shall be delivered seven calendar days prior to scheduled presentations of the material unless otherwise specified in the task order.
- F. The contractor shall receive all review comments from the COR and take appropriate action as stated below:
 - (1) **Approved Submittals** – The contractor shall ensure that all changes, revisions, or additions required by review comments are addressed and incorporated into future submittals.
 - (2) **Rejected Submittals** - When submittals are rejected, the COR will notify the contractor, in writing, identifying the reasons for rejection. The contractor shall ensure that the submittal is completed and/or revised as required and resubmitted within the time scheduled by the COR. Reasons for rejection include:

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- (a) Incomplete Submittals – Approval of the submittal is delayed because required elements are missing. The contractor shall submit all missing elements. When all elements are received and accepted the COR will approve the submittal.
 - b) Unacceptable Submittals – The submittal is rejected due to poor quality of work or work that does not otherwise meet the established project goals. The contractor shall submit new material.
- G. Transmittal Documents - The contractor shall include a transmittal in the form of a printed letter, pdf document, e-mail, or fax cover sheet along with all samples, proofs, prints, reports, digital files, digital images, and multimedia files, sent from the contractor to the COR. This includes all copies sent to the park or other copied recipients. The transmittal shall include the following minimum information:
 - (1) "From" (contractor's name and contact information);
 - (2) "To" (recipient's name);
 - (3) Date submittal was shipped;
 - (4) Project name and park name;
 - (5) Itemized list of contents; and
 - (6) List of copied recipients who received the same submittals.

5.3 Specific Requirements for Accessibility

When specified in the task order, the contractor shall provide copies of submittals in an accessible format for review by individuals with visual impairments. This may include, but is not limited to, pdf documents formatted for screen readers.

5.4 Specific Requirements for Closeout Package.

At the conclusion of work, the contractor shall return all government-furnished property and all other outstanding materials as specified in individual task orders. All material generated by the contractor in the process of completing a task order is the property of the government.

Minimum content of a Closeout Package for each contract type shall include, but not be limited to, the following:

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- A. Exhibit Planning and Design Closeout Package: All government-furnished property and other materials as specified in accordance with individual task orders.
- B. Exhibit Fabrication Closeout Package: In accordance with Section 30, Closeout.

Section 6. PRODUCTION COST ALLOWANCES / ESTIMATES

6.1 Introduction

Individual task orders will specify a target production cost or “design-to” figure for the project. Production Cost Allowances are used early in the design process before specific details have been determined. They are based on industry standards and a reasonable allocation of project funding, for example per square foot of space or per exhibit area. Later in the exhibit development process Production Cost Estimates are prepared from detailed design specifications for individual project elements.

Since budget formulations vary by project, the contractor shall consult with the COR if there are any questions about what is included in the design-to figure. Generally, it shall include all costs for fabricating, transporting, and installing exhibit structures and graphic elements.

Depending on the project, allowances / estimates may also include media development costs such as image acquisition, original artwork, audiovisual, and multimedia programs, and non-interpretive elements such as an information desk and sales area fixtures. Exhibit-related modifications to the space shall be included in the design-to figure when such work shall be performed under the exhibit fabrication contract. Some costs may be split, for example, the cost of exhibit lighting fixtures may be part of the exhibit budget, while new electrical wiring required for the lighting is excluded.

The contractor shall submit increasingly detailed production cost allowances / estimates as planning and design work proceeds. The purpose is to insure that the project, as designed, can be built within the available budget. Estimates shall be determined by the contractor’s professional experience and / or by researching the cost of similar recent projects.

Exhibit production cost allowances / estimates are designated as Class A, B, and C based on level of detail. Class B and C contain less detail and are more typically “allowances,” while Class A is an accurate estimate based on detailed design specifications. They are described in 6.3 through 6.5 of this Section.

The contractor shall also provide life-cycle cost estimates. The purpose of these estimates is to identify ongoing costs associated with operating and maintaining the exhibit.

6.2 General Requirements

- A. All levels of production cost estimating shall adhere to the following criteria:
 - (1) The contractor shall provide the most accurate pricing information available for the current stage of project development.

- (2) The Production Cost Allowances/Estimates shall be equal to or less than the design-to cost and shall be a realistic representation of the cost for producing the exhibit as designed. Estimates shall not be arbitrarily priced to match the target budget.

All design changes that increase the Production Cost Estimate above the target production budget, whether initiated by the contractor or requested by the government, shall be documented by the contractor and appended to the Production Cost Estimate as alternate / additional items.

- (3) Production Cost Estimates shall be itemized by category and prepared in a computer file that can be translated or opened by the most current versions of Microsoft Word or Microsoft Excel.
- (4) All cost data related to the project shall be considered proprietary information that shall not be shared outside of the government. Federal regulations preclude outside firms from bidding on production of the project if they have received project-specific details in advance of other potential bidders.

6.3 Specific Requirements for Class C Production Cost Allowances

- A. Unless specified otherwise in individual task orders, the contractor shall provide a Class C Production Cost Allowance in the Pre-Design phase, that shall include the following information:
 - (1) The total area (including circulation space) in square feet of the exhibition space.
 - (2) The total exhibition cost and the cost of the exhibition per square foot. Where exhibit zones have been identified and the basic characteristics of the elements within those zones are known, a separate per square foot cost shall be specified for each zone. Examples of zones include, but are not limited to lobby, information / orientation space, sales area, and primary exhibition space.
 - (3) In instances where one or more high-cost exhibit elements have already been identified, they shall be priced as a separate line item. Examples include, but are not limited to, a complex exhibit case required to house a valuable and sensitive artifact, a large scale diorama, an original artwork mural, a topographic map with light program, and extensive use of audiovisual or interactive programs.

6.4 Specific Requirements for Class B Production Cost Allowances / Estimates

- A. Unless specified otherwise in individual task orders, the contractor shall provide a Class B Production Cost Allowance / Estimate in the Schematic I phase. An updated Class B Production Cost Allowance / Estimate shall be provided in the Schematic II, Design Development I, and Design Development II phases. Class B Production Cost Allowance / Estimate are typically used in the Value Analysis process and shall include the following information:
- (1) Class B Production Cost Allowance / Estimate prepared in the Schematic I phase shall include, at a minimum, the estimated overall cost for each exhibit area identified in the exhibition plan. In instances where individual exhibits or exhibit elements have already been identified, they shall be individually itemized.
 - (2) Class B Production Cost Allowance / Estimate prepared in the Schematic II, Design Development I, and Design Development II phases shall be further itemized at a level of detail consistent with the current level of the exhibition's development as follows:
 - (a) A short description of proposed exhibits and major exhibit elements within each exhibit area.
 - (b) The cost associated with each proposed exhibit and / or exhibit element.
 - (3) Class B Production Cost Allowance / Estimate shall include allowances for contingency, shipping, and installation as separate line items.

6.5 Specific Requirements for Class A Production Cost Estimates

- A. Unless specified otherwise in individual task orders, the contractor shall provide a Class A Production Cost Estimate in the Production Documents phase. Class A Production Cost Estimates shall be prepared based on the detailed specifications for all exhibit elements found in the Production Documents and shall include the following categories:
- (1) Exhibition fabrication costs organized according to exhibit scene, content group, and exhibit elements within each content group. For each individual exhibit element, the estimate shall itemize and price each material, labor cost, and mark-up costs for an exhibit fabricator to produce the element, or the cost for acquiring an element that is commercially available, or the cost of custom elements fabricated by a specialty sub-contractor.

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- (2) Media costs for all content purchased specifically for the exhibition, and not already accounted for in the exhibit planning and design budget. This may include but is not limited to:
 - (a) Image acquisition;
 - (b) Original artwork and photography; and
 - (c) Audiovisual and interactive software.
- (3) All Graphic Production costs not included in the exhibit planning and design budget.
- (4) Commercially obtained items including but not limited to:
 - (a) Audiovisual and other electronic equipment; and
 - (b) Lighting equipment.
- (5) Exhibit installation cost including:
 - (a) Fabricator site visits;
 - (b) Samples, mock-ups;
 - (c) Shipping; and
 - (d) Exhibit installation travel and labor costs.
- (6) Miscellaneous Production Costs itemizing all costs not otherwise accounted for. For example, shop drawings, as-built drawings and project closeout costs.

6.6 Life-cycle Cost Estimates

- A. The contractor shall provide a life-cycle cost estimate for the proposed design in the Schematic phase. Updated life-cycle cost estimates shall be provided in the Design Development and Production Documents phases. Life-cycle cost estimates shall include the following information:
 - (1) Operational costs associated with the exhibition including but not limited to:
 - (a) Staffing required to operate and maintain the exhibit on a daily basis;

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- (b) Costs for consumable items including but not limited to video projector bulbs, specialty exhibit lighting, printed hand-outs, touchable “discovery” items; and
 - (c) Maintenance contracts.
- (2) Long-term replacement costs associated with the exhibition including but not limited to:
 - (a) Service life and replacement cost for commercially available audiovisual, electrical and electronic equipment; and
 - (b) Service life and replacement cost for custom made exhibit elements such as mechanical interactive devices.
- (3) Lifespan of the exhibition including but not limited to:
 - (a) Effective life of the exhibition’s physical structure and graphics;
 - (b) Effective life of the exhibition’s content and message; and
 - (c) Effective life of the exhibition’s style of presentation.

Section 7. EXHIBIT EVALUATION

7.1 Introduction

Exhibit Evaluation is the process for better understanding the audience, and using this information to produce effective exhibits. Evaluations help exhibits better address visitors' needs and expectations while carrying out the parks' interpretive missions. Three typical stages of evaluation include:

- Front-End Evaluation is conducted at the beginning of a project, when themes, goals, and initial design solutions are being considered. Front-End Evaluation seeks input from potential visitors to find out what kinds of information they already know, what visitors would like to know, and explores how exhibits can best present this interpretive information;
- Formative Evaluation is conducted before the fabrication of exhibits, when mock-up testing can be carried out. Formative Evaluation can reveal problems with proposed designs and is especially important for interactive exhibits; and
- Summative/Remedial Evaluation is conducted after final installation, when the entire exhibition can be evaluated and final adjustments can be made.

7.2 General Requirements

A. Base Evaluation on Established Objectives for Exhibits

In addition to developing broad exhibition goals, the team must have clearly defined objectives for each exhibit that shall be identified during the Schematic Phase (and listed in the Content Outline). Objectives guide not only the way the exhibit is tested at the formative and summative/remedial stages, but direct the entire exhibit development process, including decisions about content, interpretation, media selection, and presentation techniques.

B. Define the Audience

The exhibit evaluation process requires the planning team to identify the intended target audience in terms of their ages, educational levels, and levels of entering knowledge of the subject matter of the exhibit (e.g., facts, concepts, controversies, comparisons).

C. Develop an Evaluation Methodology Plan

Prepare a written Evaluation Methodology Plan for conducting each evaluation phase as called for in the individual task order. The methodologies employed may include any or all of the following social science research and diagnostic tools: literature review, personal interviews, focus groups, brief questionnaires, observations, and tracking studies as well as other methodologies.

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Describe any Government-Furnished personnel and facilities required to accomplish the evaluations. The plan shall be submitted to the COR for review and approval prior to finalization.

D. Adhere to Office of Management and Budget (OMB) Regulations.

Individual task orders shall specify whether the evaluation will require submittal to OMB for approval. This applies when conducting an evaluation that asks 10 or more visitors the same type of questions. The contractor shall prepare all paperwork associated with the OMB requirements for the expedited approval process. This process can be very lengthy.

Scheduling parameters for the National Park Service (NPS) Office of Social Science and the OMB to review and approve the request shall be specified in the task order. See the NPS Social Science website at www.nature.nps.gov/socialscience/survey.cfm to learn more about the guidelines and how to complete the required forms.

E. Conduct Evaluation

(1) Travel.

Travel to sites specified in the Evaluation Methodology Plan.

(2) Logistics.

(a) Communicate with the Park to set the date, time, and meeting locations. Coordinate the travel, date, time, and meeting locations with the COR.

(b) Individual task orders may specify that the contractor shall be responsible for recruiting the evaluation study participants.

(c) Individual task orders may specify that contractors make logistical arrangements for use of non-NPS sites (e.g. local schools, museums, and other institutions).

F. Prepare and Submit Evaluation Report and Implementation Plan.

(1) Evaluation Report.

Collect and organize responses to the evaluation including information regarding methodology used to gather information, demographics and size of study groups, and a summary and analysis of the information collected.

(2) Evaluation Implementation Plan.

The contractor shall document how they propose to incorporate the results of the evaluation in the planning and design process to enhance the effectiveness of the interpretive media.

7.3 Specific Requirements for Front-End Evaluation

The contractor shall conduct Front-End Evaluation, concentrating on getting input from potential visitors to find out what kinds of information they need and would like to know, and how this information could be presented in a meaningful, interesting, and cost-effective way. In addition to the General Requirements, the contractor shall identify any objectives and concepts that will be especially challenging to communicate in the exhibits or that require special sensitivity in presenting to the public.

7.4 Specific Requirements for Formative Evaluation

The contractor shall conduct Formative Evaluation on specific exhibit elements to determine design and/or content problems before they become a part of the final exhibition. Mock-ups and working prototypes shall be tested; the number of mock-ups and prototypes will be specified in individual task orders. In addition to the General Requirements, the contractor shall do the following:

- A. Propose exhibit elements to be evaluated for review and approval by the COR;
- B. Build the mock-ups for selected exhibit elements to be tested, and ship them to testing site(s). All exhibit layouts shall consist of actual text and proposed graphics; any three-dimensional elements shall be identified in the layout; and
- C. Be responsible for removing the mock-ups from the test site(s) and disposition in accordance with the individual task order.

7.5 Specific Requirements for Summative/Remedial Evaluation

The contractor shall conduct Summative/Remedial Evaluation studies to reveal problems that were not, or could not be, identified during the earlier stages of development and to determine the extent to which the original objectives have been met. In addition to the General Requirements, the evaluation shall including the following:

- A. Evaluation of visitor traffic, identifying any crowd-flow, orientation, and signage problems (e.g. traffic study utilizing an annotated floor plan) and proposing remedial solutions.
- B. Evaluation of exhibit effectiveness to determine the degree to which content is communicated with visitors. The contractor shall propose remedial changes for those exhibits needing improvement.

Section 8. ACCESSIBILITY

8.1 Introduction

Exhibits planned, designed, and fabricated for the National Park Service shall follow the latest published version of the Programmatic Accessibility Guidelines for National Park Service Interpretive Media. These Guidelines are a combination of best practices, NPS and Department of the Interior directives, and federal laws. Federal laws include the Architectural Barriers Act, Sections 504 and 508 of the Rehabilitation Act as amended, and the 21st Century Communications and Video Accessibility Act.

8.2 General Requirements

Accessibility requirements for visitors with specific disabilities shall be addressed. If the site or criteria of the project pose particular challenges to accessibility, additional attention shall be paid to a full description of the accessibility solutions. See the Programmatic Guidelines for National Park Service Interpretive Media for requirements addressed under specific disabilities.

8.3 Specific Requirements for Schematic Design

As part of the Schematic II Report, the contractor shall describe how the interpretive themes, messages, and information presented within the exhibition meet accessibility requirements by effectively communicating to visitors with sensory, mobility and intellectual disabilities.

The report shall directly reference elements of the contractor's Schematic Design and any other relevant project information that addresses accessibility within the exhibition. The report shall include:

- A. A description of how access to the exhibition's goals and themes will be accomplished for people with sensory, mobility and intellectual disabilities.
 - (1) These goals shall be achieved and articulated through a combination of universal design approaches, assistive technology, and techniques specific to accessibility and meeting the needs of visitors with disabilities.
 - (2) The primary approaches and solutions for accessibility shall allow all visitors to participate in the same programs and experiences. Where an alternative approach to accessibility is necessary, the rationale and decision-making process leading to the alternative approach shall be explained in the narrative.
- B. How the exhibit design meets the relevant laws, including the Architectural Barriers Act and Sections 504 and 508 of the Rehabilitation Act.

- C. In this report, at a minimum, the contractor shall address the following:
- (1) How the layout of the physical space and the proposed exhibit elements utilize universal design principles;
 - (2) Confirm that there are accessible routes into, within, and out of the exhibition, and that all exhibit elements are physically accessible;
 - (3) Describe what multisensory opportunities are provided to engage the diversity of visitors with and without disabilities;
 - (4) How the main goals and themes of the exhibition communicate in multiple and layered modes to engage the diversity of visitors with and without disabilities;
 - (5) How the proposed mechanical interactives meet universal design and accessibility requirements, including heights, reach ranges, weight and required force to operate;
 - (6) How visual components of the exhibits are conveyed to people who are blind or have low vision;
 - (7) How audio components within the exhibit are conveyed to people who are deaf or hard of hearing; and
 - (8) What types of assistive technology shall be employed.

8.4 Specific Requirements for Design Development and All Subsequent Phases of Work

The contractor shall fully develop and implement all approved accessibility-related solutions during subsequent phases of work. All accessibility-related revisions, updates, and design details shall be submitted to the COR as part of the overall project submittal, review, and approval process.

8.5 Specific Requirements for Interior Directional and Information Signs

- A. Accessibility signage shall be integrated within the exhibition and developed as part of the exhibition's graphic package.
- B. Universal symbols shall be used to identify the accessibility of exhibit elements and, where appropriate, other related places, programs, and activities. Digital files for these universal symbols are available for download at: <http://www.nps.gov/hfc/carto/map-symbols.htm> under "Other Symbols." Accompanying text shall be added as appropriate and shall focus on the service, not the user. (For example "Hearing Loop Installed. Switch hearing aid to T-coil" may accompany the T-coil assistive listening symbol.)

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- C. Interior building signage (such as identification of restrooms, elevators, and other permanently designated spaces) is not included in this specification. If this type of signage is included as part of an interpretive exhibit project, refer to the appropriate sections of the current ADA and ABA Accessibility Guidelines available at <http://www.access-board.gov/ada-aba/final.cfm>

Section 9. EXHIBIT VISUALIZATION

9.1 Introduction

The contractor shall produce sketches, renderings, presentation boards, booklets, models, computer simulations, or other media as specified in individual task orders. This media shall be designed to visually describe the proposed exhibition to a diverse audience, which may include the project team, general public, sponsors, and stakeholders.

In contrast to other more technical documents that describe specific details, visualization materials provide a holistic view of the exhibition. They give a sense of how the exhibition will be experienced by the visitor. They also allow project team members to quickly grasp how individual elements work together and identify issues that may not be apparent when those elements are considered individually.

9.2 General Requirements

- A. Individual task orders will either specify the media type and quantity for visualization materials or require the contractor to propose the type of media to be developed.
- B. The contractor shall submit preliminary designs to the COR for review and approval. The contractor shall make all changes and/or additions to the preliminary design prior to preparing the final visualization materials.

9.3 Specific Requirements for Renderings

- A. The contractor shall provide examples of the proposed style for the renderings to the COR for approval prior to beginning work. Size, acceptable media, mounting requirements, and other format information shall be approved by the COR in advance.
- B. Renderings shall accurately depict the proposed exhibits and the architectural space in which they will be placed in perspective view.
- C. The specified level of detail may range from impressionistic to photo realistic. Traditional media and styles of illustration may include: line art in pencil or ink, monochrome pencil sketches in line and tone, color pencil renderings, ink with color wash, marker renderings, pastel, gouache, acrylic, or other media approved in advance by the COR. Computer generated illustrations may include images generated in 3D modeling and rendering programs, illustration programs, and photo-composition programs.

9.4 Specific Requirements for Animated Walkthroughs

- A. Prior to beginning work, the contractor shall provide an example showing the level of detail and proposed rendering style for the walkthrough. The approximate running time (or navigation method for interactive walkthroughs) shall be approved by the COR in advance.
- B. The walkthrough shall accurately depict the proposed exhibits and architectural elements in three-dimensional space. Unless otherwise specified in individual task orders, camera points of view shall include an exhibit overview from above and an eye-level view as seen by an observer walking through the exhibition.
- C. The walkthrough's storage media and format shall be proposed by the contractor and approved in advance by the COR. Examples of storage media include CD-ROM, and DVD. Examples of formats include video DVD, Quicktime, MPEG2, Flash, and Quicktime VR.

9.5 Specific Requirements for Scale Models

The contractor shall fabricate exhibit models and carrying cases specified in the task order. Individual task orders will specify the level of detail required for each model. All models shall conform to the following specifications:

- A. Models shall be fabricated at a level of detail consistent with their intended use, including, but not limited to:
 - (1) Study Models - The contractor shall fabricate a scale model of all visitor center areas related to the project. The purpose of this model is to assist the project team in understanding the proposed exhibit layout and issues related to the use and possible modification of the visitor center. Models prepared for such purposes shall be accurate in form and dimension, but do not need to be fully representative of material, color, and architectural detail.
 - (2) Presentation Models - Based on the visual and narrative descriptions presented in the Schematic or Design Development phases of work, the contractor shall fabricate a scale model of the visitor center, exhibit areas, and the exhibits within. The purpose of this model is to provide a dimensional representation of the form, placement, and style of the exhibits. Such models shall be accurate in form and dimension, contain facsimiles of object, graphic, and typographic content, and shall include indications of color, texture, and material.
 - (3) Selected Exhibit Models - The contractor shall fabricate scale models of specific exhibits. The level of detail required will be specified in individual task orders.

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- B. To the extent specified in individual task orders, the contractor shall revise exhibit models to reflect updates in the exhibition plan.
- C. When specified in the task order, the contractor shall fabricate storage and transport cases for models.

Section 10. RESOURCE PACKAGES

10.1 Introduction

Resource Packages begin with the preparation of a Resource Package Abstract in the Pre-Design Phase that identifies and organizes the media elements that will bring the exhibition to life. During the Schematic Design Phase, Resource Package Level I and Level II build upon the abstract by providing more detailed information about those media elements and organizing them into the appropriate thematic categories. After the Schematic Design Phase, information in the Resource Package informs the Design Development Content Outlines and subsequent submittals as the final media elements are selected and obtained.

10.2 General Requirements

- A. The contractor is responsible for making sure that all the information they provide is accurate and reflects the most recent scholarship.
- B. The contractor shall provide general source information (described below) for every media element listed in the Resource Packages and/or proposed in their design solutions.

10.3 Specific Requirements for Resource Package Abstract.

Typically occurring as part of the Pre-Design Phase, the contractor shall prepare the Resource Package Abstract. At this early stage, the abstract identifies the existing and potential media resources that could become the specific elements featured in the exhibition. The Resource Package Abstract shall include the following:

- A. Identify and list any available artifact and image collections at the park;
- B. Identify and list any potentially available artifact and image collections owned or managed by individuals and other institutions (e.g., special collection at the National Archives);
- C. Identify and list any potential resources that might exist or that need to be created for featuring in the exhibition (e.g., new artwork, photography);
- D. Note special challenges (e.g., new park with no collection) and special opportunities (e.g., an existing oral history collection of significant relevance); and
- E. Develop a bibliography, noting the books, periodicals, and other literature of potential use in developing the exhibition.

10.4 Specific Requirements for Schematic Design Phase

The Resource Package Abstract is further developed in the Schematic Design Phase, with Resource Package Level I associated with Schematic I, and Resource Package Level II associated with Schematic II.

A. Resource Package Level I

The contractor shall organize the media elements according to the established themes that match the corresponding bubble diagram(s) prepared in Schematic I.

1. Unless otherwise specified in the task order, the contractor shall submit two hard paper copies of the Resource Package Level I or one electronic pdf copy that shall be organized according to the established themes, and describe how the material is organized and managed in their work process (e.g. paper copies, database). The package shall include a diverse range of media types (e.g. artifacts, photographs, video footage, quotes, and potential low-tech interactives) that are existing and available, existing and potentially available, and those that need to be created. At this stage of the Resource Package, the goal is not to have every available and potential item listed but rather to provide enough of a sampling that corresponds to the bubble diagram(s) to demonstrate the choices available to the project team.
2. The contractor shall provide the following information for every item listed in the Resource Package Level I: name of item, photocopy/thumbnaill (for existing images and objects), original source, and description.

B. Resource Package Level II

The contractor shall organize the media elements according to specific Scenes and Content Groups that match the corresponding floor plans, sample elevations, and conception renderings in Schematic II.

1. The contractor shall submit two hard paper copies or one electronic pdf copy of the Resource Package Level II that shall be organized according to the established exhibit areas, and describe how the material is organized and managed in their work process (e.g. paper copies, database). The package shall include a diverse range of media types (e.g., artifacts, photographs, video footage, quotes) that are existing and available, existing and potentially available, and those that need to be created. At this stage of the Resource Package, the goal is to further refine the number of media elements proposed, and relate them to the corresponding floor plans, sample elevations, and conceptual renderings in Schematic II.

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2. The contractor shall provide the following information for every item listed in the Resource Package Level II: name of item, photocopy/thumbnaill (for images and objects), original source, and description.

Section 11. CONTENT MANAGEMENT

11.1 Introduction

The purpose of Content Management is to organize, track, manage, and document media elements to be featured in an exhibition, organized by unique identification numbers.

Content Management is a developmental process, and not a static file or document. During the course of exhibit development, contractors need to identify the media elements being developed and, through a series of Content Schedules, communicate how they relate to associated media elements and to the exhibition as a whole.

For many years the National Park Service maintained a Content Management application called the *Museum Exhibit Planner*, which ran under FileMaker Pro and was provided to contractors for their optional use; the NPS no longer provides, maintains, or supports the *Museum Exhibit Planner* application.

The Content Management specifications below identify the data needed for generating Content Schedules during the exhibit development process, and how this data is to be identified, named, and organized. The contractor shall use the software application of their choice in managing project content and generating Content Schedules. Software shall be government supported software specific to the agency. The contractor shall use the NPS numbering system and NPS naming conventions for data fields, as described below.

11.2 General Requirements

A. Role of the COR.

The COR will provide guidance to the contractor regarding Content Management and Content Schedule requirements. Individual task orders may specify additional data and Content Schedule requirements for a particular project.

B. Project Data

The contractor shall provide the following Project Data with each Content Schedule submittal, in a document header, as follows:

- Park
- Project
- Project phase
- Content Schedule name
- Document issue date
- Page number

C. Content Management Numbering System

A simple, logical, and consistent numbering system is essential to managing the many elements that go into an exhibition. Moreover, the many simultaneous projects underway in the National Park Service by various project teams necessitates having a consistently applied numbering system so that all team members are speaking the same language.

Every element must have its own unique number to facilitate effective identification and communication of all elements throughout the planning, design, and fabrication stages of a project. Content Schedules providing updated information regarding objects, images, audiovisual programs, and the other elements of an exhibition all depend on having an organized numbering system so team members can focus on content instead of spending extra time sorting out the hundreds of elements that make up an exhibition.

The numbering system organizes and tracks information at the “exhibit element” level of detail – individual objects, images, etc. – as well as graphic layouts and audiovisual packages, which can be thought of as compound elements containing other elements. Changes have been made to the previous NPS numbering system; it now uses the format “XX-XX.XX-XX” as described in more detail in sub-section (3) below.

Exhibit element categories and the numbering system are specified as follows:

(1) Exhibit Element Types

AO (Accessioned Object)

Accessioned Objects are cataloged items from NPS resources or loan items from other museums, historical associations, libraries, etc. (see Section 1, Definitions, and Section 18, Object Preservation and Protection). They include historic artifacts for display made by human hands such as arrowheads, cannonballs, pottery, baskets, hats, chairs, medals, money, and original documents. They also include natural history specimens that have been accessioned into the park’s collection.

IM (Image)

Individual photographs, illustrations, art, maps, charts, diagrams, or other display images.

GL (Graphic Layout)

Panel layouts which usually contain multiple graphic elements such as labels, images, and placeholder indicators for embedded three-dimensional and audiovisual elements.

CE (Custom Element)

General category for three-dimensional elements that are not Accessioned Objects. These include: models, tactile and mechanical interactive elements such as flip books, optical viewers, and low-technology interactive devices; non-accessioned natural history specimens; and, non-accessioned historic objects (such as antiques) and reproduction historic objects (such as replicas).

CA (Case)

Exhibit cases and vitrines for displaying artifacts and other exhibit elements.

EP (Electronic Program)

Computer, audiovisual, or other programs with informational or interpretive content. Examples are videos, audio messages, computer interactive programs, animated battle map programs (see Section 19, Audiovisual and Computer Elements – Software).

EE (Electronic Equipment)

Audiovisual or computer equipment or devices which will run, control, or display electronic programs. This is one umbrella number that identifies an associated set of audiovisual equipment for running a particular Electronic Program (for example, a computer interactive station that consists of several pieces of electronic equipment).

(2) Scenes and Content Groups

Previous NPS planning and design specifications have referred to a series of individual exhibits making up one overall exhibition (for example, Exhibit 02: Orientation to the Park). This is being replaced with a new approach that refers to Scenes and Content Groups. How an exhibition is organized into Scenes and Content Groups is usually the responsibility of the contractor, and is established in the Schematic Design phase of work.

Scenes

A Scene establishes one visual setting in the exhibition, and is one holistic set of individual but related Content Groups; the Scenes taken together form the overall exhibition. For example, a Scene could be a marsh habitat diorama that consists of the following Content Groups: introductory graphic panel, large background mural, natural history specimens and models, a reader rail, and a touch area – all physically and/or thematically connected to each other.

Another Scene in the same exhibition could feature how early settlers lived in the area, consisting of these Content Groups: a vignette of a cabin interior, reader rail with tactile reproduction items, a large artifact case, and an oral history station. In addition, Scenes can be thematically-linked Content Groups in a defined space, such as a set of orientation panels and a terrain model in a lobby, or a series of Content Groups in one room of a historic building.

Content Groups

A Content Group is a discrete thematic story or information set that, together with adjacent related Content Groups, is part of a larger Scene. The above examples of a habitat Scene and a cabin Scene describe their respective Content Groups. A Content Group tells one aspect of the larger story or information presented in the overall Scene.

(3) Numbering System

The numbering system is based on the “Element Identification Number” which has three parts, separated by hyphens. “IM-02.04-101” is an example of an Element Identification Number. The contractor shall not use a different numbering system.

IM-02.04-101

The first part of the Element Identification Number is the Element Type. It occupies two character spaces for the acronyms of the element categories as described in C (1) above. In the example shown here the “IM” indicates this element is an image.

IM-02.04-101

The second part of the Element Identification Number is the Scene-Content Group Number; it occupies four numeric spaces consisting of two two-digit numbers separated by a decimal point (single-digit numbers are preceded by a zero). The first two-digit number refers to the Scene number in the exhibition. In this example, the “02” refers to Scene 02 in the exhibition. The second two-digit number refers to the Content Group number. In this example, the “04” refers to Content Group 04 in the Scene.

IM-02.04-101

The third part of the Element Identification Number is the Item Number. It occupies three numeric spaces (single-digit and two-digit numbers are preceded by zeroes or a zero, as in “003” or “024”). It is best to have item number sequences reflect some logical order in the exhibit, such as from top to bottom, or from left to right. Using this method, “IM-02.04-001” would likely be a primary image in its respective graphic layout. Item numbers may repeat within an exhibit if there is a logical reason for doing so. For example, Accessioned Object “AO-04.03-005” and Image “IM-04.03-005” may be assigned to associate the historic image of an object with that actual object on display.

Item Numbers need not be consecutive. It is permissible to leave gaps, perhaps to leave room for items to be added later. It is also useful to use 100, 200, 300, 400,...series Item Numbers which correspond to sections of a Content Group. For example, all elements with 100 series numbers might be located on the top half of a Content Group, with 200 series numbers on the bottom half. In another example, all 100 series elements in a Content Group might be located on or associated with the same Graphic Layout.

A useful protocol is to use Item Number “999” to indicate an element which does not yet have a place in the exhibit. Such items stack up at the end of an exhibit awaiting the opportunity to be placed or deleted. Also, if there are several images that are candidates for a place in the exhibit, but the final selection has not been made, identical Item Numbers may be assigned to hold the choices on a temporary basis.

D. Data Fields and Naming Conventions

The contractor shall use the NPS numbering system and NPS naming conventions for data fields. Individual task orders may specify additional data and Content Schedule requirements for a particular project.

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E. Content Schedules

The contractor shall prepare Content Schedules beginning at Design Development II through Production Documents (and through Production Support, if included in the task order); see specific requirements per project phase below.

Content Schedule categories include the following:

- Accessioned Objects
- Images
- Custom Elements
- Graphic Layouts
- Electronic Program/Equipment Schedules
- Cases

The contractor shall provide the Project Data (referenced above in 11.2 B) with each Content Schedule submittal, in a document header.

F. Exhibit Element Data

Each Exhibit Element has a set of data fields. Each Field has a Form (text, alphanumeric, number, graphic file, etc.) and associated Values (custom or selected from an established list).

The contractor shall provide the required data for the following Exhibit Element categories:

Images (IM)

Field: Element Identification Number
Form: alphanumeric
Values: custom

Field: Descriptive Name
Form: text
Values: custom

Field: Type
Form: text
Values: established list

- B/W photo
- Color photo
- B/W Illustration
- Color Illustration
- Map
- other (identify)

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Field: Image (photo documentation)

Form: graphic file

Values: custom

Field: Copyright Owner

Form: text/numbers (name, address, telephone number, email address)

Values: custom

Field: Copyright Owner's Reference Number, if applicable (for example, LC 80997)

Form: alphanumeric

Values: custom

Field: Use Rights Status

Form: text

Values: established list

- Public domain (no rights needed)
- Permission needed but not secured yet
- Permission needed and secured

Field: Licensing Restrictions

Form: text

Values: established list

- none
- length of use
- cropping
- any additional restrictions (clarify in "Notes")

Field: Acquisition Status

Form: yes/no

Values: established list

- yes
- no

Field: Provided By

Form: text

Values: established list

- Government (if Government, specify details in "Notes" field)
- Planning & Design Contractor
- other (identify; for example, "partner")

Field: Final Digital Resolution at Finished Cropped Size

Field: number (DPI)

Values: custom

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Field: Finished Dimension/Height of Cropped Image
Form: number (inches)
Values: custom

Field: Finished Dimension/Width of Cropped Image
Form: number (inches)
Values: custom

Field: Notes (opportunity to note any other important information)
Form: text
Values: custom

Accessioned Object (AO)

Field: Element Identification Number
Form: alphanumeric
Values: custom

Field: Descriptive Name
Form: text
Values: custom

Field: Type (what AO is made of)
Form: text
Values: established list

- metal
- stone
- ceramic
- wood
- textile
- paper
- mixed materials
- ethnographic
- organic
- specimen
- other (identify)

Field: Width
Form: number (inches)
Values: custom

Field: Depth
Form: number (inches)
Values: custom

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Field: Height
Form: number (inches)
Values: custom

Field: Reference Image (photo documentation)
Form: graphic file
Values: custom

Field: Source
Form: text/numbers (name, address, telephone number, email address)
Values: custom

Field: Accession Number
Form: alphanumeric
Values: custom

Field: Current Location
Form: text
Values: custom

Field: Condition/Treatment (description of condition, need for and status of treatment)
Form: text
Values: custom

Field: Required Display Conditions (multiples may be selected)
Form: text
Values: established list

- security
- controlled environment/passive
- controlled environment/active
- lighting
- NAGPRA
- other (identify)

Field: Notes (opportunity to note any other important information)
Form: text
Values: custom

Custom Element (CE)

Field: Element Identification Number
Form: alphanumeric
Values: custom

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Field: Descriptive Name

Form: text

Values: custom

Field: Type

Form: text

Values: established list

- non-accessioned historic object
- reproduction historic object
- natural history model
- taxidermy
- sculpture
- prop
- scale model
- dimensional map
- diorama/tableau
- life-size figure/mannequin
- flip book/lift-up flaps
- interactive (non-electronic)
- other (identify)

Field: Width

Form: number (inches)

Values: custom

Field: Height

Form: number (inches)

Values: custom

Field: Depth

Form: number (inches)

Values: custom

Field: Reference Image (photo documentation)

Form: graphic file

Values: custom

Field: Source (supplier of CE; for example, a company manufacturing reproductions)

Form: text/numbers (name, address, telephone number, email address)

Values: custom

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Field: Provided By

Form: text

Values: established list

- Government (if Government, specify details in Notes field)
- contractor (specify)
- other (identify)

Field: Notes (opportunity to note any other important information)

Form: text

Values: custom

Graphic Layout (GL)

Field: Element Identification Number

Form: alphanumeric

Values: custom

Field: Type

Form: text

Values: established list

- graphic panel
- compound graphic
- banner/flexible graphic
- applied graphic

Field: Size/Width

Form: number (inches)

Source: custom

Values: custom

Field: Size/Height

Form: number (inches)

Source: custom

Values: custom

Field: Contents

Form: text

Values: list of IM, AO, CE, EP, EE, CA elements associated with the GL

Field: Imaging Process

Form: text

Values: established list

- inkjet/photo output
- high pressure laminate (HPL)
- cut/routed

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- silk screen
- hand painted
- multiple processes
- other (identify)

Field: Panel Process

Form: text

Source: established list

- fused polycarbonate
- face-mounted to acrylic
- digital print on vinyl
- digital print on fabric
- aluminum wrapped with overlamine
- other (identify)

Field: Notes (opportunity to note any other important information)

Form: text

Values: custom

Exhibit Element: Case (CA)

Field: Element Identification Number

Form: alphanumeric

Values: custom

Field: Type

Form: text

Values: established list

- wall-mounted
- free standing
- built-in

Field: Case Width

Form: number (inches)

Values: custom

Field: Case Depth

Form: number (inches)

Values: custom

Field: Case Height

Form: number (inches)

Values: custom

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Field: Conservation Grade Status

Form: yes/no

Values: established list

- yes
- no

Field: Vitrine Form

Form: text

Values: established list

- 1 side (window)
- 2 sides
- 3 sides
- 4 sides
- 5 sides

Field: Vitrine Material

Form: text

Values: established list

- acrylic
- non-glare acrylic
- glass
- non-glare glass
- special security (describe in notes)

Field: Ancillary Case Equipment (multiples may be selected)

Form: text

Values: established list

- motion sensor
- breakage sensor
- motion and breakage sensor
- passive buffering (desiccant)
- dedicated HVAC system
- data logger
- other (identify)

Field: Internal Lighting System

Form: yes/no

Values: established list

- yes
- no

Field: Notes (opportunity to note any other important information)

Form: text

Values: custom

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Electronic Program (EP)

Field: Element Identification Number

Form: alphanumeric

Values: custom

Field: HFC Audiovisual Program Number

Form: alphanumeric

Values: custom (provided by HFC)

Field: Element Identification Number for Associated Electronic Equipment package

Form: alphanumeric

Values: custom

Field: Program Name (for example, "Island Voices")

Form: text

Values: custom

Field: Description (brief description of program)

Form: text

Values: custom

Field: Type

Form: text

Values: established list

- video / with sound, mono
- video / with sound, stereo
- video / with sound, 5.1
- video / no sound
- audio station
- audio station / video captioned
- audio tour (handheld)
- audio/video tour (handheld)
- soundscape / mono
- soundscape / multichannel
- portable / handheld tour
- interactive / multimedia
- interactive / computer
- other (identify)

Field: Program Length

Form: number (minutes)

Values: custom

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Field: Activation

Form: text

Values: established list

- motion sensor/proximity
- pushbutton
- touch screen
- continuous loop (program does not have defined starting/ending point)
- looping (program has defined starting/ending point)
- staff activated
- other (identify)

Field: Program/Software Format

Form: text

Values: established list

- SD video
- HD video
- Computer animation
- Audio
- other (identify)

Field: Program/Software Aspect Ratio

Form: text

Values: established list

- 4:3
- 16:9
- 5:4
- 16:10
- other (identify)

Field: Program Accessibility Requirements

Form: text

Values: established list; multiples to be selected

- Audio Description
- Assistive Listening
- Subtitles for Deaf & Hard of Hearing
- Transcripts
- other (identify)

Field: Original Source

Form: text

Values: established list

- exists (indicate source in "Notes": name, address, telephone number, email address)
- new program

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Field: Notes (opportunity to note any other important information)

Form: text

Values: custom

Electronic Equipment (EE)

Field: Element Identification Number (for Electronic Equipment package)

Form: alphanumeric

Values: custom

Field: Element Identification Number for Associated Electronic Program

Form: alphanumeric

Values: custom

Field: Components of Equipment Package (required starting at Design Development II)

Form: text

Values: established list (of electronic components in package); multiples to be selected

- Monitor, LCD flat panel
- Monitor, LED flat panel
- Monitor, Plasma flat panel
- Monitor, Touchpanel
- Monitor, Touchpanel w/CPU
- Projector, LCD
- Projector, DLP
- Speaker, wand
- Speaker, handset
- Speaker, surface mount
- Speaker, in-wall
- Speaker, ceiling
- Speaker, directional
- Amplifier, mono
- Amplifier, stereo
- Amplifier, multi-channel
- Digital media player w/controller
- Digital media player w/o controller
- Aux input plate
- Blu-ray DVD player
- Computer
- Control processor
- Control panel
- Pushbutton(s)
- Desk monitoring/control panel
- Master power control panel

- Power control relay
- Surge protector
- UPS
- Equipment rack
- Video monitor, rack mount
- Audio monitor, rack mount
- KVM switch, rack mount
- other (identify)

Field: Equipment Make (required starting at Production Documents I)

Form: text

Values: custom

Field: Equipment Model (required starting at Production Documents I)

Form: text

Values: custom

Field: Equipment Quantity (required starting at Production Documents I)

Form: numeric

Values: custom

Field: Notes (opportunity to note any other important information)

Form: text

Values: custom

11.3 Specific Requirements for Schematic Phase

Schematic I

The NPS numbering system is not required.

Design alternatives propose Scenes, including a narrative description of proposed media elements.

Schematic II

The NPS numbering system is not required.

The preferred design alternative is established with Scenes and their respective Content Groups listed, including a narrative description of proposed media elements.

11.4 Specific Requirements for Design Development Phase

Design Development I

The NPS numbering system is not required.

Draft DD I Content Outline and Updated DD I Content Outline include a listing of Scenes and their respective Content Groups, with a general description of the associated exhibit elements.

Design Development II

The NPS numbering system is required.

Draft DD II Content & Specification Package and Updated DD II Content & Specification Package, consisting of all the Content Schedules listed in E above (with the exception of the Case Schedule, which shall be included in the exhibit drawing package), and all their associated Exhibit Element Data listed in F above (with the exception of detailed EE component-level information, as noted above, which is required starting at Production Documents I).

11.5 Specific Requirements for Production Documents Phase

Production Documents I

The NPS numbering system is required.

Production Content and Specifications Package, consisting of updates for all of the Content Schedules listed in E above, and all their associated Exhibit Element Data listed in F above (including EE component-level information).

Production Documents II

The NPS numbering system is required.

Prepare and submit project data fields for all Scenes and Content Groups.

11.6 Specific Requirements for Production Support Phase

Specific task orders may require the contractor to provide services during the Production Support Phase, including updating the project's Content Management data.

Section 12. TEXT

12.1 Introduction

The contractor shall develop and prepare all written text that will appear in the exhibition. Write text with reference to the project goals, exhibit objectives, the resource package, and the Schematic Design phase planning documents.

Exhibit text is integrally related to other elements experienced by visitors. Text must relate to and function within the specific physical and graphic design of the exhibit as a whole. Text must contribute to achieving the project goals, but it cannot contribute as a stand-alone element. In every instance, the contractor shall consider whether text is the most effective means of achieving project goals.

Text is developed in stages, usually beginning in the Design Development phase of work. The contractor shall provide increasingly refined drafts of text, showing the text's relationship to other exhibit elements through the content outlines and graphic layouts. The stages of text development include:

Text Intent – A written description of the subject and purpose of each label or block of text, and usually including draft titles for primary blocks of text.

Text Level I – The first draft of text, to be reviewed for writing style, content, and interpretive effectiveness.

Text Level II – A more refined draft, revised or re-written as necessary in response to review comments.

Text Level III – Edited, proofed text close to what will appear in the completed exhibition. Level III text usually requires additional revisions before production to correct any remaining typographical, grammar, and factual errors, etc. that were not identified in earlier reviews.

12.2 General Requirements

A. HFC Style Guide

All exhibits planned and designed shall be produced in accordance with the latest available version of the Harpers Ferry Center Editorial Style Guide, available from the COR or online at:

<http://www.nps.gov/hfc/pdf/HFCstyleGuide2011.pdf>

B. Proofread all text

The contractor shall proofread all text for correct spelling, punctuation, and grammar prior to submittal.

C. NPS standards for interpretation

The NPS assumes that our audiences seek more than information and learning, that they seek meaningful experiences. Text, in coordination with all exhibit elements, shall create opportunities for visitors to form their own intellectual and emotional connections with meanings and significances inherent in the park's resource; available from the COR or online at:

www.nps.gov/idp/interp/index.htm

D. Hierarchy of text

The contractor shall establish a consistent hierarchy for the content and purpose of text in the exhibit. This hierarchy shall be reflected in the appearance of text in the exhibit's design. The contractor shall define characteristics of each level in the hierarchy, such as length, style, etc. Examples of hierarchical levels are: titles, subtitles, primary and secondary body text, interpretive captions, identification captions, and text for interactives.

E. Sources

- (1) The contractor shall be responsible for making sure that all information provided in exhibit text is accurate and reflects the most recent scholarship.
- (2) The contractor shall be responsible for ensuring that exhibit text is not plagiarized and does not violate intellectual property rights law.
- (3) Beginning with Text Level I (the first draft of all text) the contractor shall provide footnotes, citing references where necessary for fact checking purposes.

F. Audience.

Unless a more specific audience is defined for an exhibit or portions of an exhibit, the general visiting public is the audience for whom exhibits are produced, not scholars, historians, scientists, or administrators. Unless otherwise specified in the task order, the contractor shall write to an eighth grade (academic) reading level, and use available standard software tools for evaluating the reading level (i.e., Klesch-Kincaid Reading Level); the contractor shall inform the COR of the software tool used and the results obtained.

G. Length of text.

The contractor shall make every effort to keep text brief while achieving project goals.

H. Quotations.

All quotations must be attributed, verified, and the source documented in the footnotes.

I. Multiple perspectives.

Text, in coordination with all exhibit elements, must accommodate and present multiple points of view regarding the resource, and rely on accurate information and avoid the tendency to exaggerate or slant information to present a personal or particular viewpoint.

J. Interpretive writing style.

Interpretive writing is required for many exhibit labels rather than informational or creative writing. For the purpose of this contract, “informational writing” is defined as providing factual data for reference or other use; “creative writing” is artistic expression in written form and evokes sensory impressions and images; and, “interpretive writing” draws from technical, informational, scientific, historical, and cultural sources; it incorporates creative techniques and seeks to connect readers emotionally and intellectually to the meanings and significance of the resource(s). A successful NPS exhibit uses accurate and comprehensive information, but conveys more than facts. The writing style for exhibits shall be interpretive and informative. Active voice is preferred in exhibit text writing.

12.3 Specific Requirements for Multi-Lingual Exhibits

Unless otherwise specified in the individual task order, for exhibits requiring other languages in addition to English the text shall be translated and displayed as follows:

- A. Text at all levels of the hierarchy must be provided in each language, including captions, text for interactives, and map labels.
- B. Text in all languages shall be equally accessible.

12.4 Specific Requirements for Design Development Phase

- A. For Design Development I Draft Content Outline, the contractor shall develop Text Intent, to include:
 - (1) A description of text intent for all labels, consisting of draft titles for all primary text and descriptions of the topics or information to be presented in each Content Group.
 - (2) Sample text to demonstrate style and reading level for one representative Content Group showing each hierarchical level of text.

- B. For Design Development I Updated Content Outline, the contractor shall develop Text Level I, to include a complete draft of all text, which shall be included in the Content Outline in two forms:
 - (1) Text only, formatted as a Word document, organized by Content Group and including footnotes.
 - (2) Blocks of text placed in, or adjacent to, the associated Graphic Layout Draft.
- C. For Design Development II Graphic Layout Package, the contractor shall develop Text Level II, to include a complete second draft of all text as follows:
 - (1) Text placed directly into each graphic layout.
 - (2) When specified in the task order, additionally submit a copy of the text as a Word document. This text shall be identical to the text shown in the graphic layouts, and shall also include footnotes.

12.5 Specific Requirements for Production Documents Phase

- A. For Production Documents I Graphic Layout Package, the contractor shall develop Text Level III consisting of all edited, proofed text.
- B. For Production Documents II Graphic Layout Package, the contractor shall correct text errors identified in COR review comments of the PDI Graphic Layout Package. In addition, perform independent review of all text, notify COR of any additional errors found, and correct them as part of preparing Graphic Production Files. Text appearing in the PDII Graphic Layout Package shall be identical to text in the Graphic Production Files.
- C. When specified in the task order, additionally submit a copy of the text as a Word document. This text shall be identical to the text shown in the graphic layouts, and shall also include footnotes.

12.6 Specific Requirements for Production Support Phase

Individual Task Orders may require the contractor to make additional changes to text in the Production Support Phase as specified in the task order.

Section 13. EXHIBIT DRAWINGS

13.1 Introduction

Exhibit Drawings describe how the exhibition is organized within the allotted architectural space, its physical shape, dimensions, materials, and construction details.

Exhibit Drawings (prepared by the Planning and Design Contractor) are distinguished from Fabrication Drawings (prepared by a fabricator) by their level of detail. They must, at a minimum, communicate design intent. Details specifying *how* the exhibit is built, for example specific construction techniques and hardware, shall be necessary only to the extent required to clarify design intent, and to describe non-standard, unusual or critical materials and processes. To avoid duplication of effort or unnecessary redesign, the Planning and Design contractor shall refer to the NPS standard exhibit fabrication specifications, located below, when preparing Exhibit Drawings.

When preparing detailed Fabrication Drawings, exhibit fabricators shall maintain the design intent of the previously prepared Exhibit Drawings, and shall follow the NPS standard exhibit fabrication specifications.

13.2 General Requirements

- A. Exhibit Drawings shall be coordinated with other project documents to insure consistency in identifying individual exhibit elements. All labeling and numbering of elements shall conform to the exhibit Content Management specifications. [Section 11, Content Management](#).
- B. The latest and most accurate available version of the architectural floor plan drawings shall be used as a guide when developing exhibit design drawings.
 - (1) When individual task orders specify a site visit, the contractor shall measure and document the existing architectural space.
- C. All drawings shall be legible when printed at 11" x 17".
- D. All drawings shall be prepared at a standard architectural scale appropriate to the information being communicated on the drawing.
 - (1) All drawings shall include a graphical scale indicator.
 - (2) All printed copies of drawings shall be output at the original scale or at a standard multiple of the original scale such as 25%, 50%, or 200%.
- E. All Exhibit Drawings shall include a legend with the project name, phase of work, issue date, and revision number.

- F. The contractor shall provide paper copies and electronic files when drawings are computer-generated. All computer-generated drawings shall be submitted in their original file format and in pdf format. Each disc shall be identified with the project name, the park, and the name and version of the program used to produce the drawings.

13.3 Specific Requirements for Schematic Design Phases

- A. At a minimum, the contractor shall prepare and submit diagrams and plan-view drawings of the exhibition's content and physical layout at a level of detail consistent with the current level of exhibit planning and design. During Schematic Design this shall include:
 - (1) For Schematic I, diagrammatic studies (Bubble Diagrams) for each design alternative. The diagrams shall be organized to best fit the project according to one of the following methods:
 - (a) As labeled shapes (bubbles) and lines identifying exhibit themes and concepts and how they relate to each other. The weight, importance, or emphasis of individual elements shall be indicated by their size and location on the diagram.
 - (b) As labeled shapes (bubbles) on an exhibit floor plan, indicating the approximate size and location of each Scene (major exhibit area).
 - (2) For Schematic II:
 - (a) A floor plan with an accurate footprint of all proposed Scenes. All Scenes and Content Groups within each Scene shall be labeled on the floor plan.
 - (b) Elevation views for a minimum of two Content Groups selected to communicate the proposed appearance and style of the exhibition.

13.4 Specific Requirements for Design Development Phases

- A. For Design Development I, the contractor shall prepare and submit drawings of the developed design. The primary use of these drawings is for project team review and approval, and to serve as the basis for Production Documents in a later phase of work. Designs shown in the drawings shall meet the specifications for Exhibit Structures identified in Section 22, Design Guidelines for Exhibit Structures. At a minimum, the drawings shall include:
 - (1) Cover sheet that identifies the project name, project location and site plan, date of submission, and table of contents.

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- (2) Floor plan of the facility showing location of the exhibition site, the primary exhibit area with name and location of each Scene, and references to exhibit detail drawings.
 - (3) Floor plans and elevations of existing conditions indicating any modifications such as demolition and new construction.
 - (4) Plan and elevation views of each Scene / Content Group identified by title and identification number, and showing exhibit structures and all graphic panels, artifact locations, and all other interpretive content with identification numbers. Include a floor plan on each sheet indicating the location of the views shown.
 - (5) Proposed fabrication details for unusual exhibit structures. (Section 22, Design Guidelines for Exhibit Structures, requirements apply.)
 - (6) Reflected ceiling plan of the exhibition space showing proposed lighting plan.
 - (7) Proposed colors, materials, and finishes.
 - (8) Proposed furnishings or other off-the-shelf items and equipment.
 - (9) Proposed data and electrical wiring plans for the exhibition space, indicating floor and wall outlets, ceiling junction boxes, and locations of switches and controls.
 - (10) Location of remote audiovisual equipment.
- B. For Design Development II, the contractor shall prepare and submit a revised set of drawings incorporating all planning and design changes. It shall also include additional details developed during this phase of work, including but not limited to:
- (1) Lighting equipment schedule. (Section 23, Exhibit Lighting, requirements apply.)
 - (2) Case Schedule. (Section 11, Content Management, requirements apply.)

13.5 Specific Requirements for Production Documents Phase

- A. As part of document preparation within the Production Documents phase of work, the contractor shall prepare and submit final Exhibit Drawings. Designs shown in the drawings shall meet the specifications for Exhibit Structures identified in Section 22, Design Guidelines for Exhibit Structures. The drawings shall, when combined with other Production Documents submitted by the contractor, provide sufficient information for exhibit fabricators to prepare detailed Fabrication Drawings. At a minimum, the Production Exhibit Drawings shall include:
- (1) Cover sheet that identifies the project name, project location and site plan, date of submission, and table of contents.
 - (2) Floor plan of the facility showing location of the exhibit site, the primary exhibit space with name and location of each Scene, and references to exhibit detail drawings.
 - (3) Floor plans and elevations of existing conditions indicating any modifications such as demolition and new construction.
 - (4) Plan and elevation views of each Scene / Content Group identified by title and number, and showing exhibit structures and all graphic panels, case locations, and all other interpretive content with identification numbers. Include a floor plan on each sheet indicating the location of the view shown.
 - (5) Typical fabrication details including plan, elevation, sectional, and isometric views.
 - (6) Fabrication details of unusual exhibit structures.
 - (7) Case Schedule. (Section 11, Content Management, requirements apply.)
 - (8) Reflected ceiling plan of the exhibit area(s) identifying existing and new lighting fixtures and hardware. Include a lighting schedule for all new lighting indicating type of fixture, track, or associated hardware required.
 - (9) An electrical plan of the exhibit area indicating floor and wall outlets and ceiling junction boxes, power circuits, and power load for each exhibit or audiovisual element.
 - (10) Specification of all colors, materials, and finishes to be used.

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- (11) Identification of all furnishing or other “off-the-shelf” items and equipment including the name, address, and telephone number of the supplier and/or manufacturer of each item.
 - (12) Location of remote audiovisual equipment and routing of audiovisual signal wiring.
 - (13) Exhibit power, lighting and audiovisual control switch locations.
 - (14) Description of exhibit start-up, operation and shut-down procedures.
- B. The contractor shall revise and resubmit the final exhibit design drawings to address review comments provided by the COR.
 - C. The contractor’s name and other identifying information shall be removed from the final submittal of Exhibit Drawings intended for release to potential exhibit production offerors.

13.6 Fabrication Drawings

- A. General Requirements:
 - (1) Provide Fabrication Drawings and Revised Fabrication Drawings as follows:
 - (a) Submit Fabrication Drawings for review and approval prior to fabrication of exhibits. Provide Revised Fabrication Drawings to incorporate changes in accordance with review comments.
 - (b) Provide Fabrication Drawings to incorporate all changes or additions as specified in individual task orders or modifications for elements which were not included in the Exhibit Drawings. Provide Revised Fabrication Drawings to incorporate changes in accordance with review comments.
 - (2) Review all measurements relating to the fabrication and installation of work required under this contract. Provide corrected dimensions on the drawings.
- B. Fabrication Drawings shall include the following changes or additions to the government-furnished Exhibit Design Drawings:
 - (1) Plan, elevation, and section view drawings indicating final dimensions and layouts;

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- (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 Section 11, Content Management.
- C. Catalog Cuts - Provide legible scanned and printed copies of catalog cuts for all off-the-shelf products, and include its corresponding identification number in accordance with the content management system. When more than one product is shown on a page, highlight, circle, or otherwise identify the specific product, including all appropriate specifications such as model or part number, color, size, etc. Off-the-shelf products requiring catalog cuts include:
 - (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. Isometric Drawings - Provide isometric or 3D projection drawings to illustrate access into the exhibits for maintenance and repairs by the park staff. Drawings shall 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 all copies of the Maintenance Manual.
- E. Artifact Mount Drawings - Provide drawings for review and approval of artifact mounts in accordance with Section 18, Object Preservation and Protection.
- F. Preliminary Maintenance Manuals -
 - (1) Provide preliminary submittals of the following, with content specific to the exhibit to be fabricated and installed under the task order:
 - (a) Maintenance Manual;

- (b) As-Built Lighting Plan, and;
 - (c) Audiovisual Operations Manual.
- (2) In accordance with Section 29, Operational Training and References, provide the following for each Preliminary Manual, at a minimum:
- (a) Title page;
 - (b) Table of Contents;
 - (c) Contract information;
 - (d) Placeholder pages for items listed in the Table of Contents, with notes identifying intent for final contents. Include draft all sections available.

13.7 As-Built Drawings

- A. General Requirements: The As-Built Drawings shall be prepared and submitted by the contractor as part of the final closeout package. The As-Built Drawings shall document the final, completed, installed condition of the exhibits and serve as an accurate representation of the design, as it was executed.
- B. Specific Requirements:
- (1) The drawings shall include a complete set of Exhibit Drawings, in accordance with this Section, 13.5,
 - (2) The drawings shall incorporate fabrication detail drawings in accordance with this Section, 13.6.
 - (3) The drawings shall incorporate revisions or modifications which took place during, or after, the on-site installation.
 - (4) The drawing sheets for the lighting plan, reflected ceiling plan, audiovisual program locations, electrical plan, power plan, etc., shall be updated to match the corresponding information in the separate As-Built Lighting Plan and the Audiovisual Operations Manual.
 - (5) Organization of Drawings:
 - (a) Clearly identify the drawings as "AS-BUILT" on the cover page, along with the date of completion of the drawing set.

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- (b) Number sheets in accordance with the original design drawings. If additional sheets or revised sheets are added to the set, use a numbering system that is based on the original system, such as adding a letter to the number. Do not use a completely separate, internal numbering system.
- (6) The contractor shall identify the date of completion on each of the revised and new drawings.

Section 14. MATERIAL, COLOR, AND FINISH SPECIFICATIONS

14.1 Introduction

The visual theme or style of an exhibition shall be proposed by the contractor during the Schematic II phase of work, with refinements and detail added during the Design Development phases. In the Production Documents phase, the contractor shall provide final specifications for all visible elements in the exhibition.

14.2 General Requirements

- A. The contractor shall consider cost when making material / finish selections. The goal is to achieve an effective balance between resources allocated to the exhibition's physical structure and its interpretive media elements.
- B. Materials, colors, and finishes shall be selected for the most effective visual presentation, to reinforce the exhibition's content, durability, and sustainability. In no case shall an exhibit's visual appearance compete with or obscure its educational, interpretive or informational messages.

14.3 Specific Requirements for Design Development Phase

- A. The Contractor shall submit samples of specific materials, colors, and finishes for the exhibit. All samples shall be of sufficient size, shape, and configuration to provide an accurate representation of their appearance in the exhibit. Samples obtained from the manufacturer or prepared by the contractor include, but are not limited to:
 - (1) Plastic laminates (example: Formica).
 - (2) Solid surfacing materials (example: Corian).
 - (3) Paint samples (including surface luster).
 - (4) Wood, metal, glass, plastic, ceramic, fabric, carpet or other materials with natural or applied finishes.
 - (5) Color chips to specify:
 - (a) Screenprinting inks – use Pantone Matching System.
 - (b) Digitally output graphics –Pantone Matching System or other appropriate color matching chips. Paint color chips are not acceptable. Since color information is embedded in digital files, physical samples shall only be required for the principal color palette, and other critical color matching purposes.

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- B. Materials and finishes specified for use inside of artifact display cases shall conform to the National Park Service Exhibit Conservation Guidelines.
- C. Samples shall be assembled onto a Material, Color, and Finish Sample Board that includes the following additional information:
 - (1) All samples shall be labeled with the manufacturer's identification name and/or code number.
 - (2) Samples for all paints, finishes and materials shall include the vendor's name and contact information.
- D. The contractor shall submit two identical copies of the Material, Color, and Finish Sample Board in the Design Development I phase of work.

14.5 Specific Requirements for Production Documents Phase

Unless otherwise specified in the task order, the contractor shall prepare and submit a total of three Material, Color, and Finish Sample Boards revised to address all review comments as follows:

- A. All materials, colors, and finishes shall match the corresponding specifications in the Production Exhibit Drawing package.
- B. At the contractor's request, the COR will return the two sample boards submitted in the Design Development phase of work. The contractor shall revise and resubmit the two existing sample boards along with a third, new copy. All three copies shall include identical information.
- C. If the contractor does not request return of the existing sample boards for revision, the contractor shall prepare and submit three new Material, Color, and Finish Sample Boards.

14.6 Specific Requirements for Fabrication Phase

Provide samples for all exhibit materials, colors, and finishes specified in the exhibit design. Provide additional samples as specified in individual task orders.

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

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- (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 - All samples shall be identified with exhibit color number.
 - (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. All samples shall be identified with exhibit color number.
 - (d) Metal - Finish and metal specified, including but not limited to, paint, powder coating, patina, and anodized finish.
- (2) Glazing - Glass or acrylic glazing, in specified type and thickness.
- (3) Artifact Cases Materials - Provide material and finish samples in accordance with Section 18, Object Preservation and Protection.
- (4) 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.
- (5) Custom Life-size Figures (Figures created from making casts from real people) - The contractor shall submit the following to the COR for review and approval:
 - (a) Phase I Submittals -
 - i Photographs of proposed models for each figure shall be submitted for the COR to choose from. The contractor shall provide a minimum of three choices for each figure. The models shall match the intent for each final cast figure as closely as possible in their relevant physical characteristics.
 - ii References for clothing and accessories - The contractor shall provide a reference package of samples and catalog cuts representing the proposed clothing styles, fabrics, colors, hair or wigs, and accessories for each figure. If figures and clothing are intended to receive a hardened, monochromatic treatment, a sample shall be provided of the actual color and texture.

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- (b) Phase II Submittals -
 - i Review of poses - Upon selection of model(s) for custom cast figures by the COR, the contractor shall provide photographs of proposed poses by the model(s) which are consistent with the design intent. The photographs shall include multiple viewpoints. If the figures in the design are holding props (such as tools, weapons), the models shall also hold similar props.
 - ii Clothing and accessories - After casting and assembly of the figure, but prior to final finishing, the contractor shall submit photographs of the figure with clothing and other accessories such as wigs, hats or footwear.
- (c) Phase III Submittals - The contractor shall complete the figures in accordance with the Phase I and Phase II submittal comments provided by the COR. In addition, the contractor shall provide:
 - i Photographs of the completed figures, taken from multiple viewpoints;
 - ii Cleaning and maintenance information for the figures for inclusion in the Maintenance Manual, in accordance with Section 29, Operational Training and References.
- B. Catalog Cuts - In accordance with Section 13, Exhibit Drawings, 13.6, Fabrication Drawings.
- C. Graphics - In accordance with Section 15, Two-Dimensional Exhibit Graphics, 15.11, Graphic Production Samples.
- D. Mock-ups and Prototypes - In accordance with Section 24, Mock-ups and Prototypes

Section 15. TWO-DIMENSIONAL EXHIBIT GRAPHICS

15.1 Introduction

Two-Dimensional Exhibit Graphics convey interpretive messages, describe objects or other exhibit elements, and provide general information within the exhibition. Exhibit graphics may include stand-alone text, photographs, illustrations, maps, or any combination of text and images. They are produced and mounted for display using a variety of processes.

Development of Two-Dimensional Exhibit Graphics includes two major but intertwined tasks: creation of the Graphic Layout with text, images and design elements that communicate interpretive or informational content, and design of the panel or other physical component on which the Graphic Layout is presented in the exhibition.

Graphic Layouts are prepared using computer software, with the resulting graphic production files being structured to accommodate the selected graphic production process. Direct digital output processes such as ink jet print and LED/Laser imaging on photo paper are most commonly used. In these processes, all text and images are prepared in a single Graphic Layout, which is output as a single print and mounted on a single panel. This panel is considered one two-dimensional exhibit graphic.

Along with direct digital output, an exhibit design may call for specialty processes such as silk screening, etching, or cut vinyl. Each specialty process may have unique technical requirements for preparation of graphic production files.

In addition to single flat panels, some Two-Dimensional Exhibit Graphics may be compound graphics, composed of a number of separate pieces to add dimensionality, shapes, or other textures and materials. An example is a large panel with a background image, dimensional cut-out lettering applied as a title, and several smaller mounted images standing off from the main panel. In this case the entire assembly may be designated as a single Two-Dimensional Compound Exhibit Graphic. Individual Graphic Layouts may be needed for each of the discrete pieces making up the compound graphic, along with an exhibit drawing showing the placement of all the elements in relation to each other.

Graphics created for display on screens or by projection are not included in this specification.

15.2 Graphic Layouts – General Requirements

- A. Create all Graphic Layouts required for the exhibition unless otherwise specified in individual Task Orders. Graphic Layouts shall be prepared for each Two-Dimensional Exhibit Graphic according to the following criteria:

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- (1) Graphic Layouts shall be designed for legibility and to meet National Park Service accessibility requirements. (Section 8, Accessibility, requirements apply).
- (2) In developing Graphic Layouts the contractor shall take into account the proposed exhibit environment in which the graphics will be viewed, including but not limited to lighting levels, viewer distance and angle of view, possible obstructions, and shadows from other exhibit elements.
- (3) The graphic design shall support the clear communication of information. Labels and captions shall be clearly associated with the objects and images they are describing. Care shall be taken to insure that the design does not imply incorrect information due to the misleading selection, juxtaposition, or alteration of images.
- (4) The primary purpose of typography shall be to promote an understanding of the interpretive or informational message of the exhibition. Use of typographic styles that are distracting or difficult to read shall be unacceptable. The contractor shall balance the selection of fonts and use of typography to compliment the exhibition's design approach while being accessible to a wide range of visitors, including those with low vision or who have reading difficulties.
- (5) An individual Graphic Layout shall be prepared for each exhibit graphic element that needs to be output and mounted separately during production. Exception: similar small elements may be grouped together on one Graphic Layout to improve efficiency as long as clear instructions are provided.
- (6) All Graphic Layouts shall be prepared using appropriate software application programs as specified in 15.5.A of this Section.

15.3 Specific Requirements for Design Development Phase

A. Design Development I

The contractor shall develop graphic layout drafts in two stages during the Design Development I phase of work as follows:

- (1) As part of the Draft DDI Content Outline, the contractor shall prepare, at a minimum, one sample graphic layout draft for each type of exhibit graphic element in the exhibition as follows:
 - (a) All sample graphic layout drafts shall demonstrate a proposed graphic design approach, including the specification of standard sizes, layout formats, color palette, and typography.

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- (b) Placement copies of key images shall be included in the sample graphic layout drafts. Secondary, or less prominent images may be indicated by outlines or other visual representations only to the extent that the proposed graphic design approach remains clear.
 - (c) Text intent, consisting of draft titles for all primary text, and descriptions of the topics or information to be presented shall be included in the sample graphic layout drafts. Secondary or smaller text elements may be indicated by greeking or other visual representations only to the extent that the proposed graphic design approach remains clear.
 - (d) Outlines or images shall be included to indicate the location of three-dimensional objects or other exhibit elements, if any, to be mounted on a sample graphic layout draft.
 - (e) The size and shape of sample graphic layout drafts shall match the corresponding two-dimensional exhibit graphic elements shown in the Draft DDI Exhibit Drawing Package.
 - (f) Sample graphic layout drafts shall be included in the Draft DDI Content Outline as full color prints scaled such that the proposed graphic design approach is clearly communicated. Each print shall be labeled to identify the type of two-dimensional exhibit graphic shown (for example: "Content Group introduction panel" "primary text panel", "reader rail graphic").
 - (g) In addition, the contractor shall include typography and graphic layout specifications sheet(s) in the Draft DDI Content Outline including:
 - (i) Samples of all typefaces used, identified by name and manufacturer, showing different point sizes used.
 - (ii) A graphic layout color palette with color swatches identified by Pantone number.
 - (iii) Any standard graphic motifs, decorations, or special treatments used as part of the graphic layout approach.
- (2) As part of the updated DDI Content Outline, the contractor shall prepare graphic layout drafts for all two-dimensional exhibit graphic elements in the exhibition as follows:

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- (a) Graphic layout drafts shall follow the design proposed in the approved sample graphic layout drafts, as modified by COR review comments. Prior to proceeding, the COR may require the contractor to submit additional samples when the original sample graphic layout drafts are not approved, or approved with extensive comments.
- (b) Placement copies of all selected images shall be included in the graphic layout drafts. In cases where specific images have not been selected or are not available, an outline showing location, size, and shape of the missing image shall be substituted, accompanied by a written description of the desired image.
- (c) A copy of all draft text (Text Level I) for each graphic layout shall be included. As a default, this text shall be integrated into the layout using the correct typeface, size, and position. Alternately, with prior approval of the COR, draft text may be placed in a column adjacent to the graphic layout draft in a simple word processing format (for example when the reduced size of the graphic layout results in illegible text).
- (d) Outlines or images shall be included to indicate the location of any three-dimensional objects or other exhibit elements to be mounted on the two-dimensional exhibit graphic. These elements shall be clearly labeled to distinguish them from the printed graphic layout.
- (e) The size and shape of graphic layout drafts shall match the corresponding two-dimensional exhibit graphic elements shown in the updated DDI Exhibit Drawing Package.
- (f) Graphic layout drafts shall be included in the updated DDI Content Outline in full color, 11" X 17" format. Each print shall be labeled to identify the following:
 - (i) Location of the graphic layout in the exhibition, by Scene and Content Group.
 - (ii) Scale at which printed, with 100% equal to the final production size in the exhibit.
 - (iii) Finish size of the graphic layout in the completed exhibition.
- (g) In addition, the contractor shall include revised typography and graphic layout specifications sheet(s) in the updated DDI Content Outline.

B. Design Development II

The contactor shall complete a DDII Graphic Layout Package, as follows:

- (1) A title page shall be included, with project name, document title, phase of work, and issue date.
- (2) A Graphic Layout Schedule shall be included, listing all graphic layouts in the exhibition, and including the data specified in Section 11.2(E) and 11.2(F).
- (3) Revised typography and graphic layout specifications sheet(s) shall be included.
- (4) Each graphic layout shall be printed in full color on its own 11" X 17" sheet. Each sheet shall include the following information in the margin:
 - (i) Graphic layout number, using the Content Management Numbering System as specified in Section 11.2(C).
 - (ii) Scale at which printed, with 100% equal to the final production size in the exhibit.
 - (iii) Finish size of the graphic layout in the completed exhibition.
- (5) Placement copies of all selected images shall be included in the graphic layouts. Outlines or other graphic representations of images are not acceptable. Each image shall be labeled with its image (IM) number.
- (6) Text Level II (second draft text) shall be included in the graphic layouts as follows:
 - (a) Text appearing in these graphic layouts is the record version of all currently proposed exhibit text. Greeking or other generic representations of text is not acceptable.
 - (b) All text shall be integrated into graphic layouts using the correct typeface, size, and position.
 - (c) All text must be of legible size for review purposes, typically 10 point or larger, except as follows:
 - (i) In cases where reduction of a graphic layout to fit on a single sheet results in illegible text, enlarged sections of the layout shall be provided on subsequent sheets for text review purposes.

- (ii) Alternately, with prior approval of the COR, a duplicate copy of all text in the graphic layout may be placed in one or more columns adjacent to the graphic layout or on an adjacent sheet for review purposes. This text shall be presented in a simple word processing format, 10 point or larger, with all punctuation, paragraph breaks, etc., intact.
 - (d) Text footnotes, citing references where necessary for fact-checking purposes shall be placed in one or more columns adjacent to the graphic layout or on an adjacent sheet.
- (7) Outlines or images shall be included to indicate the location of any three-dimensional objects or other exhibit elements to be mounted on the two-dimensional exhibit graphic. These outlines or images shall include the statement: "Do Not Print – For Placement Only", and labeled with the appropriate exhibit element number.
- (8) The size and shape of graphic layout drafts shall match the corresponding two-dimensional exhibit graphic elements shown in the DDII Exhibit Drawing Package.

15.4 Specific Requirements for Production Documents Phase

A. Production Documents I.

The contractor shall prepare and submit a PDI Graphic Layout Package as follows:

- (1) This document shall consist of an updated version of the DDII Graphic Layout Package, revised to resolve all COR review comments. It shall conform to the specifications in 15.3.B of this Section.
- (2) Text Level III - edited, proofed text – shall be included in all graphic layouts.
- (3) Placement copies of the current versions of all images shall be included in all graphic layouts.
- (4) Where 30% or fewer of the pages in the PDI Graphic Layout Package include revisions from the DDII Graphic Layout Package, and with approval in advance from the COR, the contractor shall have the option of submitting a PDI Graphic Layout Addendum Package consisting of the revised pages only. An up-to-date Graphic Layout Schedule shall also be included in the addendum package.

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- (5) Where over 30% of the pages in the PDI Graphic Layout Package include revisions from the DDII Graphic Layout Package, the contractor shall submit a complete revised version of the package.

B. Production Documents II.

The contractor shall furnish Production-Ready Graphic Layouts as follows:

- (1) Complete all production-quality scans required for the exhibition as specified in 15.6.B of this Section.
- (2) Adjust color balance, saturation, image sharpness, and perform other minor touch-up work as needed for all production-quality scans.
- (3) Prepare all Final Image Files for the exhibition as specified in 15.5B(2) of this Section. This shall include blending of multiple source images, application of color, transparency, or a combination of other effects to match the visual intent of the corresponding low-resolution placement image, and adjusting image for correct cropping and bleed.
- (4) Prepare all Vector Illustration Files for the exhibition as specified in 15.5B(3) of this Section.
- (5) Correct all typographical, grammar, formatting and factual errors in text noted in the COR review of the PDI Graphic Layout Package.
- (6) Prepare and submit all Production-Ready Graphic Layout Files as specified in 15.5B(1) of this Section.
- (7) Prepare and submit a PDII Graphic Layout Package in 11" x 17" landscape format including:
 - (a) Title page with project name, document title, phase of work, and issue date.
 - (b) Graphic Layout Schedule.
 - (c) A complete set of all graphic layouts as follows:
 - (i) Where technically feasible, these prints shall be produced directly from the Production-Ready Graphic Layout Files.
 - (ii) In all cases, the prints shall be an accurate representation of the contents of the Production-Ready Graphic Layout Files.

- (iii) All images and text shall be legible. In instances where graphic layouts scaled to fit a standard 11" x 17" page are not legible, the contractor shall provide a reference print of the entire graphic layout sized to fit a standard page, followed by enlarged, legible sections of the graphic layout on subsequent pages.
- (iv) Printed copies of each graphic layout shall include, at a minimum, the following information printed in the margin:
 - Graphic Layout (GL) number.
 - Computer file name.
 - Scale at which printed, with 100% equal to the final production size in the exhibit.
 - Dimensions for the final production size.

15.5 Requirements for Graphic Production Files

A. Software.

The following software programs are acceptable:

- (1) Adobe InDesign, Version CS4 or later for graphic layout files.
- (2) Adobe Photoshop, Version CS4 or later for image (raster based continuous tone) files.
- (3) Adobe Illustrator, Version CS4 or later for vector based graphic illustration files.
- (4) Adobe Acrobat, Version 9 or later for pdf (portable document format) files.

Newer versions of these programs that are released during the term of this contract shall also be acceptable unless otherwise stated in individual task orders. Substitution of other software programs shall be approved, in advance, by the COR.

B. File Structure

Throughout the exhibit development process, all files generated by the contractor shall follow a standardized structure for each file type. File types, structure, and their naming convention shall be as follows:

- (1) Graphic Layout Files include all of the components - images, text, and graphic ornaments - for a single exhibit graphic element that will be output and mounted separately during production. These files shall be created in Adobe InDesign, and shall be organized into layers determined by the document's content. All graphic layout files shall be RGB files with the Adobe RGB 1998 profile embedded. In addition:
 - (a) All files shall be created at 50% or greater of final printed size.
 - (b) All linked files shall be correctly referenced and available to the graphic layout file for the file to print correctly (see 15.5.B.(4) of this Section).
 - (c) Image identification numbers shall be located on or adjacent to the corresponding elements on the layout, and placed on a separate layer.
 - (d) Other supporting information shall be located in the document margin, and shall be placed on a separate layer. This data includes, but is not limited to, the file name, date or revision number, and document scale in relation to the final output.
 - (e) All graphic layout files prepared for final output shall include crop marks and sufficient bleed to accommodate the specified production process.
 - (f) Each file shall be named to correspond with the identification number assigned in the Content Management Numbering System. File names shall follow the format:

GL-00.00-000Work.indd for Design Development level graphic layouts.

GL-00.00-000Prod.indd for Production level graphic layouts.
- (2) Image Files (continuous tone, or raster files) shall be structured according to their specific use during the exhibit development process. A separate folder shall be used for each file type, and each file shall be named to correspond with the image identification number assigned in the Content Management Numbering System. The file types include:

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- (a) Raw Image Files - Unimproved scan files, supplied files, and digital camera raw files (in Adobe DNG format). These files may be 16 bits per channel or 8 bits per channel RGB.
- File names shall follow the format: **IM-00.00-000Raw**. The appropriate file extension shall be appended to the file name.
- (b) Working Image Files - Layered PSD files (Photoshop native file format). These are the files in which all work has been done. All work shall be done on layers and be available for further editing. All editing functions shall be done on adjustment layers where practical. Where this is not the case, a duplicate of the original image layer shall be made and the edits shall be applied to it. These files may be 16 bits per channel or 8 bits per channel RGB, shall be scaled to final use size and resolution, and shall have the Adobe RGB 1998 profile embedded.
- File names shall follow the format:
IM-00.00-000Work.psd
- (c) FPO Image Files - Low-resolution versions of images used for developmental purposes during exhibit planning and design. The FPO image files are linked to the graphic layout files prior to final output of the exhibit graphics. These files shall be produced at a quality level sufficient to provide a clear representation of the image as it will appear in the final exhibit, balanced against the need for a manageable file size that can be easily stored, transmitted and printed. Compressed image formats such as JPG are acceptable for FPO files. The FPO images shall be cropped and scaled to match the Final Files they are representing. These files shall be 8 bits per channel RGB and shall have the Adobe 1998 profile embedded.
- File names shall follow the format: **IM-00.00-000FPO**. The appropriate file extension shall be appended to the file name.
- (d) Final Image Files - Production-ready image files created by flattening the final version of Working Files. These are the files linked to the graphic layout files for final output. These files shall be 8 bits per channel RGB and shall have the Adobe 1998 profile embedded.
- File names shall follow the format: **IM-00.00-000Prod**. The appropriate file extension shall be appended to the file name.

- (3) Vector Illustration Files – These files shall be created in Adobe Illustrator, and shall be organized into layers determined by the content in the document. In addition:
 - (a) Supporting information shall be located in the document margin, and shall be placed on a separate layer. This data includes but is not limited to the file name, and date or revision number.
 - (b) Vector illustrations shall be designated as images in the Content Management Numbering System. File names shall follow the format:

IM-00.00-000Dev.ai for Design Development level vector illustrations.

IM-00.00-000Prod.ai for Production level vector illustrations.
- (4) Linked Files are raster or vector files required by the primary file in order to print correctly. Graphic layout files often require one or more linked image files. Supporting files shall always be linked to, not embedded in, the primary file. Approved formats for linked files are tiff, pdf, psd, and ai.
- (5) PDF Files are used for electronic distribution, viewing and printing of review documents during exhibit development. Unless otherwise approved in advance by the COR, pdf files shall not be used for final exhibit production output. The pdf file name shall be identical to the file from which it was created, with the **.pdf** extension replacing the original file's extension.

C. Color Management

The design and production processes shall be color managed from beginning to end using ICC (International Color Consortium) and ColorSync color management as follows:

- (1) All raster image and vector files shall be RGB files.
- (2) Color working space shall be Adobe RGB (1998). The Adobe RGB (1998) profile shall be embedded in all RGB files.
- (3) Color settings for InDesign and other Adobe applications shall be US Prepress Defaults. Important settings in this context are:

Enable Color Management

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Working Space: RGB; Adobe RGB (1998)

Conversion Options:

Engine: Adobe ACE

Intent: Relative Colorimetric

Use Black Point Compensation

Transparency Blend Space (for InDesign files): Document RGB

All soft proof color evaluations shall be made in this environment.

- (4) The D50 standard viewing conditions (ANSI PH2.30-1989 For Graphic Arts and Photography - Color Prints, Transparencies, and Photomechanical Reproductions - Viewing Conditions) shall apply, and all hard copy color evaluations will be made in this environment.
- (5) All defined colors (Swatches) in InDesign and Illustrator shall be set to Color Type: Process.

D. Fonts

- (1) The contractor shall provide all font files necessary to view, edit, and print all graphic layouts produced under this contract.
- (2) OpenType is the standard approved font technology for all Graphic Layout files. Type 1, TrueType, or any other font technology is not acceptable unless approved in advance by the COR.
- (3) The contractor is responsible for meeting all software licensing requirements of the font copyright owner. The contractor shall provide valid software licenses permitting the receiver of the submittal to install the fonts on a computer system for purposes of viewing, editing, and printing all graphic layouts produced under this contract.
 - The requirement to provide font licenses may be waived upon written notice by the COR to the Contractor that the receiver of the submittal already owns a valid font license. In this case, submittal of the font files shall still be required.

E. Organization of Multiple Files

The contractor shall use a consistent system for organizing the multiple files generated during the course of the project. Unless otherwise approved by the COR in advance, files shall be submitted on CD-ROM disk, DVD-ROM disk, or similar portable media as appropriate for the volume of data, in a universal format that can be read by current Microsoft Windows and Apple Macintosh operating systems.

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Files shall be organized as follows:

- (1) By physical disk. Each disk shall be clearly labeled with the project name, date, brief description of contents, and the level of exhibit development, for example “Design Development II” or “Production I”. The total number of disks shall be indicated, for example: “Disk 1 of 5” for a series of 5 disks, or “Disk 1 of 1” for a single disk. Each disk shall be accompanied by a print-out of the disk directory listing all folders and files on the disk.
- (2) The root directory of Disk 1 shall contain a Font directory, which shall contain all font files required for production of the graphic layouts. Other files related to the exhibition as a whole, such as “ReadMe” files and PDF versions of printed submittals shall also be located in the root directory of Disk 1.
- (3) A folder shall be established for each exhibition scene, consistent with the project organization established in the Content Management specifications. For example, a folder titled “Scene 01” shall include sub-folders with all files associated with exhibition scene 01. Subfolders for content groups within a scene may also be established when the complexity of the exhibition warrants it.
- (4) Within each exhibition scene folder or content group sub-folder, sub-folders shall be established for each required file type as follows:
 - (a) Graphic layout files (GL- series InDesign files).
 - (b) Image files (IM-series raster images) with nested sub-folders as follows:
 - Sub-folders within the image file folder shall be created as necessary for Raw, Work, FPO, and Final image files as exhibit development proceeds.
 - (c) Vector illustration files (IM-series Illustrator files).
 - (d) PDF, reference, or other miscellaneous files relating to the specific scene or content group, if necessary.

15.6 Requirements for Image Scanning

A. FPO Scans:

For Position Only (FPO) images are used in graphic layouts prior to the Production Documents phase of work. Scans for FPO images shall be produced at a quality level sufficient to provide a clear representation of how the image will be used in the completed exhibition, balanced against the need to maintain a small file size that can be easily stored, transmitted and printed. Compressed image formats such as JPG are acceptable for FPO image scans.

B. Production-quality Scans:

- (1) Prior to scanning, the contractor shall review the resolution, cropping, and final size of the production image that will be created from the scan. The contractor shall notify the COR if the quality of the source image is not suitable.
- (2) Scans requiring extreme enlargements of the source image shall be performed using a process and equipment capable of providing high quality results. This shall include the wet mounting of transparencies and negatives and/or use a drum scanner when necessary. The contractor shall consult with the COR to determine when specialized processes and equipment are necessary.
- (3) Unless otherwise specified by the COR, the following scanning specifications shall be followed:
 - (a) Resolution: 150 – 200 dpi at final image size and cropping.
 - (b) Color Space: RGB or Grayscale.
 - (c) Profile: Adobe RGB (1998) or Gray Gamma 2.2.
 - (d) File type: PSD, TIFF, pdf with no compression, or DNG.

15.7 Graphic Fabrication - General Requirements

The contractor shall provide fabrication of all two-dimensional exhibit graphics. Except as otherwise specified in individual task orders, graphic source material will be government-furnished to the fabrication contractor in a digital format.

A. Review all government-furnished materials. Work includes:

- (1) Inventory of the government-furnished sources to ensure that the actual sources match the accompanying inventory list;

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- (2) Inspection of each source to ensure that it is acceptable for use in the exhibit;
 - (3) Verify that FPO files match the government-furnished sources;
 - (4) Compare the graphic layouts with the exhibit drawings to verify that the final output size of each graphic layout matches the size of the corresponding panel;
 - (5) Verify the fit and cropping of images within graphic layouts; and
 - (6) Verify that all required files and fonts are furnished with digital files.
- B. Graphic Production Files - As specified in individual task orders, all work that includes the following shall be in accordance with 15.5 and 15.6 of this Section:
- (1) Preparation of digital files for specified output;
 - (2) High-resolution scanning of graphic images;
 - (3) Linking of Image and Vector files to Graphic Layout Files; and
 - (4) Adjusting digital files for color corrections and bleed.
- C. Creative graphic design services - as specified in individual task orders.
- D. Produce original artwork - as specified in individual task orders, and in accordance with Section 16, Reference Packages for Custom Interpretive Exhibits, and Section 17, Image Acquisition.
- E. Produce Sample Proofs - Produce and submit intermediate proofs, samples, and revised layouts for review and approval by the COR in accordance with Section 5, Submittals and Reviews.
- F. Produce Final Graphic Media - Produce all final graphic media.
- Media includes, but is not limited to:
- digital prints on paper;
 - digital high pressure laminate panels;
 - wall-size murals on fabric, vinyl, paper, laminate or other materials;
 - porcelain enamel panels;
 - fused polycarbonate panels;

- digital printing of scrim and banners;
- Braille plaques, and visual graphic panels incorporating raised or Braille tactile surfaces;
- etched or sandblasted glass, stone or metal;
- screen printed graphics;
- cut-out, dimensional graphics, letters or symbols;
- hand-painted or air-brushed graphics; and,
- floor graphics applied or embedded as a paint, stain, tile, metal, vinyl, carpet, or other material.

15.8 Graphic Fabrication - Review of Source 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.

- A. Inspect all government-furnished graphic sources to ensure that they correspond to the accompanying inventory list, typically specified on the project database.
- B. Inspect the quality of each source to ensure that it is suitable for use in the exhibit.
 - (1) Government-furnished photographic negatives, prints, transparencies, or other media 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.
 - (2) Inspect government-furnished digital files to ensure that they are scanned at a resolution that is suitable for production of a high quality print at the specified output.
- C. Compare each image source against the corresponding FPO on the government-furnished design drawings or graphic layouts to ensure the images match, and against the layouts to ensure that they correspond properly.
- D. Compare the government-furnished graphic layouts with the design drawings and verify that the dimension of each graphic layout matches the corresponding structural panel.
- E. Verify that the proposed cropping, orientation, and dimensions of images will fit within the layout as designed.

- F. 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.
- G. 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 COR no later than three business days.

15.9 Handling of Source Material

Provide professional care and handling of source materials. The contractor shall provide protection from loss and physical damage at all times. Certified mail and written receipts or tracking numbers shall be used in transferring sources to and from photographic and graphic processors. All government-furnished source materials shall be returned to the COR unaltered and undamaged. No retouching or other alteration on original government-furnished prints, negatives, transparencies, or digital files is permitted. See Section 17, Use Rights and Licenses.

15.10 Graphic Production Files

Any work under a task order which requires alteration, or adjustments to government-furnished graphic production files, or creation of a new graphic production file, shall be in accordance with this Section, 15.5, and 15.6.

15.11 Graphic Production Samples

Graphic production samples include paper proofs and material samples that represent the images, layouts, typography, colors, and output media specified. The contractor shall provide the following samples to the COR for review and approval. The contractor shall provide two complete sets of all production samples unless specified otherwise in the individual task order.

- A. Paper Proofs
 - (1) Full-size (100%) paper proofs for all graphic images and layouts in full-color and including final, high-resolution scanned images.
 - (2) Proofs that have been reviewed by the COR and require changes shall be corrected and resubmitted as revised proofs, and identified with the date of revision.

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- (3) Each sheet shall be clearly identified with the following minimum information:
 - Project Name: NPS Alpha code plus project ID; for instance, SHEN-BYRD VC
 - Date of submittal/revision
 - Exhibit GL- (layout) number(s)
 - Font(s)/point sizes(s)
- (4) For large murals, it is acceptable for the contractor to submit the proof in sections. For reference in assembling the sections, the contractor shall submit a reduced-scale print of the entire mural on one sheet, with the seams marked.

B. Production Samples

- (1) Provide full-scale graphic samples of images, layouts and output media specified. The samples shall represent all combinations of colors, typography, and types of images as they will appear in the final graphics. Minimum size of production samples shall be 11" x 17" or as specified in individual task orders.
- (2) The individual task order may also specify particular areas of exhibit graphic panels, at full scale, which the COR requires in addition to the production samples. Dimensions of these sections shall be a minimum of 12" by 12", or as specified in individual task orders.

C. Other Graphic Production Samples

- (1) For graphic prints to be mounted, laminated, overlaminated, and/or embedded, provide two 8" x 10" samples of a mounted and laminated print for each type of mounting substrate and print specified.
- (2) Dimensional letters - provide samples in specified sizes, materials, and finishes.
- (3) Cut-outs - provide samples showing a portion of the image at full scale with final thickness and edge treatment represented, in sizes as specified in the individual task order.
- (4) Braille and raised tactile graphics - Provide production samples representing the images and layouts specified, in sizes as specified in the individual task order.

- (5) Other graphic media - The contractor shall be required to provide samples representing the specified graphic in its final output media for all specified graphics, including the non-traditional media including etched glass or metal, hand-painted graphics, ceramic mosaics, and other non-digital graphics, as specified in the individual task order.

15.12 Corrections to Digital Files and Proofs

- A. The contractor shall be responsible for the correctness of all contractor generated layouts, and to all contractor-generated changes or corrections.
- B. The contractor shall make corrections to the digital layouts and files when any of the following are specified on individual task orders:
 - (1) When text is found to be incorrect, either due to errors in the original text or in preparation of the layouts;
 - (2) When original graphics cannot be obtained or are found to be incorrect, or the use rights cannot be purchased and substitutions have to be found;
 - (3) When readability of text is found to be unacceptable and adjustments to the layout and/or font size are needed to enhance contrast between text and the background; and/or
 - (4) When color settings in digital files are inconsistent with the color specifications for each output media as specified on the government furnished color sample board and exhibit plan drawings.

15.13 Graphic Output

- A. Digital Output
 - (1) Archival Inkjet Prints - Inkjet prints on paper, fabric, scrim, and vinyl shall be archival inks at high resolution with no visible dot patterns, graining, or banding.
 - (2) Digital High Pressure Laminate - 1/16" (1.5mm) to 1" (25mm) in thickness, as specified in the individual task order, with a black solid phenolic resin core and a matte finish, as manufactured by:

Fossil Industries, Inc.
44 Jefryn Boulevard
Deer Park, New York 11729
800-244-9809
www.fossilinc.com

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iZone/Blind Dog
2526 Charter Oak Dr., Suite 100
Temple, Texas 76502
888-464-9663
www.izoneimaging.com

- (3) Fused polycarbonate graphic panels, in thickness as specified in the individual task order, as manufactured by:

Aardvark Graphic Solutions, Inc.
1400 South Lipan Street
Denver, Colorado 80223
303-282-6695
www.rhinopanel.com

B. Screen Printing

- (1) Durability - The contractor shall determine, through manufacturer's specifications and testing, which type of screen printing ink is 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, and 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 prior to screen printing.
- (2) 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, and other images used in a "set" shall be consistent throughout the exhibit.

C. Cut-out Letters

- (1) Surfaces and all edges shall be smooth and free of imperfections. Finish coatings shall be consistent in color, and match approved sample submittals.
- (2) All letters shall be provided with mechanical fastening hardware (such as mounting pins) as well as adhesives, for securing the letter to the substrate. All hardware and adhesives shall be hidden from view when the letters are mounted.

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- (3) Mounted letters shall be correctly aligned and spaced horizontally and vertically for the font size and type specified. The contractor shall create a template to align the letters based on a printout of the type at the comparable size.

D. Cut-out Graphics

- (1) The following methods of fabricating cut-out graphics are acceptable. Other fabrication methods shall be in accordance with production samples reviewed and approved by the COR:
 - Digital high pressure laminate panels with a thickness of ½" thick, or thicker, with a solid black phenolic resin core; or
 - Fused polycarbonate panels, with a thickness of ½" thick.
- (2) The cut out image shall follow the crop lines as specified on the graphic references. All edges and back shall be smooth and finished.

E. Flip Books and Lift-and-Drop Panels

- (1) Digital high pressure laminate panels shall be the default standard material for flip books, lift and drop graphic panels, and other similar low-tech interactive graphics which are moved by the visitor and need to be rigid and durable. Panel thickness and associated hardware shall be in accordance with reviewed and approved fabrication drawings.
- (2) Flip book page holes or slots shall be placed outside the image area of the flipbook page. For a three-ring flip book with holes 1/2" wide by 3/8" high, stagger the holes so that the top hole is 3/32" further in from the edge than the center hole and the center hole is 3/32" further from the edge than the bottom hole. This is to allow the hole or slot to be big enough for ease of movement and yet the page will hang straight and not pull downward at the bottom right corner while at rest.
- (3) Provide tabs on each flip book page, and provide handles on lift-and-drop panels which are in accordance with the principles of universal design. According to this principle, it should be easy for a visitor to operate the interactive exhibit with a closed fist, and not have to grab, pinch, or hold with the fingers and thumb.
- (4) Hinge hardware or other mechanism or parts associated with the flip book shall not cause pinching of the user's fingers or have any sharp edges or corners.

15.14 Image Quality

- A. Contractor Inspection and Acceptance - All government-furnished source material shall be inspected by the contractor for final determination as to its acceptability and use as intended output media. If the source material is found to be unacceptable, the contractor shall notify the COR prior to processing or using the material, as specified in this Section, 15.8.
 - (1) Digital Scans - The contractor shall provide scans of non-digital media as specified in the individual task order. The contractor shall scan artwork, photographs, and other material at the resolution recommended for the particular output device used, based on the final size and detail of the image, and in accordance with this Section, 15.6.
 - (2) Digital Output - Colors in the final image shall match color samples, original artwork, or photographic images. The contractor shall save the original scan on digital storage media in accordance with this Section, 15.5.

- B. Quality Control - The contractor shall be responsible for the quality and durability of images produced and installed. The contractor shall bear the costs associated with replacement or repair of those graphics that are unsatisfactory after installation because of defects in workmanship, improper fabrication techniques, use of inferior or incorrect materials, and improper handling, mounting, or installation.

- C. Image Quality - The following are required for acceptable graphic output media:
 - (1) Size - The contractor shall adjust cropping of images to achieve a correct finished size, for subject matter, and for best overall composition. Seams shall be located away from text and important images. The contractor shall allow for necessary bleed and trimming.
 - (2) Color - Prints and transparencies shall have high color saturation and correct color balance, and all colors shall match consistently from panel-to-panel.
 - (4) Consistency - The contractor shall ensure consistency of panels that are part of a group.
 - (5)
 - (a) Murals and Multi-Panel Images - Images that are mounted on more than one panel shall line up exactly from panel-to-panel. All colors and tones shall remain consistent. Seams shall be equally spaced and shall occur so that all panels that make up the mural are equal width; as an exception, the outermost panels may be narrower in width as long as both outer panels are of equal width.

Seams shall not occur through text that is part of the printed panel, nor through significant details in graphic images that are part of the printed panel.

- (b) Panel Groups - Panels of the same output type that form part of an exhibit grouping shall be made consistent in color balance, tones, contrast, and mounting methods, unless specified otherwise in individual task orders.
- (c) Backlit Graphics - The contractor shall ensure evenly balanced backlighting of display transparencies, including proper diffusion sheeting, control of lighting intensity, and even distribution of lighting across all areas of the image.

15.15 Mounting and Overlaminating

Graphics images and layouts that are output on paper, including digital inkjet prints and prints on photographic paper, shall be mounted on a rigid and stable support substrate, and shall be covered with a clear overlaminate layer to protect them from minor physical damage and ultraviolet light. The following mounting methods are acceptable:

- A. Mounting Support - Anodized aluminum shall be used as the graphic support, to provide corrosion resistance and dimensional stability. 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 the edges.
- B. Mounting Film - Use the cold roll lamination method and MACtac Permacolor®, Permatrans® Mounting Film, IP2101 Series, to mount prints to anodized aluminum. MACtac products are manufactured by:

Bemis Company, Inc.
One Neenah Center, 4th Floor
P.O. Box 669
Neenah, Wisconsin 54957-0669
920-727-4100
www.mactac.com

Mount prints in accordance with the manufacturer's specifications. Print shall be securely mounted to substrate surface, free from wrinkles, blisters, scratches, rips, tears, adhesive residue, or other imperfections. Trim print 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 print shall remain flat, true, and even after mounting.

- C. Protective Overlamine Film - Use the cold roll lamination method and MACtac Permacolor® Permagard® IP7301 Series, Lustre finish, to apply a clear, protective coating to the mounted print. Apply the overlamine so that it is wrapped around the print and aluminum sandwich and adhered to the back of the aluminum substrate for a minimum two inch overlap. All aluminum and print edges shall be trimmed clean and square prior to application of overlamine. The contractor shall follow all manufacturer's recommendations to ensure a continuous bond free of bubbles, scratches, dirt, and indentations. The overlamine film surface shall be protected from indentations, scratches, and impressions from handling, packing material, and transport prior to installation of the exhibit.
- D. Subsurface Mounting to Non-Glare Acrylic or Polycarbonate
- (1) Mount the print using MACtac Permacolor®, Permatrans® Mounting Film, IP2101 Series, in accordance with the manufacturer's specifications. Print shall be securely mounted to substrate surface, free from wrinkles, blisters, scratches, rips, tears, adhesive residue, or other imperfections. Bevel all edges at a 45° angle or round off edges, whichever is specified in the drawings. Polish all edges and ease all sharp corners.
 - (2) Subsurface Mounting for Non-Flat Mounting Configurations – Graphic prints to be mounted to curved surfaces and cylinders shall be mounted as follows unless specified otherwise on the drawings or in individual task orders: Subsurface mount graphic to MACtac PermaFlex® IP6000 Lustex®, 15 mil, with pressure-sensitive adhesive on one side and low-gloss textured surface. Follow all manufacturers' recommendations for laminating of the graphic, temperature and humidity ranges, bending radius, and other factors so as to maximize the exhibit's durability during the life of the exhibit. It is recommended that the edges of a curved graphic be enclosed or protected by a molding or frame.

15.6 Application to Exhibit Structure

- A. The contractor shall apply finished graphics to, or install on, exhibit structures and panels as specified on the drawings. Exact measurement and precise alignment shall be required. Seams between panels of multi-panel graphics shall be flush and tight, with no gaps or inconsistencies. Images shall line up precisely from one panel to another.
- B. The contractor shall attach graphics to exhibit structures in accordance with reviewed and approved fabrication drawings and sample submittals. Unless specified otherwise in the individual task order, the contractor shall use a combination of concealed mechanical fasteners and adhesives to attach mounted graphic panels to the exhibit structure. Acceptable mechanical fasteners include pinch cleats, "z-clips", or concealed screws.

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Acceptable adhesives include 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

Apply tape along the perimeter of the rear of the substrate, one inch in from the edge, with another strip across the middle at the widest point, and others as needed. Use 1/16" thick x 1" wide tape, or width and thickness sufficient to support the substrate as recommended by the manufacturer. For panels requiring additional support due to weight or curvature, apply beads of low-VOC construction adhesive with caulk gun in areas in-between tape.

Image Files (continuous tone or raster files) shall be structured according to their specific use during the exhibit development process. A separate folder shall be used for each file type, and each file shall be named to correspond with the image identification number assigned in the Content Management Database. The file types include:

- (a) Raw Image Files - Unimproved scan files, supplied files, and digital camera raw files (in Adobe DNG format). These files may be 16 bits per channel or 8 bits per channel RGB.
 - File names shall follow the format: **IM-00-000Raw**. The appropriate file extension shall be appended to the file name.
- (b) Working Image Files - Layered PSD files (Photoshop native file format). These are the files in which all work has been done. All work shall be done in layers and shall be available for further editing. All editing functions shall be done on adjustment layers where practical. Where this is not the case, a duplicate of the original image layer shall be made and the edits shall be applied to it. These files may be 16 bits per channel or 8 bits per channel RGB, shall be scaled to final use size and resolution, and shall have the Adobe RGB 1998 profile embedded.
 - File names shall follow the format:
IM-00-000Work.psd

Section 16. REFERENCE PACKAGES

16.1 Introduction

The contractor shall prepare Reference Packages for any exhibit element that requires detailed subject matter, creative, technical, and/or artistic input to inform and direct its production by a creative or technical specialist. These elements include, but are not limited to, original artwork, sculptures, models, reproductions, dioramas, and life-sized figures.

Reference Packages are developed to provide the creative or technical specialist with critical information needed to accurately create the exhibit element. A separate Reference Package is required for each custom exhibit element that is to be produced, and for which specifications are not included elsewhere in the exhibit planning and design documents. Each Reference Package shall provide written descriptions and graphic depictions that together provide the details that are needed to produce the exhibit element.

An audiovisual storyboard is one example of an exhibit element that is specified elsewhere in the contract, and that does not require a separate Reference Package.

Requirements for Maps are specified in Section 26, Maps. Reference Package requirements for other types of elements are detailed below.

16.2 General Requirements

The Reference Package shall contain a description of the work to be performed, and samples of the proposed style. The contractor shall research, identify, locate, gather, originate, and validate reference materials necessary to develop an accurate depiction of the subject matter. At a minimum, the material shall contain a narrative description of design and interpretive intent, final production specifications such as final size and required resolution, examples, and samples of style. Other visual materials include documents and photographs that will serve the purpose of developing the exhibit elements by showing a representation of the item, and its color, size, shape, and accurate positioning. The contractor shall provide all detail in the Reference Package needed to communicate design intent.

The contractor shall develop a Reference Package for each unique exhibit element. This is the default requirement for all task orders, unless otherwise specified.

16.3 Specific Requirements

A. Specific Requirements for Illustrations and Artwork

The Resource Package shall include the following:

- (1) Intent, purpose, and message to be communicated.

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- (2) Samples of proposed style.
- (3) Time period.
- (4) Location.
- (5) Subject matter and content intent.
- (6) Season, time of day and lighting intent.
- (7) Common and scientific name, gender, stage of life, size, and pose for animals included.
- (8) Common and scientific names and size of plants, fungus, and other organisms included.
- (9) Name or identity of specifically known people to be depicted.
- (10) Age, gender, ethnicity, hair and eye color, size and stature, pose, style of clothing and associated accoutrements for people to be illustrated.
- (11) Size, materials, architectural features and perspective of buildings or structures to be included.

B. Specific Requirements for New Photography.

The Reference Package shall include the following:

- (1) Intent, purpose, and message to be communicated.
- (2) Location and contact information for staff at the location if needed.
- (3) Samples of proposed style.
- (4) Subject matter.
- (5) Season and time of day.
- (6) Lighting intent.
- (7) Art direction.
- (8) Photographic media required (i.e., color, black and white, over- or underexposed, other special effects, minimum film format requirements, minimum digital requirements).
- (9) Final size that the image will be used in the exhibit.

- C. Specific Requirements for Natural History Models
- (1) The Reference Package shall include the following specifications for the characteristics of the specimen:
 - (a) Common and scientific name of specimen.
 - (b) Sex, stage of life (larva, juvenile or adult).
 - (c) Size.
 - (d) Pose.
 - (e) Season if it affects the appearance.
 - (f) Associated elements, such as habitat pieces.
 - (2) The Reference Package shall specify the following about the production:
 - (a) Style of model, such as photographs of the desired style.
 - (b) Proposed fabrication technique.
 - (c) Finish treatment: monochrome, duotone, integral color, or realistically surface colored.
 - (d) Details of attachment, placement, and integration with other exhibit components, such as copies of the exhibit design drawings that refer to the model.
- D. Specific Requirements for Architectural and Other Cultural History Models
- (1) The Reference Package shall include the following information for the characteristics of the item:
 - (a) Size.
 - (b) Shape.
 - (c) Placement.
 - (d) Materials, textures.
 - (e) Associated elements.

- (2) The Reference Package shall specify the following about the production:
 - (a) Style of model, such as photographs of the desired style.
 - (b) Proposed fabrication technique.
 - (c) Finish treatment: monochrome, duotone, integral color, or realistically surface colored.
 - (d) Details of attachment, placement, and integration with other exhibit components, such as copies of the exhibit design drawings that refer to the model.

E. Specific Requirements for Life-Sized Figures

- (1) The Reference Package shall include the following specifications and references for the characteristics of the person:
 - (a) Name or identity if specifically known.
 - (b) Age, gender, ethnicity, hair and eye color.
 - (c) Size and stature, including height and weight.
 - (d) Pose.
 - (e) Time-period and style of clothing.
 - (f) Hairstyle.
 - (g) Associated Accoutrements.
- (2) The Reference Package shall specify the following about the production:
 - (a) Style of figure, such as photographs of the desired style.
 - (b) Proposed fabrication technique.
 - (c) Finish treatment: monochrome, duotone, or realistically colored.
 - (d) Clothing treatment: cast clothing or natural textile fabric.
 - (e) Details of attachment, placement, and integration with other exhibit components, such as copies of the exhibit design drawings that refer to the life-size figure.

- F. Specific Requirements for Dioramas
- (1) The Reference Package shall include the following specifications and references for the characteristics of the diorama:
 - (a) Common and scientific name, sex, stage of life, size, and pose for each animal.
 - (b) Common and scientific name, size of plants, fungus, and other organisms.
 - (c) Physical and spatial relationships between specimens and their habitat.
 - (d) Season.
 - (e) Associated elements.
 - (2) The Reference Package shall specify the following about the production:
 - (a) Style of model, such as photographs of the desired style.
 - (b) Proposed fabrication technique.
 - (c) Finish treatments.
 - (d) Details of attachment and integration within the diorama and with other exhibit components.
- G. Specific Requirements for Reproduction Historic Objects
- (1) The Reference Package shall include the following information for the characteristics of the object:
 - (a) Dimensions.
 - (b) Weight.
 - (c) Placement.
 - (d) Materials and construction/fabrication method.
 - (e) Associated exhibit elements, reproduction historic objects, accessioned objects, or non-accessioned objects.

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- (2) The Reference Package shall specify the following about the production:
 - (a) Appearance and style; include photograph of original object, or contemporary period photographs, drawings or illustrations of prototype.
 - (b) Justification or evidence for use.
 - (c) Proposed fabrication technique.
 - (d) Details of attachment, placement, and integration with other exhibit components.
 - (e) Source for non-custom elements (for example, hardware source for custom furniture).

- H. Specific Requirements for Historic Objects (Accessioned or Non-accessioned)
 - (1) The Reference Package shall include the following information about the object:
 - (a) Dimensions.
 - (b) Weight.
 - (c) Placement.
 - (d) Description, including materials and construction method.
 - (e) Associated exhibit elements, reproduction historic objects, accessioned objects, or non-accessioned historic objects.

 - (2) The Reference Package shall specify the following about the recommended object:
 - (a) Appearance and style; include photograph of original object or contemporary period photographs, drawings, or illustrations of object.
 - (b) Justification or evidence for inclusion.
 - (c) Source; include catalog information if located in park collection. Include catalog and contact information if located in another collection or with a dealer.

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- (d) Details of placement and integration with other exhibit components. Include security, lighting, environmental, and mounting requirements.
- (e) Conservation requirements or conservation assessment needed.

Section 17. USE RIGHTS AND LICENSES

17.1 Introduction

The contractor shall procure and obtain existing images and other third party intellectual property to be used in the interpretive media. Acquisition of this content, including all required signed license agreements, typically occurs during the Production Documents phase, but identification of the content to be acquired and confirmation that the appropriate terms and conditions are available is required in the Design Development Phase.

17.2 General Requirements

The contractor shall acquire all images and other content identified in the Content Management reports with the appropriate terms, conditions, and rights for all interpretive media. (See Attachment F., *Intellectual Property Guidelines for Harpers Ferry Center Interpretive Media*.)

All content shall have the appropriate documentation of the associated use rights. Any content requiring a license or permission shall have the signed license agreement or grant of permission to use. If the same image is used for multiple purposes in the exhibition, then the contractor shall obtain the number and type of permissions required. All open source or public domain sources shall come with documentation reflecting the open nature of the content. Content from Internet sources, such as flickr or Wikipedia, require documentation that it is open source, or, if not, signed license agreements from the owner. Contractors shall not assume that government-furnished images or other project planning partners are copyright-free; contractors shall verify each source and its copyright status. For images showing children where they are clearly identifiable, the contractor shall obtain permission for their use.

A. General Use

The contractor shall acquire all needed content with a signed license agreement which clearly indicates that the contractor is acquiring the rights on behalf of the National Park Service. The license agreement shall provide the appropriate use rights for all approved content which shall be in accordance with and pursuant to Section G, FAR 52.227-17, Rights in Data – Special Works, and also FAR 52.227-18, Rights in Data – Existing Works. Unless otherwise specified in an individual task order, the minimum requirements for all licensed content are one-time, nonexclusive use rights for the lifetime of the project to display publically and display on the internet.

B. Special Uses

Individual task orders may specify special circumstances that require additional use rights (for example, use in a sales item). In this case the contractor shall acquire additional rights that are consistent with the intended use of the content. The acquisition of these use rights shall be in addition to the minimum rights specified above unless otherwise specified in the task order.

C. Acquisition not Required

Individual task orders may specify the image acquisition is not required. In this case, the contractor is still required to identify the needed content, confirm that the appropriate use rights are available and estimate the acquisition costs for inclusion in production/fabrication budgets as necessary.

17.3 Specific Requirements

A. Design Development

In the DD II Content & Specifications Package, the contractor shall complete all data fields for media elements as specified in Section 11, Content Management. For Images requiring acquisition, this includes identifying the copyright owner, and information regarding any licensing restrictions (for example, credit requirements, cropping, and any additional restrictions).

For all other content requiring acquisition (such as the rights to reproduce excerpts from copyrighted written works), the contractor shall document any licensing restrictions, including length of use, cropping restrictions, or credits required, in the “notes” field of the respective Exhibit Element Data.

B. Production Documents

The contractor shall acquire all images and other third party intellectual property, and update all data fields for media elements, as required during Production Documents I.

By Production Documents II, the contractor shall prepare a Use-Rights Documentation Package consisting of the following:

- (1) Cover page titled “Use-Rights Documentation Package,” name of park, name of project, and document issue date.
- (2) Images Schedule.

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- (3) For each image used, the image's facsimile with associated Element Identification Number(s), and signed original license agreement.
- (4) For all other content requiring acquisition, their exhibit Element Identification Number and associated signed original licensing agreements.

Section 18. OBJECT PRESERVATION AND PROTECTION

18.1 Introduction

The mission of the National Park Service is to “preserve unimpaired the natural and cultural resources” left in our care. Owing to the nature of our exhibits and the importance of the artifact resources we may choose to place in those exhibits, NPS conservation standards are designed to provide maximum practicable preservation for these materials while on display.

Conservation concerns should be integrated into the exhibit plan early. Sufficient time and resources shall be identified in the project schedule and budget to address artifact related issues.

Objects in exhibitions are categorized based on their required level of protection as follows (also see Section 1. Definitions):

- A. **Accessioned Objects (often referred to as “artifacts”)** are cataloged items from NPS resources or loan items from other museums, historical associations, libraries, etc. and 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. They include man-made historic objects, original documents, and natural history specimens that have been accessioned into the park’s collection.

Accessioned Objects shall be handled, mounted, and installed in accordance with the guidelines contained in this Section.

- B. **Non-Accessioned Objects** are antiques or other original objects displayed in an exhibition that have not been accessioned into a park or other institution’s collection. The level of preservation and protection given non-accessioned objects shall be determined by the park on a case-by-case basis, ranging from the same level provided accessioned objects to that of a consumable reproduction or prop.
- C. **Reproduction Historic Objects, 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 Section, but shall be mounted and installed in accordance with fabrication details approved by the COR as specified in Section 13, Exhibit Drawings. See also, Section 16, Reference Packages.

18.2 General Requirements

Provide design and fabrication of artifact cases, artifact mounts, and installation of artifacts into exhibit cases as follows:

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- A. Travel to the park, Harpers Ferry Center Conservation Lab located in Charles Town, West Virginia, and/or other locations as specified in individual task orders, to inspect, measure, photograph, and produce templates needed for artifact mount production.
- B. Handling procedures shall be approved in advance by the object curator and the COR for artifacts that 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 COR.
- D. Ensure fit of all artifacts within the casework as designed by review of artifact dimensions and adjustments to casework dimensions as required.
- E. When specified in individual task orders, the contractor shall be responsible for storage of replaceable objects at the contractor's facility during the fabrication process, and for transportation of the objects to the installation site.
- 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. Provide and install silica gel humidity ballast into artifact cases.
- K. Adjust lighting on artifacts and test light levels to ensure foot candle limits are not exceeded.

18.3 Artifact Stewardship

A. Damage

While in the contractor's possession, and while handling artifacts, the contractor shall exercise extreme care and abide by the Specifications set forth in this Section. Should the contractor break, chip, fracture, scratch, or otherwise damage any artifact, the contractor shall immediately notify the COR. 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 the 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 accessioned objects 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.

D. Transport of Objects

(1) The contractor shall only transport replaceable objects to the installation site that were stored at their facility during fabrication of the exhibits. The government will provide transportation of accessioned objects to the installation site.

(2) Shipping of Objects from the Government to the Contractor

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 COR 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 the following address or as specified in individual task orders:

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

(3) Shipping of Objects from the Contractor to the Government

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. The object(s) shall be returned to the address listed in individual task orders. For shipping packages to the Harpers Ferry Center's Registrar's Office, the address is as follows:

National Park Service
Harpers Ferry Center
Office of the Registrar, Room 141
31 Maple Tree Drive
Charles Town, West Virginia 25414
304-535-6716

E. 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, lint-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.
- (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 if 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 COR.

18.4 Artifact Case Fabrication

A. Review and Approval

The contractor shall provide submittals for review and approval to the COR prior to fabrication of artifact cases. Submittals shall detail the technical design of artifact cases, and all structures and equipment to be installed inside artifact cases, including:

- (1) Fabrication drawings - In accordance with Section 13, Exhibit Drawings.
- (2) Artifact case gasketing - Samples of actual gasketing proposed for use shall be submitted to the COR for laboratory testing by the NPS for outgassing of volatile compounds. A minimum lead time of six weeks shall be allowed for the testing in the production schedule. If the gasketing requires use of an adhesive backing, this will need to be tested also.
- (3) Artifact case interiors: materials and finishes - In accordance with Section 14, Material, Color, and Finish Specifications. In addition, materials as specified in the Individual task order, such as fabrics proposed for use in the interior of the case, shall be submitted for laboratory testing by the NPS for outgassing of volatile compounds. A minimum lead time of six weeks shall be allowed for the testing in the production schedule.
- (4) Catalog Cuts - Catalog cuts shall be submitted to the COR for review and approval. At a minimum, the catalog cuts shall include the following:
 - (a) Locks;
 - (b) Hinges, latches, and other specialized hardware;
 - (c) Ventilation fans and associated grilles or screens;
 - (d) In-case lighting, in accordance with Section 23, Exhibit Lighting;
 - (e) Glazing; and
 - (f) Security devices, dataloggers and other specialized equipment included in the contractor's scope of work.

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- B. 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.
- (1) Artifact Case Crack and Gap Sealant - To ensure a tight seal, fill all seams which could allow air exchange with outside air using silicone, acrylic latex, or acrylic latex silicone caulk which meets the following criteria:
 - (a) Neutral curing - It does not emit acetic acid during curing; and
 - (b) Low VOC - It has a low VOC (volatile organic compounds) rating of no more than 50g/l (50 grams per liter).
 - (2) Gasketing -
 - (a) The gasket chosen for the case shall be a safe material that does not outgas any volatile compounds, including its adhesive backing;
 - (b) It shall be the appropriate size and density for its channel or frame so that it compresses uniformly and provides a tight seal;
 - (c) Only compress the gaskets in one direction, to achieve a well-sealed case;
 - (d) Use tube gaskets to seal mechanical fasteners that penetrate the case; and
 - (e) For hinged doors: where possible, use a continuous gasket set into a channel with rounded corners; place gaskets as far as possible away from the pinch area of the hinge.
 - (3) Paint - For painted surfaces inside the artifact case, use paints with a low VOC rating of no more than 50g/l (50 grams per liter).
 - (4) 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.

- C. 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. Materials, finishes, and fabrication methods for areas of the case containing silica gel ballast, or any other areas exchanging air with the artifact chamber, shall be fabricated in accordance with the same requirements for the artifact chamber.
- D. Artifact Case Pedestals - Unless specified otherwise in the individual task order, artifact case structures, pedestals or platforms for use inside artifact cases shall be fabricated using Medite II, industrial grade medium density fiberboard (MDF) manufactured with a formaldehyde-free binder which meets the requirements of ANSI A208.2-2002. 6.

18.5. Silica Gel - As specified in Individual task orders.

18.6 Artifact Mounts

- A. General - The contractor shall use the same type and quality of materials for mounting accessioned objects and non-accessioned objects.
- B. Mount Design
 - (1) Mount Design Drawings - The contractor shall provide drawings of proposed mounts for artifacts to the COR for review and approval prior to fabrication. 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 shall be used for multiple artifacts, the contractor may submit a typical drawing that identifies the artifacts referred to by number.
 - (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.
- C. Mount Guidelines - Mounting design and materials shall be in accordance with this Section.
 - (1) 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.
 - (2) 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.

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- (3) Fastening system shall be based on mechanical design; it shall not rely on adhesives to support the mount or artifact.
- (4) Mounts shall be designed to minimize vibration and abrasion.
- (5) Where feasible, mounts shall help protect artifacts from theft.
- (6) 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.
- (7) 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.
- (8) Mounts shall not utilize fabrics or materials that contain unstable dyes which could transfer colorants to artifacts.
- (9) Sharp edges shall be removed from materials in close proximity to the displayed artifacts.
- (10) 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.
- (11) Clamps and brackets shall be padded with non-abrasive, inert materials.
- (12) Replacement mounts shall be of the like kind and materials unless otherwise specified on the drawings.

D. Mount Fabrication

- (1) Artifact mount material submittals - Materials proposed for fabrication of artifact mounts shall be submitted as specified in individual task orders. If also required in individual task orders, the contractor shall submit samples of artifact mount materials to the COR for laboratory testing to determine if it is safe for its intended use. A minimum lead time of six weeks shall be allowed for the testing in the production schedule.
- (2) 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.

18.7 Installation

- A. **Handling** - Handling of artifacts at the installation site shall be in accordance with this Section, 18.3 Artifact Stewardship, E., Artifact Handling.
- B. **Site Conditions** - Provide a clean, undisturbed work area at the exhibit site away from visitor access and any conditions that could be harmful to the artifacts, such as extremes of temperature and humidity, direct sunlight, smoke, and materials unsafe for direct contact. Coordinate with the COR and the park for use of a climate-controlled room close to the exhibit room for this purpose. The contractor shall be responsible for all furnishings, equipment, and tools required for their on-site workstations.
- C. **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 COR 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.
- D. **Installation of Silica Gel** – If specified in the individual task order, the contractor shall furnish and install silica gel humidity ballast.
 - (1) Humidity level - The silica gel shall be conditioned to the specified relative humidity level, 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.
 - (2) Quantity - The required quantity per case, packaged in bags or containers which will fit the silica gel chambers in accordance with reviewed and approved fabrication drawing.
 - (3) Air flow - The contractor shall ensure that the silica gel packaging system and the quantity of silica gel packages installed are compatible with the silica gel chamber. There shall be adequate space for the required quantity of silica gel packages and allow maximum air flow through the silica gel material and with the artifact chamber, in accordance with the manufacturer's recommendations.

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- E. **Artifact Case Lighting** – Unless otherwise specified in individual task orders, the contractor shall aim and adjust all lighting on artifacts in accordance with required footcandle levels furnished by the COR 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.

- F. **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. Do not open and clean the case during or after other work that may raise dust levels in the vicinity of the case, such as vacuuming or dusting of adjacent exhibit structures.

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.

Section 19. AUDIOVISUAL AND COMPUTER ELEMENTS – SOFTWARE

19.1 Introduction

Traditional audiovisual (AV) presentations include linear programs with fixed running times. Through the use and/or integration of numerous elements such as sound effects, music, voice-overs, interviews, moving and historic images, AV programs can be innately dynamic. They are especially effective in eliciting emotional responses, telling stories, and conveying concepts where motion and/or sound are important or particularly effective.

Computer interactive (or multimedia) programs are often non-linear. They encourage users to become engaged through interaction, exploration, and learning at their own pace and may include multiple layers of information. In an exhibit setting, AV and computer interactive elements may also interact with other exhibit elements, such as programmed lighting and electromechanical devices.

The terms “software” and “programs” are used interchangeably to describe the media content, format, and control code used in AV and computer interactive elements, including audio and video programs and computer software. “Equipment” refers to the electronic equipment used to play a program.

Each exhibition, its content, and presentation is custom designed. The extent to which traditional audiovisual programs and computer interactive programs are proposed and utilized will determine when and what kind of deliverables are required. In an exhibition where these elements are a driving force in the presentation, it is important for AV and computer specialists to be involved early in the planning and design process and for early planning documents to describe the programs in greater detail.

Equipment and software components need to be carefully coordinated to ensure an effective presentation. Equipment compatibility relative to the designer’s vision is a critical element even in the early stages of the design. Audiovisual and Computer Elements - Equipment specifications are detailed in Section 20.

Specifications for the conceptual development of audiovisual and computer interactive programs used in exhibits are stated below. These specifications shall apply to work performed by exhibit planning and design contractors and their subcontractors. In addition, for task orders that include production of completed audiovisual or computer interactive programs, specifications included in the most recent version of the following document at the time of contract award shall apply:

National Park Service Standard Specifications for Audiovisual Production and
Multimedia Planning, Design and Production Services with Installation

19.2 General Requirements for Initiating Planning and Design of Software

No later than the Design Development I phase of work, the contractor shall develop and present an overall AV strategy for the exhibition. This strategy shall be based on the contractor's planning and research for the proposed AV elements and shall include:

- A. Description of how AV content will be integrated with the rest of the exhibition to reinforce the interpretive message, including an explanation of the interpretive purpose of the AV elements and any advantages or disadvantages of using AV instead of other media for this purpose.
- B. The target audience and proposed style of presentation for the AV elements.
- C. An overview of existing resources and new material necessary to create the programs including, but not limited to, historic images, archival film footage, oral history interviews, quotations, new film footage, reenactments, custom photography, animation, graphics, illustrations, music, and sound effects. The contractor shall include a detailed listing of resource information in the Resource Package. ([see Section 10, Resource Packages](#))
- D. Proposed playback formats in order to evaluate potential production paths, and for coordination with equipment specifications.
- E. Description of the physical integration of AV elements with the rest of the exhibition, including strategy for limiting sound spill, requirements for light control, and maintaining a comfortable flow of visitors through the exhibition space.
- F. Description of the accessible components of all AV software, such as captioning, audio description, assistive listening, and navigation of interactive programs by people with visual impairments. ([see Section 8, Accessibility](#))
- G. Cost estimate for the proposed AV software elements, to be included within the Class B Production Cost Estimate for the exhibition. ([see Section 6, Production Cost Allowances/Estimates](#)).

19.3 Specific Requirements for Exhibit Video and Audio Programs

- A. Unless otherwise specified in individual task orders, the contractor shall describe each audio and video program in the exhibition no later than the Design Development I phase of work, and prepare and submit a Treatment for each audio and video program in the exhibition no later than the Design Development II phase of work. The Treatment, in both general terms and by specific example, shall provide sufficient detail to provide a sense of the proposed production, and shall be suitable for use as a working model from which a production plan and script can be written. Each Treatment shall include:

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- (1) A complete overview of the proposed production's creative approach and storyline. In narrative form, the Treatment shall include a description of the actors and/or participants, their roles and general dialogue or narration, and a general description of the scenes, locations, graphics, artwork, animation, and audio elements to be used in the production. Sketches or storyboards shall be included, if necessary, to communicate the creative approach and storyline.
 - (2) The total running time for the program, based on the following guidelines:
 - (a) Programs located within an exhibit area without visitor seating shall be limited to three-minutes or less unless otherwise approved by the COR.
 - (b) Programs located within an exhibit area with visitor seating shall be limited to eight-minutes or less unless otherwise approved by the COR.
 - (c) Programs located in dedicated mini-theater areas within the exhibition shall be limited to 15-minutes or less unless otherwise approved by the COR.
 - (d) Audio soundscapes, video imagery without a storyline, and similar continuously running, mood setting AV elements shall be of sufficient length to avoid appearing repetitious or annoying.
 - (3) Description of how the program content shall be made accessible to visitors with visual or hearing impairments.
 - (4) Description of the proposed playback equipment, including screen size, resolution and type, audio system details (i.e., mono, stereo, surround-sound, handsets).
 - (5) Description of the proposed control system and equipment (i.e., continuously running, staff activated, visitor activated, automatic sensor).
- B. Source information for critical video, graphic, and audio elements that are essential to the successful production of the program shall be attached to the Treatment.
- C. A cost estimate for the program shall be included within the current Class B Production Cost Estimate for the exhibition. ([see Section 6, Production Cost Allowances/Estimates](#)).

19.4 Specific Requirements for Computer Interactive Elements.

- A. Unless otherwise specified in individual task orders, the contractor shall describe each computer interactive program in the exhibition no later than the Design Development I phase of work, and prepare and submit a design for each computer interactive program no later than the Design Development II phase of work. Each program design shall include:
- (1) A graphic representation (flow chart) outlining the structure, content, and navigation of the program, including accessibility elements for users with physical, visual, hearing, and cognitive impairments.
 - (2) A general narrative of the program describing the creative approach that shall be used in developing the content and overall graphic approach. Sketches or storyboards shall be included if necessary to communicate the creative approach. The creative approach shall include descriptions of:
 - (a) Graphic elements, titles, text, 2D or 3D animation.
 - (b) User interface, navigational devices and behavior, including interface elements for accessibility.
 - (c) Attract screens, closing sequences, help screens, and credits.
 - (d) The use of music, sound effects, video, and/or narration.
 - (3) The proposed computer equipment and operating system platform for the program.
- B. Source information for critical video, graphic, and audio elements that are essential to the successful production of the program shall be included with the design.
- C. The contractor shall inform the COR of all proposed programs requiring network or Internet connectivity. Plans for such programs shall require additional review and approval by the government to ensure compliance with all network security requirements and Information Technology policies in effect at the time of submittal.
- D. A cost estimate for the program shall be included within the current Class B Production Cost Estimate for the exhibition. ([see Section 6, Production Cost Allowances/Estimates](#))

Section 20. AUDIOVISUAL AND COMPUTER ELEMENTS – EQUIPMENT

20.1 Introduction

“Equipment” refers to the electronic devices used to play video, audio, or computer programs within an exhibit. It also includes devices and systems that control multiple programs, or that interface with other exhibit elements such as programmed lighting and electromechanical devices.

AV and computer elements present an important part of the interpretive message in exhibits where they are installed; inoperative equipment severely impacts an exhibition’s effectiveness. Therefore, equipment selections should be based on the long-term requirements for the exhibit. Equipment shall be easy to operate with minimal training, and designed for long life and minimal maintenance.

Equipment and software components need to be carefully coordinated to insure that all design goals are met. Specifications for audiovisual and computer interactive software are detailed in [Section 19, Audiovisual and Computer Elements - Software](#). Equipment specifications are stated below.

20.2 General Requirements

- A. Equipment and systems shall be designed with ease of use in mind, and require minimal maintenance.
- B. The contractor shall work with the appropriate project team members to ensure that the exhibit space electrical system will accommodate all specified AV and computer equipment. This coordination shall begin at the earliest possible opportunity and continue through the duration of the project.
- C. The contractor shall inform the COR of all proposed systems that require network or Internet connectivity. Plans for such programs require additional review and approval by the government to ensure compliance with all network security requirements and Information Technology policies in effect at the time of submittal.

20.3 Specific Requirements for Design Development Phase

- A. Design Development II
 - (1) In coordination with the overall AV strategy specified in [Section 19, Audiovisual and Computer Elements – Software](#), the contractor shall identify the types of equipment that are proposed for use with each AV and computer interactive element as follows. Sizes and salient characteristics shall be identified, but specific brands and models are not required at this phase of development.

- (2) The contractor shall specify locations for all equipment, for signal and control wiring or conduit runs, for exhibit power circuits/outlets to be used by each piece of equipment, and for switch locations.
- (3) The contractor shall develop start-up and shut-down procedures for the exhibition. This shall be conducted from a single control panel or bank of wall switches, or by use of a preprogrammed timer with a manual override function and battery backup. Start-up and shut-down shall be designed for convenient operation. Controls shall have limited staff access and, preferably, shall be grouped together in one location.

20.4 Specific Requirements for Production Documents Phase

A. Production Documents I

The contractor shall provide detailed specifications for all audiovisual and computer interactive equipment in the exhibition as follows:

- (1) Specify brand name equipment that is appropriate for the application, as well as for the environmental conditions in which it shall be installed. Use industrial or commercial grade equipment. Simplify systems design by using a single brand and model for each type of equipment throughout the exhibit whenever possible. When possible, computer equipment shall be the same brand available to the government via the DOI-approved equipment list.
- (2) Specify all ancillary equipment required for a fully operational system, such as surge protectors, uninterruptible power supplies, push buttons, and motion sensors.
- (3) All equipment shall be identified by brand name and model number.
- (4) For each product specified, provide the manufacturer's technical information sheets, the manufacturer and/or supplier's address, telephone number, and information regarding accessories and additional equipment.
- (5) Special order items and items that are not normally available from a manufacturer's stock shall be clearly identified as such.
- (6) The contractor shall provide architectural specifications including, but not limited to, the number and placement of circuits, load requirements for each circuit, and the number, type, and placement for high and low voltage conduit.

- (7) Prices for all equipment shall be included within the contractor's Design Development II Class B Production Cost Estimate. In addition, the cost of one spare unit for each type of equipment shall be included in the estimate unless otherwise specified by the COR. The contractor shall also provide a life-cycle cost estimate for all equipment specified in the exhibition. ([see Section 6, Production Cost Allowances/Estimates](#)).

B. Production Documents II

- (1) The contractor shall update the AV and computer equipment specifications to reflect all changes in the project and submit the updated equipment specifications as part of the Document Preparation submittals.

The contractor shall review the availability of the approved equipment during the Production Documents phase. When previously specified equipment has been discontinued, the contractor shall specify replacement equipment by brand name and model number, and provide cut sheets that show all product specifications.

- (2) Prices for all equipment shall be included within the contractor's Class A Production Cost Estimate. In addition, the cost of one spare unit for each type of equipment shall be included in the estimate unless otherwise specified by the COR. The contractor shall also provide an updated life-cycle cost estimate for all equipment specified in the exhibition. ([see Section 6, Production Cost Allowances/Estimates](#)).
- (3) If specified in individual Task Orders, the Contractor shall provide detailed wiring diagrams for the equipment in each audiovisual and computer interactive system. Wiring diagrams shall show the precise points of connection on each piece of equipment; wiring between systems and controllers, and the interface between AV systems and lighting or other electromechanical device. Clearly identify the circuit/outlet to be used by each piece of equipment; specify the load rating for each piece of equipment, and the total load on each circuit/outlet that shall be used for powering the equipment.

20.5 Specific Requirements for Fabrication Phase

A. Submittals for Review

The contractor shall provide the submittals for review and approval in accordance with Section 13, Exhibit Drawings, 13.6, and as specified in the individual task order. Unless otherwise specified in the task order, the fabrication contractor shall provide the following minimum submittals for all audiovisual elements and integrated lighting equipment in the scope of work:

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- (1) Fabrication drawings for mounting hardware, cabinet, or enclosure of equipment;
- (2) Plan Drawings indicating locations of power sources and wiring conduits, reflecting up-to-date on-site conditions and dimensions, in accordance with Section 13, Exhibit Drawings, 13.6, A., (2).
- (3) Wiring diagrams for each system and between systems and controllers in accordance with Section 13, Exhibit Drawings, 13.6, C;
- (4) Catalog cuts for audiovisual equipment, and lighting, in accordance with Section 13, Exhibit Drawings, 13.6, C.
- (5) Audiovisual Operations Manual, in accordance with Section 29, Operational Training and References, 29.4

B. 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 manufacturers 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.necplus.org

Persons trained and experienced in the fabrication, installation, and implementation of professional audiovisual, video, sound reinforcement, cinema playback, and show control systems shall perform all assembly, fabrication, and installation work. All installation practices shall be adhered to as described in pertinent chapters of the following publications or their latest published edition:

“Audio Systems Design and Installation”, Author: Philip Giddings, Focal Press

“Sound System Engineering”, Second Edition Authors: Don and Carolyn Davis, Howard W. Sams & Co.

In addition, all requirements of the latest published edition including, but not limited to, the following shall apply unless otherwise noted. In case of conflict between cited or referenced standards, the more stringent example or standard shall apply.

- National Electrical Code (N.E.C.)
- Federal Communications Commission (F.C.C.)
- Society of Motion Picture and Television Engineers (S.M.P.T.E.)
- American Society for Testing Materials (A.S.T.M.)

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- Electronic Industries Association (E.I.A.)
- Handbook for Riggers, 1977 Revised Edition, W.G. Newberry; Calgary, Alberta Canada
- Basic Principles for Suspended Loudspeaker Systems, Technical Notes Volume 1, Number 19, JBL Professional Division

C. 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.

D. 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.

- (1) The contractor shall test all audiovisual interactive and visitor-activated audiovisual media in their shop, prior to shipment and installation at the site. The audiovisual media shall be tested on the same equipment to be installed and used for the program on-site in order to test the function of the complete integrated system.
- (2) The contractor shall test environmental conditions for all operating equipment for heat build-up, in their shop and again on-site after the equipment has been installed, but before the artifacts are installed. Test by operating the equipment for a minimum of two consecutive hours with all ventilation controls in place. Do not open and close the environment during the test; do not open the environment to read the temperature; use a sensing device inside the environment with a remote read-out.

E. Safety

On-site installation of all electrically-powered equipment shall be in accordance with Section 28, Installation, 28.5, Safety.

F. Materials

(1) Audiovisual Equipment

The contractor shall purchase and/or install audiovisual equipment as specified in individual task orders.

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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.

All materials provided by the contractor shall be new and all work completed to the satisfaction of the COR.

Government-furnished equipment shall be integrated into the audiovisual system by the contractor. The contractor shall protect all equipment against cosmetic and operational damage, and shall replace equipment damaged while in the contractor's possession.

At a minimum, the following types of equipment shall be submitted for review and approval by the COR prior to shipment and installation to the site. The contractor shall provide catalog cuts or reviews of actual equipment samples, in accordance with the individual task order.

- (a) Video monitors - display monitors, touchscreen monitors.
- (b) Digital playback equipment - equipment for playback of digital video or audio media, handheld equipment for playback of audio description files, and control equipment for playback equipment.
- (c) Computers - desktop personal computers, laptop computers, tablet computers, including accessories such as keyboards, mice, and monitors.
- (d) Audio speakers - including mounted speakers, personal handheld sound-stick-type speakers, and headphone speakers.
- (e) Equipment Racks - Standard audiovisual equipment racks shall be used any time multiple sources and processing equipment are grouped together in one location.
- (f) Lighting fixtures, lamps and accessories as specified in the individual task order and in accordance with Section 23, Exhibit Lighting.
- (g) Ventilation Fans - Fans shall be provided as necessary to vent heat out of enclosed environments in which equipment or lighting is installed. In accordance with this Section, Item J, Heat Ventilation.
- (h) Thermostats - Provide line voltage thermostat as necessary to achieve the temperature control specified under this Section, Item J, Heat Ventilation.

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- (i) Cables and connectors - audio cables, video cables, loudspeaker cables, composite video cables, data cables, and other cables as required, audio and video connectors.
 - (j) Pushbuttons - 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.
- (2) Electrical - Materials shall be new and U/L approved.
 - (a) 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.
 - (b) Conduit - All conduit shall be 3/4" electric metallic tubing unless specified otherwise.
 - (c) Outlets - Multi-outlet power strips with integral circuit breaker and grounded outlets.
 - (d) Surge Protection - Provide an electrical surge suppression system dedicated to each audiovisual system, all fiber optic illuminators, and each interactive electronic exhibit. Size the suppression device to accommodate the maximum load plus 100 percent.
- G. Audiovisual Equipment - Shop Fabrication - The contractor shall be responsible for ensuring that audiovisual equipment shall fit and operate with the exhibit structures.
 - (1) The government will ship one type of each piece of government-furnished audiovisual equipment to the contractor's facility, within two weeks after the postaward conference. The contractor shall demonstrate the fit and operation of the equipment to the COR during a site inspection at the contractor's facility.
 - (2) 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.

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- (3) The contractor shall test all audiovisual equipment to ensure operation.
 - (4) 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.
 - (5) The contractor shall ship audiovisual equipment and hardware in their possession to the park.
- H. Audiovisual Equipment - Installation - The contractor shall install all audiovisual components in the exhibits. The contractor shall connect all audiovisual components to assemble the systems and connect them to the appropriate power source. All electrical work on site shall be in accordance with Section 28, Installation, 28.5, Safety.
- (1) Installed equipment shall be easily accessible for cleaning, adjustment, replacement, and routine maintenance, have proper ventilation, and shall provide safety and convenience for the operator.
 - (2) Floor Standing Rack - Provide a floor standing metal equipment rack with locking rear door, removable vented side panels, and vented top. The contractor shall provide a rack layout for review and approval by the COR before installing equipment in the rack. Equipment not manufactured for traditional rack mounting methods shall be provided with a rack mount shelf sized appropriately for that equipment.
 - (a) Rack Power Distribution - Use switched power strips with surge suppression on the front of the racks that shall allow the audiovisual equipment to be turned off when required: Tripp-Lite IBAR-12-UL20 or approved equal. Vertical power strips shall be mounted in the back of the rack for extra outlets to accommodate all equipment mounted in the rack: Middle Atlantic PD-2415SC-NS or approved equal.

In high current or large sound systems, provide a sequential power system for rack mounted and peripheral equipment. The power system shall include a front panel mounted on/off power control for the audiovisual system. The power control shall provide electrical power first to headend equipment such as mixers, switchers, processors, and media players, and after a predetermined timed delay provide power to audio amplifiers. No single sequenced outlet shall be encumbered with more than 90% of its load rating.

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- (b) Uninterruptible Power Supply (UPS) - This is required for all video projectors, computers, and control systems unless the manufacturer specifications state that it may be shut down by a switched outlet. The UPS shall constantly protect connected equipment against brownouts and over-voltages without draining battery power. It shall provide surge suppression and noise protection.

A UPS shall be required for all other equipment in locations that are prone to frequent black-outs. Use Tripp-Lite OmniSmart or SmartPro series or approved equal.

- (3) 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 COR for review and approval.
- (4) 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.
- (5) 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 COR. 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. Unused conductors, shields, or drain wires shall be dressed under heat shrink tubing, not cut.
- (6) 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.
- (7) 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.

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- (8) 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.
- 9) Cables, except video cables, which require cutting, 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.
- (10) Cables shall not be installed with a bend radius less than that recommended by the cable manufacturer.
- (11) Cables, regardless of length, shall be marked with a unique ID number, optionally with the source and input/output port name, within three- to six-inches of both ends. There shall be no unmarked cables in the system. Marking codes used on cables shall correspond to codes shown on drawings, run sheets, and patch panels. Labels shall be any of the following styles: self-laminating; heat shrunk with electronically printed text; or, electronically printed wrap-around numbers with clear shrink wrap over them.
- (12) Terminal blocks or connectors shall be provided for all cables that interface with racks, cabinets, consoles, or equipment modules. All control panel cables shall be terminated on their own terminal strip in the rack, all bussing of the cables shall be done on the controller side of the terminal strip. Use eurostyle screw terminal strips that have captive wire retention screws with wire protectors to protect stranded wires from screw damage. All metal parts shall be recessed providing a dead front design to ensure safety and to prevent short-circuiting. Provide as required according to cable type.
- (13) Unless specified by make and model in the design package the use of gender adapters, video or audio connection adapters, and prefabricated, molded, or modular connecting cables are prohibited for use in these systems. The low quality generic cables that are shipped with players are prohibited.
- (14) Provide the audiovisual system free of artifacts such as hum, noise, or distortion of any level above that specified by the manufacturers of the equipment specified and/or provided. System components and related wiring shall be located to minimize electromagnetic and electrostatic hum, spurious oscillation, wiring length, and shall provide proper ventilation, safety, and convenience for the operator.
- (15) 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.

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- I. Electrical -
 - (1) Safety - The contractor shall perform all electrical work on site in accordance with Section 28, Installation, 28.5, Safety.
 - (2) Codes - The contractor shall obtain all requirements pertaining to the most recent state and local codes:
 - (3) 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.
 - (4) The contractor shall evaluate power supply versus power demand to determine appropriateness of existing circuits.
 - (5) It shall be the responsibility of the contractor to advise the COR if total power service requirements for any exhibit structure exceeds 15 amperes.
 - (6) The contractor shall ensure that power cables do not cause interference with audiovisual signal cables.
 - (7) Coordination - Provide secondary distribution lines and one three-prong grounded female receptacle within each applicable exhibit unit for hook-up of electrical equipment.
 - (8) 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.
 - (9) Access - Ensure serviceability to each and every piece of equipment. Provide cutouts and access panels to facilitate maintenance. Avoid alterations to exposed surfaces.
 - (10) Support - Provide 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.

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- (11) 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.
- (12) 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.

Provide battery back-up units with built-in surge protection for all fiber optic illuminators, desktop computers, and other programmed devices such as DVD and MP3 players.

- J. 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 with thermostats as necessary to prevent the equipment environment's temperature from rising above 100 degrees Fahrenheit, or above the equipment's maximum operating temperature, whichever is less.
 - (1) Fans shall be selected and installed to provide the maximum amount of airflow with the minimum amount of noise. Provide fans of type and quantity to replace the enclosed volume of air at a minimum of every two-minutes. No individual fan shall contribute more than 35 dBa of noise to the environment.
 - (2) 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.
 - (3) 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.
- K. Support Hardware - All hardware shall be of a grade equal to at least five times the rated load weight of the equipment supported.

SECTION 21. TACTILE EXHIBIT ELEMENTS AND MECHANICAL INTERACTIVES

21.1 Introduction

The use of tactile exhibit elements and mechanical interactive exhibits are important to the effectiveness of interpretive exhibits. They enhance the aesthetic appeal of an exhibit by providing dimensionality. This contributes to increased accessibility for visitors with certain disabilities and invites visitors to physically interact with the exhibit, which increases visitor interest. Mechanical interactive exhibits in particular add another level of learning through “doing” in addition to looking and reading. Some mechanical interactive elements supplement the interpretive message by discovery through activity; others are used as a tool to reveal information. Examples of mechanical interactive exhibit elements that have been used successfully in National Park Service exhibits include lift and drop exhibits, hinged or sliding doors, discovery drawers, and a roulette-style wheel.

21.2 General Requirements

When tactile exhibits and mechanical interactive exhibits are incorporated into exhibits, safety, accessibility, and durability shall be primary considerations in the design of these elements. The exhibit element must be relevant to the interpretive theme and shall enhance visitor understanding. Instructions for use of mechanical interactive exhibits shall be obvious and easily understood. Tactile and mechanical interactive exhibit shall be low maintenance except when the nature of the tactile or interactive exhibit is such that routine maintenance will be required and the requirement for such maintenance is included as part of the design proposal.

21.3 Specific Requirements

A. Safety.

Safety must be the highest consideration in the design of tactile and mechanical interactive exhibits. The design shall include details that prevent injury during use or misuse. Particular care shall be taken to prevent fingers from being pinched between closing doors or between rotating and fixed parts. Electrical components, such as light fixtures, shall be inaccessible to visitors. Cables, pulleys, and other mechanical features shall also be inaccessible, except where these are an interpretive component of the interactive design, in which case such features shall be designed so that they pose no risk of injury.

B. Accessibility.

All tactile and mechanical interactive exhibit elements shall meet accessibility requirements specified in Section 8, Accessibility, and the recommended approach to developing a tactile exhibit as described in 21.3, D.

C. Durability.

(1) Design

Tactile and mechanical interactive exhibits will endure more wear than typical graphic panels and other static exhibit structures. When designing tactile and mechanical interactive exhibits, specify materials that are appropriate for the physical environment and for the particular use intended. Specify durable, heavy-duty materials that can withstand hundreds of thousands of uses a year for years on end; always anticipate aggressive use of the exhibit. For mechanical interactive exhibits, simplicity of design with as few moving parts as possible is important.

(2) Environmental Conditions

Models and interactives in government sites are installed in a variety of types of structures and locations, many of which are historic structures, or structures lacking all modern utilities. The exhibits may be outside, exposed to sun, wind, and the weather, spray from nearby bodies of water, and so forth. It is the responsibility of the designer and the fabricator to inspect site conditions and take them into consideration when designing and fabricating a tactile model or interactive for a particular location. Factors which the designer and the fabricator shall review during their site visits include:

- (a) Physical access to the entire display: determine if there are barriers to wheelchair access to part or all of a tactile display or interactive;
- (b) Temperature range of the location: if a tactile element or interactive is placed outside, it is important to determine how hot it will get to the touch;
- (c) Harshness of the environment: particularly if the exhibit is placed outside or in a partially unprotected area. Other factors to take note of include factors requiring especially durable materials, such as a corrosive marine environment, especially harsh weather conditions, nearby blowing sand, and so forth; and
- (d) Acoustical environment: tactile exhibits often incorporate acoustical experiences. Determine the acoustical environment in which the display will be located; whether there is competing spillover from other audio program(s); Verify if there is general environmental noise; and whether it will be a problem with using speakers in this location due to echoes.

(3) Fabrication

Best practices for fabrication of more durable tactile models include the following:

- (a) Cast model as one piece, or in as few pieces as possible, to reduce seams and increase structural integrity. The visitor shall not be able to flex, wiggle, or shift any element of the model unless intended as part of an interactive experience.
- (b) Reduce or eliminate applied, glued-on, screwed-on, small elements; that can potentially be pulled off by visitors.
- (c) Heavy-duty sprayed-on clear protective coating should be applied as the final finish over painted finishes. Avoid finishes which are not fully sealed and which are not cleanable with a damp cloth. Finishes created from rough and loosely-bound together fragments of a material held together by glue tend to continuously shed this material, as they are constantly touched by visitors. It is also problematic for park maintenance crews to clean or maintain such finishes over time.

D. Interpretive Purpose.

- (1) In many instances, the interactive element supplements the interpretive message. The purpose of the interactive exercise shall be linked to the interpretive theme.
- (2) Accessibility Guidelines for the development of tactile exhibits:

Tactile elements within exhibits do not in and of themselves make the exhibit accessible. However, when planned with accessibility in mind, tactile elements provide effective communication for accessibility purposes. In particular, tactile exhibit elements convey key interpretive messages, information, and education for visitors who are blind or have low vision or learn more effectively through touch and exploration.

When considering tactile elements as a means to meet accessibility needs, the tactile elements and anticipated outcomes shall relate to the core themes and central messages within the exhibit.

For example, if an exhibit's core message is about the architecture of a historic house and the only tactile opportunities are to touch a few reproductions of decorative objects found within the house, it is doubtful that these tactile elements would convey the core messages and meanings of the exhibit. If this exhibit included a tactile floor plan and model of the house that visitors could touch in order to learn about the overall layout and architectural features of the house and are given audio navigation to guide them in their exploration, it is likely that these tactile elements will help to effectively communicate the core meanings and messages of the exhibit, particularly for visitors who are blind or have low vision.

While there is still much research to be done on the guidelines for making successful tactile exhibits for accessibility, some research has already been conducted. Acceptable guidelines follow:

- (a) One or more visually impaired consultants included on the design team to provide evaluation of the proposed tactile exhibit's ability to communicate clearly to visitors who are blind or have low vision.
- (b) The inclusion of tactile exhibit elements as an integral part of the exhibit design shall be introduced as early as possible in the exhibit planning and design process and not addressed later as an after-thought.
- (c) The use of touch and tactile exhibit elements shall be recognized as a part of a natural multi-sensory learning strategy that people of all ages use. Touch is one of our most basic learning tools, but it is frequently overlooked.
- (d) Tactile exhibit elements include a descriptive audio component which is hands-free.
- (e) In most instances, a visitor should be able to explore an entire tactile piece while standing in one spot, which gives an overall dimension **not to exceed 36" wide by 30" deep**. The size and placement of the exhibit shall allow tactile exploration with both hands, and include an audio track and a tactile key to the map.
- (f) A person who is blind or has low vision will receive the clearest mental image of the object being represented by the model if the model is as close to the full three dimensional shape of the real object as possible.

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- (g) Texture can be used to represent the concept of color or a pattern. For example, a tactile representation of our nation's flag would include three different textures for red, white, and blue. The audio description and a color key should clearly explain the textures.
- (h) Tactile exhibit elements should follow the guiding principles of Universal Design:
 - (1) Useful for people with diverse abilities;
 - (2) Accommodates a wide range of preferences and abilities;
 - (3) Simple and intuitive to use;
 - (4) Communicates perceptual information regardless of the ambient conditions or the users sensory abilities;
 - (5) Has no moving parts that are hazardous to use;
 - (6) Can be used with a minimum of effort; and
 - (7) Easy approach and use regardless of the user's body size, posture, or visual acuity.

E. Visitor Instructions.

The contractor shall provide instructions for use of the mechanical interactive exhibit, either as a stand-alone text or graphic element or as part of the broader interpretive text. Where safety instructions are warranted or required, the safety instructions shall be separate and distinct from any other instructions or interpretive messages.

F. Tactile Maps - See Section 26, Maps.

G. Maintenance.

Tactile and mechanical interactive exhibit elements shall be designed to require minimal maintenance other than cleaning. Exhibits that require frequent lubrication, alignment, tightening of parts, or replacement of parts are generally inappropriate for most National Park Service sites.

The contractor shall design an "Out of Service" sign, or similar, for each mechanical interactive element in the exhibit, taking care that each sign can be secured and removed repeatedly to the specific interactive element for which it is intended. Wherever possible, the sign shall convey the notice as an interpretive message that follows the thematic intent of the exhibit.

H. Life-cycle Cost.

The contractor shall estimate the useful life span of each tactile and mechanical interactive exhibit element, considering the estimated visitation, the type of use, and other considerations, and provide repair or replacement costs.

Where an interactive exhibit element requires routine maintenance, including cleaning, the contractor shall identify the types of maintenance and estimate the annual cost of maintenance, both in terms of labor as well as materials costs.

Section 22. DESIGN GUIDELINES FOR EXHIBIT STRUCTURES

22.1 Introduction

Exhibit structures work as a platform to support the content elements of the exhibit, and enhance the aesthetic quality of the exhibit by adding dimensionality, functionality, and presence, with characteristics that are appropriate for the themes of the exhibit, the exhibit space, and in some instances with the region of the country in which the exhibits shall be installed.

22.2 Specific Requirements

- A. The contractor shall become familiar with the general and specific requirements of the project before proposing design elements. Examples of such requirements include:
 - (1) Current and anticipated visitation.
 - (2) Spatial requirements, such as the size and shape of the exhibit area, exposed and hidden dimensional characteristics such as columns and support beams.
 - (3) Other pertinent spatial characteristics such as outlets, heating and cooling vents, wall mounted heating devices, security equipment, and plumbing.
 - (4) Access considerations, such as the size of doors, stairs, elevators, and other limiting features leading to the exhibit area.
 - (5) Environmental conditions, such as the availability of heating, cooling, and humidity control, exposure to outdoor elements and the nature of such elements, historic characteristics of the exhibit area.
- B. Exhibit structures shall provide dimensionality, especially when three-dimensional objects are not available for display.
- C. Structural design shall accommodate the available space, ensuring that the exhibits do not overwhelm the space available, nor are overwhelmed by the space. Structural elements shall be designed to provide for the comfortable flow of visitors, taking into account existing and anticipated visitor use patterns as well as anticipated “stay” times within the museum area.
- D. Exhibit structures shall be designed for the specific environment in which the exhibit shall be installed, and to accommodate unique requirements. For most projects, exhibits will be housed in heated and air-conditioned rooms. However, some exhibit environments are more extreme and shall require alternative design approaches and materials.

Other examples of unique requirements include installation into historic structures in which the original historic fabric cannot be altered or disturbed; exhibits installed in flood plains that require easy and quick disassembly for removal on short notice; in facilities where the exhibit area is used as a multipurpose room, the exhibit design requirement may include easy mobility or portability of some or all of the structures, and the design of support equipment and supplies to aid in mobility, such as tow bars or rolling cases.

- E. The contractor shall ensure that structures are designed to accommodate all media elements that are part of the exhibit, such as Discovery Drawers, audio speakers, video monitors, and supplemental AV equipment, so that the design creates no obstacles to the installation of such elements. The design shall provide for easy access to all electronic equipment and lighting for routine servicing with a minimum of climbing, bending, and reaching.
- F. The design shall be easily maintainable by the individual park area. The design shall reflect the availability and type of staff to perform routine maintenance tasks. The number of different types of materials in an exhibit shall be kept to a minimum. For example, whenever possible, use glass or acrylic in an exhibit, but not both, in order to reduce the risk that inappropriate cleaning agents will be used.

Section 23. EXHIBIT LIGHTING

23.1 Introduction

The quality of lighting in NPS visitor centers, historic structures, and exhibitions has a significant impact on the quality of the visitor experience and the preservation of historic objects. Successful exhibit lighting shall be aesthetically pleasing, shall enrich the visitor experience, and shall balance the often-competing needs of interpretation, presentation, object conservation, energy efficiency, and maintenance.

The goal is to have a complete visual presentation of the visitor center, historic structure, or exhibition area, while limiting theatrical and dramatic lighting practices. The lighting designer shall consider the requirements of all parties invested in the exhibit process – the visitor, designer, fabricator, curator, conservator, interpretive staff, and maintenance. The lighting shall be sustainable for the life of the exhibit and, with the exception of lamp replacement, be relatively maintenance free.

23.2 General Requirements

The contractor shall specify a lighting system that is appropriate to the exhibition space using the following guidelines:

- A. LED track lighting shall be considered the default standard for exhibition gallery areas. Other lighting systems may be used where indicated by design or functional requirements and as approved by the COR.
- B. Use of halogen and metal halide lamps shall be kept to a minimum.
- C. Standard and compact fluorescent lighting (CFL) shall be limited to use primarily for ambient room illumination, signage, and back-lit interpretive panels. High efficiency fluorescent lighting with a high color rendering index and appropriate color temperature may be used for wall washing and other situations where directional lighting is not needed.
- D. Use the minimum number of fixtures to accomplish the task.
- E. Limit the types of fixtures.
- F. Limit the types of lamps. Different wattages and beam spreads shall be kept to a minimum within the same family of lamps since, during maintenance, lamp types are often incorrectly substituted.
- G. Whenever possible, specify energy efficient lamps such as LED PAR lamps and LED MR-16 lamps.

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- H. Limit the use of theatrical and ellipsoidal lighting projectors; use only where absolutely necessary to accomplish the task. When image projection is required, MR-16 or LED-type projectors are preferred.
- I. To ensure continued viability and product support, the contractor shall specify commonly available lighting products that are recognized and proven successful in similar exhibit or commercial display applications.
- J. To minimize visual pollution, lighting shall be designed to integrate with the architectural space, especially in exhibition areas.
- K. Integrate natural light where possible and where artifacts will not be impacted. Use daylight harvesting technology where possible and where artifacts or visitor services will not be impacted.
- L. The contractor shall coordinate with the appropriate project team members to ensure that heat generation from exhibit lighting does not exceed the allotted cooling capacity of the proposed or existing HVAC system.
- M. Lighting shall be designed for ease of maintenance using the following guidelines:
 - (1) Fixtures shall be accessible for routine maintenance.
 - (2) Lamps shall be standardized, widely available, and easily replaceable.
 - (3) Wherever possible, choice of fixtures shall be such that lamp replacement shall be accomplished without disturbing fixture accessories (filters, screens, etc.)
 - (4) Fiber optic illuminators shall be located in a manner that allows proper ventilation and easy access for maintenance.
- N. Lighting controls shall be designed using the following guidelines:
 - (1) The contractor shall provide lighting control specifications, including any requirements for automated control systems linking lighting to AV or other exhibit elements, requirements for dimmers, and start-up, operating, and shut-down procedures.
 - (2) Locations of all lighting controls shall be indicated on the lighting plan. Controls shall have limited staff access.
 - (3) Use of a circuit breaker panel for daily switching of exhibit lighting is discouraged.

- (4) Dimmers shall be provided on lighting circuits to the extent required for effective lighting control within the exhibit. Dimming control systems programmable with preset scenes shall be preferred.
 - (5) The primary method of controlling default light levels shall be by lamp specification or through use of accessory screens. Dimming of lamps shall be kept to a minimum for this purpose.
 - (6) Occupancy sensors shall be used where possible to conserve energy and to limit light exposure in exhibits containing light sensitive artifacts.
- O. The contractor shall provide a preliminary lighting plan at the Design Development I phase of work, showing proposed fixture locations and types. In the Production Documents phase of work, the contractor shall provide a reflected ceiling plan of the exhibit area(s) identifying existing and new lighting fixtures, hardware, and controls. The plan shall include a lighting schedule for all new lighting indicating type of track, track accessories, fixture, fixture accessories, lamp type, wattage, and beam spread.

23.3 Specific Requirements for Light Levels in Exhibition Spaces

- A. Light levels shall meet the minimum requirements stated in the Accessibility specifications of this contract. ([see Section 8, Accessibility](#)).
- B. Light levels in exhibit areas shall be defined by the nature of the exhibits and limited by artifact conservation requirements.
- C. Where necessary and where possible, the design shall incorporate adaptive lighting techniques, allowing visitors' eyes to adjust to the lower levels required for light sensitive artifacts or audiovisual spaces.
- D. The contractor shall coordinate with the project conservator when designing lighting plans for exhibit areas where artifacts are displayed. The following guidelines for lighting of artifacts shall be followed:
 - (1) Attachment C, NPS Exhibit Conservation Guidelines, will provide general guidance for the lighting of artifacts in exhibition spaces.
 - (2) The project conservator shall be responsible for specifying artifact lighting limits.
 - (3) All fixtures illuminating sensitive artifacts shall be equipped with Optivex UV filters.
 - (4) Infrared radiation shall be eliminated from the object environment.

23.4 Specific Requirements for Artifact Case Lighting

- A. Attachment C, NPS Exhibit Conservation Guidelines will provide general guidance for artifacts case lighting.
- B. Heat-generating light sources shall be located in a light attic, separated from and insulated against heat spill into the artifact environment. Adequate ventilation shall be provided to remove heat from the light attic, preferably passively with exit holes or, if necessary, with the use of exhaust fans. Heat gain from lighting shall be no more than 3 to 4 ° F in the course of an exhibit day.
- C. Where different light levels are required within a case (for example, where labels require higher lighting levels than adjacent artifacts), the lighting system shall be designed to selectively illuminate individual items within the case.
- D. Directional lighting (MR-16, PAR, fiber optics, LEDs) is preferred for exhibit cases. Fluorescent lighting, although less preferable, may in some instances be used to provide a wash of general illumination. However, care shall be taken to account for the color temperature and the poorer color rendering index of fluorescent lighting. Care shall also be taken to avoid the appearance common to cases lit with fluorescents, having too much light at the top of the case and not enough at the bottom.
- E. Fiber optic luminaires and light bars may be located inside the artifact chamber provided the entry holes are sufficiently gasketed so that there is no additional air exchange and the exhibit environment is not affected. Fiber optic illuminators may be located either outside or inside the exhibit case. If inside, the preferred location shall be in the top of the case. Adequate insulation between the artifact chamber and the illuminator shall be provided if the illuminator is located in the base of the exhibit case. Manufacturer's recommendations for air exchange and illuminator mounting/position shall be followed.
- F. LED lighting may be located in the artifact chamber provided they give off no heat. LED ballasts shall be remotely located outside the artifact chamber.
- G. All ultraviolet radiation shall be eliminated through use of a UV blocking acrylic or glass separator between the artifact chamber and the light attic.

Section 24. MOCK-UPS AND PROTOTYPES

24.1 Design and Planning Phase

Mock-ups or prototypes shall be required for unusual or innovative approaches to presentation and interpretation. Examples include exhibits that incorporate new technology, mechanical devices, lighting effects, or other special effects or concepts that are unfamiliar to the project team. In these cases, mock-ups or prototypes may be required to test the idea and work out problems before making a final decision about their use in the exhibit. Mock-ups may also be used for testing the interpretive effectiveness of an idea during Formative Evaluation of the exhibition.

Mock-ups typically refer to working models that are fabricated simply, quickly, and at minimal cost in order to test a concept. Prototypes are more refined than mock-ups, and closer to the final product in material, fabrication, and operation.

24.2 General Requirements - Design and Planning Phase

- A. Requirements for the purpose, number, and type of mock-ups and prototypes will be specified in individual task orders.
- B. In each case, the mock-up or prototype shall be fabricated to demonstrate and test the functional characteristics required in the final production version.
- C. If necessary the contractor shall revise the design based upon review comments provided by the COR and information gained from fabrication and testing of the mock-up or prototype.

24.3 Fabrication Phase

- A. **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.
- B. **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.

24.4 General Requirements - Fabrication Phase

- A. Requirements for the purpose, number, and type of mock-ups and prototypes will be specified in individual task orders.
- B. Along with each mock-up or prototype submitted, the contractor shall provide the COR a report, with photo documentation, of the performance of the mock-up.
- C. Unless otherwise specified in individual task orders, prototypes shall be corrected in accordance with the review and approval by the COR and incorporated into the final exhibit along with the other elements of the same design.

Section 25. PLANNING & DESIGN SUPPORT DURING FABRICATION

25.1 Production Support Introduction

The National Park Service may choose to involve the planning and design contractor in the production process to maintain the design intent, provide continuity throughout the project and resolve production issues. Production support includes Planning and Design follow-ons, to update existing or create additional content and/or exhibit elements; and Fabrication / Installation support to review the Exhibit Fabricator's work and assist in installation, document as-built content, and evaluate the completed project. Details for all production support work will be specified in individual task orders.

25.2 General Requirements

A. Coordinate with Project Team.

The contractor's design team shall communicate with the other project team members to ensure that the completed project fulfills the conceptual and technical requirements as specified in the Production Documents.

B. Production Meetings.

Attend meetings where advice and information from the planning and design team is required. Such meetings may include postaward conferences with fabrication contractors, meetings or conference calls to discuss production submittals from the Exhibit Fabricator and other contractors, and meetings or conference calls to discuss other fabrication issues related to the Production Documents.

25.3 Specific Requirements for Planning and Design Follow-ons

A. Revise Exhibit Design Drawings.

Revise drawings when portions of the approved design or content are found to be unusable for any reason. The contractor shall redesign exhibit areas, exhibits, and or exhibit elements where necessary to accommodate changes to the project during production.

B. Revise Graphic Layouts

Revise graphic layouts when the approved design or content is found to be unusable for any reason. At a minimum, the contractor shall:

- (1) Select substitutions for graphics and artwork that are found to be unacceptable, or when the original source material cannot be located or obtained, or when use rights cannot be obtained.

- (2) Revise layouts to incorporate substitution of graphics and artwork or minor corrections to text.
- (3) Revise layouts or positioning of graphics or artifacts when graphics, artifacts, or objects cannot be obtained, are the incorrect size on the original drawings, or are otherwise unusable.

C. Revise Production-Ready Graphic Files.

Revise files following the specifications in Section 15, Two-Dimensional Exhibit Graphics. In addition the contractor shall perform the following work:

- (1) Using a color chart from the photo lab, the contractor shall adjust all colors for the final output process to be used, to ensure that they match those specified in the Approved Final Package.
- (2) The contractor shall respond to inquiries from the COR, photo lab, and production team concerning layout file design, high-resolution scans, specifications and intentions.

D. Create Original Graphic Content

Where advantageous to the government and specified in individual task orders, the Planning and Design contractor shall fully develop graphic content for production. Examples of graphic content that may be specified under this contract as part of Production Support include the development of original illustrations, the development of original and adapted maps, and new photography for use in the exhibit.

E. Provide Creative Direction

Provide creative direction to the Exhibit Fabrication contractor and to other NPS contractors that are involved in the Exhibit Fabrication process, including illustrators, photographers, model makers, audiovisual and multimedia producers, audiovisual equipment technicians and systems engineers, curators, and lighting designers.

25.4 Specific Requirements for Fabrication / Installation Support

B. Review Shop Drawings or Fabrication Drawings.

Review and comment on shop drawings that are submitted by the Exhibit Fabrication contractor. Ensure that the design intent is maintained, that measurements, materials, and finishes are correct, and that the details are reasonable.

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C. Review Production Documents/Samples.

Review and comment on samples, mockups, and prototypes submitted by the Exhibit Fabrication contractor, as specified in the individual task orders, to ensure they fulfill the conceptual and technical requirements of the project. These typically include, but are not limited to, catalog cuts for materials and equipment, color and material samples, production proofs of graphic layouts, prototypes of interactive elements, and specialty treatments that are specified in the design package or that are proposed by the Fabricator.

D. Inspect Fabrication Work

Inspect work-in-progress and completed exhibit elements at the Fabricator's shop, photo labs, subcontractor's shops, and as specified in individual task orders.

E. Support Exhibit Installation

Attend the installation of the exhibits in part to inspect pre-installation site conditions, to provide technical guidance during installation of the exhibits, to provide art and set direction, and to light or to direct the lighting of the installed exhibits. Work may include a final walkthrough of the installed exhibits with the Exhibit Fabricator and HFC and park staff to identify obvious design flaws, to identify undesirable content and design features, and to propose alternative design solutions.

F. Update Content Management Data

Revise all information to reflect the final, "as-built" content of the exhibit. Work includes incorporating revised or corrected text and text specifications, replaced images or revised image specifications, incorporating content elements that are added during the fabrication process and deleting content elements that are not used, and updating all other Content Management Database schedules.

G. Support Summative / Remedial Media Evaluation

Work will be specified in individual task orders and may include:

- (1) Participation in the evaluation process, such as attending evaluations and reviewing the final evaluation report.
- (2) Preparing and submitting alternative design solutions to remediate design weaknesses identified in the final evaluation report.
- (3) Revising, refining, and submitting the alternative design solutions into a single design element for each weakness, based on comments by the COR.

Section 26. MAPS

26.1 Introduction

Maps used in National Park Service exhibitions serve three general purposes: orientation, communicating a sense of place, and educating the public about park themes. To accomplish these goals, exhibit maps shall be designed so as to attract and engage park visitors.

Maps can take a variety of shapes, sizes, and forms depending on the requirements of the exhibit. A critical factor in deciding on a map type is data availability. For example, creating a satellite image map depends entirely on the availability of high-quality imagery. Another critical factor is cost: making a tactile model or animated map is significantly more expensive than a traditional map.

Types of exhibit maps include, but are not limited to, the following:

A. Orientation Maps

Traditional maps of a park or region that typically show administrative boundaries, roads, trails, rivers, and terrain represented with shaded relief. Orientation maps are usually planimetric (looking at the site from a point directly overhead), north oriented, and shall conform to the NPS standards used for Publications and Wayside Exhibits.

B. Image Maps

Maps created from aerial photographs or satellite images. The images may depict the park planimetrically or obliquely as in a bird's-eye view.

C. Birds-Eye View Maps

These maps, sometimes called panoramas or 3D views, are digitally rendered views that show natural landscapes (with three-dimensional terrain) and/or cultural landscapes (with three-dimensional buildings) from an oblique angle. Some birds-eye view maps serve as geologic diagrams and natural science illustrations. The contractor shall use 3D software of their choice for rendering these views, unless otherwise specified in the task order. The final views are usually presented as two-dimensional graphics within an exhibit.

D. Thematic Maps

Generalized base maps of parks and larger geographic regions overlaid with interpretive information. For example, a map of the Greater Yellowstone ecosystem depicting forest fires since 1980.

E. Tactile Maps

These maps are designed to be touchable for purposes of accessibility, often including braille, raised relief, and other tactile elements. Tactile maps are more effective at smaller sizes that are easily reachable by a person in a wheelchair using one hand. See also Section 8, Accessibility, and Section 21, Tactile Exhibit Elements and Mechanical Interactives.

F. Physical Models

Created from a variety of solid materials, such as high-density foam or resin compounds, these models show a scaled representation of the landscape in three dimensions. They derive from Digital Elevation Model (DEM) data that a Computer Numerically Controlled (CNC) router reads to carve the terrain. Textures, labels and lines can be added to the surface of the routed model via manual methods or by digital printing. Physical models may be embedded with fiber optic or LED lights to display supplemental information, such as troop movements on a battlefield. Depending on their purpose within an exhibit, physical models may or may not be touchable.

G. Interactive Maps

Delivered dynamically on kiosks and other electronic devices, interactive maps provide graphically rich tools and layered information that engages the reader. Virtual navigation and information retrieval are key uses. Interactive maps will usually be a part of a larger multimedia project; see also Section 19, Audiovisual and Computer Elements – Software.

H. Animated Maps

This product shows a sequence of events or information on a base map presented on a computer display or in a movie. Animated maps are often accompanied by narration and sound effects. Typical uses for animated maps would include showing continental drift on a world map, the advance and retreat of glaciers, and battlefield troop movements. Animated maps will usually be a part of a larger audiovisual project; see also Section 19, Audiovisual and Computer Elements – Software.

I. Flythrough Animations

As if in a low-flying aircraft, flythrough animations take the viewer on a virtual journey over a landscape created from Digital Elevation Model (DEM) data, draped imagery, and 3D buildings in a scene that can contain a horizon and clouds. Producing flythrough animations requires 3D software. Typical uses would include movies shown in visitor centers or introductory screens on digital kiosks; see also Section 19, Audiovisual and Computer Elements – Software.

26.2 General Requirements for Map Planning

For consistency, the design and content of maps shall coordinate with other exhibit elements. Planning for maps shall begin at an early stage of exhibit design, and shall address the following:

A. Map Purpose and Type

Determine the purpose, type, and intended audience for the map, and how the map shall support other information in the exhibit.

B. Cartographic Expertise Required

The contractor shall identify the skill sets required to design each map, and the resources required by the map producer. Based on the requirements of the task order, the contractor shall be required to provide the following:

- (1) In cases where the contractor is responsible for planning and design only, a reference package shall be prepared by the contractor for review and approval by the COR. The reference package shall provide sufficient information for an appropriately skilled cartographer to produce the map.
- (2) In cases where the contractor is responsible for planning, designing and producing the map, a reference package shall be prepared by the contractor for review and approval by the COR. In addition, the contractor shall propose an appropriately skilled cartographer to produce the map. The cartographer shall be approved in advance by the COR prior to production of the map.

C. Size and Scale

The contractor shall identify the geographic area of the map and its final size in the exhibit. The map design shall take into account the map projection, as this can greatly affect the how much space the map takes up.

D. Orientation

The contractor shall determine the orientation of the map; in most cases north shall be at the top of the map. Exceptions to this rule may include a tabletop map oriented to the landscape visible through a window. Most maps shall include a north arrow, provided that the projection is appropriate.

E. Content

The contractor shall identify geographical features, labels, and all other information to be included on the map, organized according to hierarchy. Only those elements which are relevant to the purpose of the map shall be shown.

26.3 General Requirements for Map Design

The contractor shall design and produce exhibit maps that combine geospatial accuracy production and design sensitivity as follows:

A. Map Design

Exhibit maps shall have a clean, uncluttered, and exceptionally legible appearance. The average person shall be able to understand an exhibit map in only a matter of seconds.

The design of exhibit maps shall be compatible with the graphic style and other design elements within the exhibition.

Most traditional orientation maps within exhibits shall adhere to the NPS map standards established for wayside and publications maps. These map standards include the use of Frutiger and NPS Rawlinson fonts, and pictographs, scale bars, north arrows, road shields, and other NPS symbols. See: www.nps.gov/hfc/carto/map-symbols.htm

B. Software

The contractor may use any software for the preliminary production of maps. However, all vector map deliverables shall be in Adobe Illustrator CS5, or later software. Raster map deliverables shall be delivered in Adobe Photoshop CS5, or later. Map information shall be organized in annotated layers for easy editing.

C. Data Sources

Unless otherwise approved in advance by the COR, exhibit maps shall derive from accurate geospatial data sources. Typical exceptions to this requirement include simple maps that can be produced more efficiently by tracing existing maps in Adobe Illustrator; artistically rendered maps, such as a map in a faux-historical style; and diagrammatic maps.

Most new maps shall derive from geospatial data sources with georeferencing, including but not limited to the following data types: ESRI shapefile, .e00, and geodatabase; AutoCAD DXF; Digital Chart of the World (DCW); Digital Line Graph (DLG); Digital Elevation Model (DEM); Digital Orthophoto Quadrangles (DOQ); Digital Raster Graphics (DRG); Spatial Data Transfer Standard (SDTS); and the full range of data formats offered online by the U.S. Geological Survey and other U.S. government agencies. The Contractor shall identify other available sources as required. All data sources shall be in the public domain unless approved in advance by the COR. See: <http://www.nps.gov/carto>

D. Map Accuracy and Generalization

Regardless of whether a map derives from geospatial or analogue sources, it shall be accurate. Putting information on maps by “eyeballing” it in is not permissible. Thematic data presented on maps shall derive from authoritative sources. Care shall be taken preparing base maps from geospatial data to generalize it appropriately depending on the map scale.

E. Map Projections

Standardized map projections are required. The UTM projection (the zone will vary according to location) and NAD83 datum are required for parks in Hawaii and the contiguous 48 states. Maps of Alaskan parks shall use the Alaskan Albers Equal-Area projection, NAD83 datum. Maps of the contiguous United States (U.S.) shall use the Albers Equal-Area projection, CONUS parameters. World maps shall avoid using cylindrical projections (i.e. Mercator, Miller, and Geographic) in favor of projections with less severe areal distortion, such as the Robinson or Winkel Tripel.

Final map deliverables shall contain metadata specifying the projection type, projection parameters, and datum. Maps produced in Adobe Illustrator with the Avenza MAPublisher GIS plugin automatically contain projection information.

F. Place Names

All place names on U.S. Government maps shall be spelled according to the U.S. Board on Geographic Names: <http://geonames.usgs.gov/>

G. Metric units of measurement

In addition to Standard English measurements, the contractor shall include metric equivalents for labeled units of measurement. All conversions shall preserve the degree of precision of the original English measurement. For example, a label that lists a trail as 0.25 mile shall not include a metric equivalent of 402.33 meters; this implies a degree of exactness that the original English did not have. The dynamic equivalent of 0.25 mile would be about 400 meters. Road and trail distances below one kilometer shall be stated in rounded off hundreds of meters. Distances greater than one kilometer shall be stated in rounded off tenths of kilometers.

H. NPS Starter Map Files

NPS Starter Maps are generic templates that shall, in most cases, require color adjustments and other minor design modifications in order to make them more attractive.

These layered Adobe Illustrator files contain all of the elements needed to design and produce NPS Wayside and Publication maps, which are directly applicable to exhibit maps. Starter Maps include graphical styles assigned to layers that automatically apply line weights and colors to roads, trails, and drainages. Map elements found in Map Starter Files include north arrows; bar scales; pictographs; road shields, callout boxes; and area color schemes keyed to natural environments, such as deserts and forests. See:

<http://www.nps.gov/hfc/carto/starter-maps.htm>

Section 27. SHOP FABRICATION

27.1 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 handling, production, storage, shipping, and installation.

27.2 Safety

A. Accident Prevention

- (1) The contractor shall provide all safeguards, devices and PPE (Personal Protective Equipment) necessary to protect the life and health of employees on the job site and the safety of the public.
- (2) All work shall be completed in compliance with all OSHA standards.

B. Health and Safety

- (1) The contractor shall comply with all applicable federal, state and local laws governing safety, health and sanitation including all applicable laws and regulations of OSHA.
- (2) Joint Duty Regarding Safety - Any party that observes a violation of the OSHA standards shall notify the contractor in non-compliance, and must see that these unsafe conditions are corrected.

27.3 Environmental Practices - The contractor is strongly encouraged to follow "green" environmental practices whenever possible while performing the work under this contract. Examples include:

- A.** Practicing waste reduction, and recycling of waste.
- B.** Using regionally local materials whenever possible, and using materials made from recycled or rapidly renewable resources.
- C.** Maintaining good indoor environmental air quality through managing air contaminants, using less harmful low-VOC materials, and improving ventilation.
- D.** Reducing the need for electricity through increased use of natural daylight for lighting.

27.4 Quality Standards - Applicable Industry Standards

- A. Woodworking - Refer to the Architectural Woodwork's Institute (AWI) Quality Standards for cabinetry and laminate work. All manufacturers' 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
46179 Westlake Drive, Suite 120
Potomac Falls, Virginia 20165
571-323-3636
www.awinet.org

- B. Cabinetry and Architectural Millwork Quality Standards - AWI Quality Standards are by reference made part of this Specification. Unless otherwise clearly detailed or specified in individual task orders, all cabinetry shall be fabricated to conform to AWI Quality Standards, Section 400, for Custom Grade material and workmanship.
- C. 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

- D. Welding - Standards for welding shall be as recommended by:

American Welding Society
550 NW LeJeune Road
Miami, Florida 33126
305-443-9353
800-443-9353
www.aws.org

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

National Ornamental & Miscellaneous Metals Association
805 South Glynn Street, Ste. 127 #311
Fayetteville, Georgia 30214
888-516-8585
www.nomma.org

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- F. Plastic Laminates - High pressure decorative laminates shall meet the minimum performance standards of the International Organization of Standardization (ISO) ISO-4586-2:2004 and the National Electrical Manufacturer's Association, LD3-2005. Laminate shall be Grade 10, General Purpose Grade, with the exception of curved, vertical surfaces, when Grade 20, Vertical Postforming Grade is acceptable.
- E. Quality Standards - Artifact Case Fabrication - In accordance with Section 18, Object Preservation and Protection.

27.5 Quality Standards - Cabinetry

- A. Large casework and structures - All casework shall be fabricated, finished, and assembled in the contractors shop. Structures too large for access into the exhibit area, or which would be damaged by shipment while assembled, shall be made in detachable sections with provisions for final assembly inside the exhibit space.
- B. Fabrication 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.
- C. Shelving - Unless otherwise specified in individual task orders, 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.
- D. 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, draw-bolts, 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 COR. Countersink face nails and face screws, fill with plastic wood or wood plugs, sand flush to surface, and finish without visible markings.

27.6 Quality Standards - Finishes

- A. 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.
- B. 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.
- C. 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 shall be 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.
- D. 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 assembly 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.
- E. Panel Edges and Backs, Concealed Areas - Finish in accordance with the following unless specified otherwise on the drawings.
 - (1) Concealed Areas - Those areas completely enclosed by solid opaque framing and skin. No finish required.

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- (2) Semi-Exposed Areas - Those areas only visible by opening doors or access panels. Finish with wood sealer.
- (3) Flat Panels, Framed - The back side of plywood or other framed material. A minimum of two coats flat lacquer primer for the surface.
- (4) 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.
- (5) 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.
- (6) Panel Backs - Backs of panels shall be finished with spray-applied lacquer finish or laminate backing sheet in color specified on the drawings.

27.7 Quality Standards - Glass

- A. 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.
- B. Laminated Safety Glass - All glass to be used for artifact case glazing shall be laminated. All exposed edges shall be eased and finely ground to be smooth, with broad surfaces free of imperfections.
- C. Tempered Safety Glass - All exposed edges shall be polished, with broad surfaces free of visible tong marks or any other imperfections.
- D. Anti-Reflective Glass - Anti-reflective glass, in thickness, glass color, and UV-filtering properties as specified on the drawings and in the individual task order. All glass to be used for artifact case glazing shall be laminated. All exposed edges shall be eased and finely ground to be smooth, with broad surfaces free of imperfections.

27.8 Quality Standards - Hardware

- A. 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.

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- B. Finish - Hinges, key-hole fasteners, concealed hinges, cam locks, slides, push locks and keys, casters, levelers, handles, and knobs as specified on 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.
- C. 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.
- D. Security Hardware -
 - (1) Provide locks for all access doors to artifacts, audiovisual equipment, and storage areas in accordance with approved drawings and catalog cuts.
 - (2) Install locks so that the hardware is concealed yet easily accessible. Locks may be installed behind removable outer panels, on the unexposed underside of structures, or as otherwise specified on the drawings. 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.
 - (3) All locks shall be keyed alike, with the exception of donation boxes. Donation box locks shall be keyed separately from all other exhibit locks.
 - (4) For hardware requiring special tools, such as tamperproof screws and cam locks, the contractor shall provide a minimum of two of each tool required.

27.9 Shop Inspections

- A. Review of work at partial stages of completion: The COR will conduct reviews or inspections of work in progress at the contractor's facility in accordance with the contract schedule. The contractor's Project Manager shall coordinate the shop reviews with the COR to ensure that the work is at a productive stage of completion for review.
- B. Photo/video documentation of shop fabrication in progress - The contractor shall provide digital photographs and/or videos of work in progress to the COR via electronic mail or ftp sites. At a minimum, the photos shall document the following stages, or as specified in the individual task order:
 - (1) Exhibit structures - prior to finish surface application;
 - (2) Exhibit structures - after finish application;

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- (3) Content Specialties - models, topographic maps, cast figures, furnishings, reproductions.

C. Final Shop Inspection

- (1) Final set-up of completed exhibits for shop inspection - 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 COR 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) Review and demonstration of AV and interactive elements - 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 the design intent and applicable fabrication specifications.
- (3) Shop inspection punch list - During the inspection, **the contractor's Project Manager shall document all review comments**. At the completion of the inspection, the Project Manager shall assemble the review comments into a punch list.
- (4) Pre-installation Meeting - The contractor's Project Manager and members of the contractor's installation team shall meet with the COR at the contractor's facility to discuss the project and review work at the time of the exhibit staging. The minimum agenda for the Pre-Installation Meeting shall be in accordance with Section 4, Travel, Meetings, and Presentations, 4.5, C.

Section 28. INSTALLATION

28.1 General Requirements

- A. Installation Team - The contractor shall provide adequate personnel to install the exhibits, including the Project Manager. Qualifications of local subcontractors who are proposed by the contractor to assist with installation shall be submitted for review and approval by the COR prior to the installation.
- B. Installation Equipment - The contractor shall provide all required tools, materials, and equipment to accomplish the job.

28.2 Packing and Crating

- A. Structures - Structures shall be blanket-wrapped with all attached exhibit elements protected.
- B. Audiovisual Equipment - Audiovisual equipment shall be shipped in original shipping box from manufacturer with all original packing materials in place.
- C. 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. All screenprinted surfaces shall be protected with brown paper secured with masking tape until completion of final on-site setup.
- D. Wood Crates - The contractor shall fabricate or supply wood crates, using CDX plywood and pine framing in thickness required, based on size of crate. Crates shall be fastened using galvanized nails and screws for crate top.
- E. Packing Materials - The contractor shall pack exhibit materials using "green" environmental methods as much as possible, such as recycled cardboard boxes, biodegradable "peanuts", recycled paper and cardboard cushioning products, and reusable heavy blankets. Wooden boxes or crates for shipment of exhibits to the site shall be reused as much as possible. The contractor shall recycle shipping containers and packing materials at the installation site which they do not retain for re-use.

- 28.3 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.

28.4 Site Preparation

- A. Existing Work - The contractor shall request authorization from the COR 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 COR.
- B. Demolition - The contractor shall remove and dispose of existing exhibit structures, furniture, lighting, and other elements from the exhibit area, as specified in individual task orders.
- C. 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; use masonite in adequate thicknesses to protect floors from indentations and other damage when heavy loads will be wheeled over, or temporarily stored on, the floor. 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.

28.5 Safety - The contractor shall provide all safeguards, devices and PPE necessary to protect the life and health of employees on the job site and the safety of the public. All contract and subcontract employees working on the job site shall be in compliance with all applicable federal, state and local laws governing safety, health and sanitation including all applicable laws and regulations of OSHA. In addition, the following requirements during on-site installation are included:

- A. Personal Protective Equipment (PPE) - The contractor shall use safe work practices while installing the exhibits on-site and use all appropriate PPE for the health and safety of the installation crew, including proper clothing, footwear, and hearing and eye protection. The contractor shall refer to the most current OSHA standards as guidance to plan PPE for the installation. PPE shall include, at a minimum:
 - (1) Protective Eye Wear - For tasks including, but not limited to, sawing, drilling, nailing, grinding, machining, welding, and handling harsh chemicals. The eyewear shall have side shields and be of the appropriate type for each kind of activity.

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- (2) Respirators and Ventilation - For tasks including, but not limited to, application of spray coatings and paints, power sanding, or other tasks which generate hazards to the respiratory system, dust masks or respirators in accordance with **OSHA 1926.103, Respiratory Protection**, shall be used. The contractor shall ensure that the fumes from all on-site applied finishes, coatings, adhesives, and other volatile substances shall be ventilated from the workspace in accordance with the manufacturer's recommendations. The contractor shall be responsible for providing portable fans as needed, to assist with ventilation.
 - (3) Hard hats - When workers are exposed to potential overhead hazards in the work site, hard hats shall be required. Examples include workers on ladders or lifts installing equipment in the ceiling while other workers are working directly below and could be hit by falling tools or materials.
 - (4) Other - Gloves, hard-toed shoes, safety vests, or hearing protection, as required in accordance with an assessment of the potential hazards on-site.
- B. Work Zones - Provide a visual and physical barrier between the exhibit installation work zone and public foot traffic to keep out unauthorized intrusions, for safety of the public and for the protection of the work being performed.
- (1) Barriers - Safety cones, orange construction fencing, and caution tape, and panels or sawhorses identified with signs, are acceptable components of work zone barriers. Work zones include power tool stations located outside the facility as well as installation work areas inside the facility. Power cords, tools, hoses and hardware shall be kept inside the work zones.
 - (2) Signs - Provide signs on the work zone barrier, identifying the area as a work area and closed to the public. If hard hats are in use in an area, identify it as a hard hat area, only.
 - (3) Access - Provide clear, accessible passageways to areas of public access which pass through the work zone. Separate the public access from the work zone using barriers on both sides, identified by signs.
- C. Electrical Safety -
- (1) On-site electrical work in the contractor's scope of work shall be performed by a licensed electrician. Examples of typical electrical work which may be included in an exhibit contract include installation of junction boxes, switches, dimmer systems, and lighting systems, or modifications to existing electrical work.

- (2) During the on-site installation of electrical wiring, switches, and other electrical or electronic devices, and for operation of electrical equipment in general, the contractor shall follow **OSHA** and industry standards for safety, including the **NEC**, **NFPA 70E National Electrical Code**, and the **National Electrical Safety Code (NESC)**.
- (3) **The contractor shall not perform electrical work on energized electrical circuits at any time.** Prior to start of any on-site electrical work, the contractor and the COR shall meet with the park electrician or other representative to coordinate the work. The park representative will identify circuits which will be shut off and assist with verifying when it is safe to begin work.

28.6 Final Lighting of Installed Exhibits - The contractor shall illuminate the installed exhibits and artifacts, as specified on the government-furnished Lighting Plan and in accordance with Section 23, Exhibit Lighting. Work shall include:

- A. Aim and adjust all exhibit lighting, including exhibit lighting equipment and accessories already in place or installed by others.
- B. Adjust lamp wattages and beam spread, as well as dimmers when available.
- C. Install lenses and accessories as required to meet the specified effects.
- D. Document 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 Manual, as specified in Section 29, Operational Training and References.

28.7 Audiovisual Systems

Installation of audiovisual systems shall be in accordance with Section 19, Audiovisual and Computer Elements - Software, and Section 20, Audiovisual and Computer Elements - Equipment.

28.8 Cleanup and Recycling

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. The contractor shall practice waste reduction and recycling of waste whenever possible while performing the on-site work under this contract.

- A. The contractor shall provide bags and containers for storage of their trash and recyclables. The contractor shall be responsible for removing waste materials generated during the installation from the park. The contractor shall not dispose of their waste in dumpsters or containers that 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 that 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.
- 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 Section 30, Operational Training and References.
- 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.

28.9 Walkthrough Inspection

- A. Upon completion of the on-site work, the contractor shall conduct a final walk-through inspection of the exhibits with the COR and park staff. The contractor shall notify the COR 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. Walk-through inspections shall occur Monday through Friday between 9:00am and 4:00pm, excluding federal holidays, or as specified in individual task orders.
- B. Installation Punch List - The inspection shall identify punch-list items (items that need to be corrected by the contractor). The contractor's Project Manager shall record the punch list during the walkthrough inspection. **During the inspection, the contractor's Project Manager shall be responsible for documenting, organizing, verifying, and clarifying the punch list items with the COR and the park to create the final Punch List document.** In addition, the contractor shall provide a completion date to the COR for each of the individual items on the list.
- C. 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.

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- D. 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.

- E. At the time of the Walkthrough Inspection, the contractor shall provide the Maintenance Manuals, keys, tools, touch-up materials, cleaning materials, and operational training in accordance with the individual task order and with Section 29, Operational Training and References.

Section 29. Operational Training and References

29.1 General Requirements -

- A. The Contractor shall provide the following documents, at a minimum, to the COR and the park at the completion of the exhibit installation, or as specified in individual task orders:
 - (1) Maintenance Manual;
 - (2) As-Built Lighting Plan;
 - (3) Audiovisual Operations Manual; and
 - (4) Photography of completed exhibits.
- B. Unless specified otherwise in the individual task order, the contractor shall prepare two copies of each set of manuals for the park and one set for the COR.
- C. For each copy of the manuals, the contractor shall also provide each of the documents in a digital form on a CD-ROM, included in a sleeve in the manual. Material sample pages and catalog cuts shall be included as pdf scans. Photographs of the completed exhibits shall be provided in a digital form on a CD-ROM, included in a sleeve in the Maintenance Manual.

29.2 Maintenance Manual

- A. Assembly of Maintenance Manual
 - (1) Pages shall be 8-1/2" x 11" sheets, punched and inserted into three-ring binders. Insert a full-length sheet of card stock into the sleeve along the spine of the binder labeled "Maintenance Manual," the name of the project, site, and month/year of installation. Organize the manual in sections in accordance with Section 29.2.B, and separate each section with labeled and tabbed dividers. Organize content of the Maintenance Manual to facilitate easy use as a reference document. Include page numbers or headers, and organize information in a logical manner.
 - (2) When audiovisual equipment is installed as part of the exhibit, the Maintenance Manual shall consist of two volumes, the second of which shall be dedicated to the operation and maintenance of the audiovisual equipment.
- B. Content of Maintenance Manual
 - (1) Title Page - Provide a title page with the name of the exhibit, the site, and installation date.

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- (2) Table of Contents - Provide a list of contents.
- (3) Contract Information - Provide name, address, and telephone number for all contractors and suppliers 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.
- (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 scanned and printed copies of catalog cuts for all products listed. 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, exploded view drawings, or digital 3-D renderings, with captions providing step-by-instructions; or

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- (b) 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 operational instructions for all electrical and mechanical equipment other than lighting and audiovisual equipment, or as specified in the individual task order. Lighting and audiovisual instructions shall be provided as specified in Parts B and C of this Section.
- (11) Catalog Cuts - Catalog cuts and manufacturer's printed instructions for all power strips, clocks, sensors, timers, ventilation fans, thermostats, motors, switches, dimmer controls, or other electrical or mechanical equipment.
- (12) Color and Finish Samples
 - (a) 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.
 - (b) One 8-1/2" x 11" mounted sample shall be provided for each type of digital output print and for each screen printing ink color and substrate combination used in the exhibit.
 - (c) Samples of specialized techniques such as sandblasted or etched graphics or finishes shall also be provided.
 - (d) As-Built Exhibit Plan – The contractor shall update the government-furnished content management schedule to reflect all changes that occur during fabrication, and provide a hard copy and electronic version of the resulting As-Built Schedules and Facsimiles. All revisions and updated information shall be clearly noted.
- (13) As-Built Exhibit Drawings - Include one copy of As-Built Exhibit Drawings printed onto 11" x 17" sheets in accordance with Section 13, Exhibit Drawings.

29.3 As-Built Lighting Plan

- A. The contractor shall provide a separate notebook that contains the As-Built Lighting Plan. Upon completion of installation of the exhibit lighting, the contractor shall prepare the As-Built Lighting Plan to reflect the actual installed lighting.
- B. Contents of the As-Built Lighting Plan:
 - (1) As-Built Drawings of the exhibit lighting plan which shows final fixture placement, orientation, and the lamp specifications for each fixture.
 - (2) Fixture Schedule - Identification of the manufacturer and model number of all fixtures, including any specialized equipment and accessories, such as lenses, gobos, gels, diffusers, and louvers.
 - (3) Lamp Schedule - Specific instructions for re-lamping, including type, wattage, beam spread, color temperature, etc.
 - (4) Wiring Diagrams - Include As-built wiring diagrams for all lighting and equipment installed by the contractor.
 - (5) 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.

29.4 Audiovisual Operations Manual

- A. The contractor shall provide a separate notebook that contains the Audiovisual Operations Manual. This Manual describes the operation and simple troubleshooting of the audiovisual systems specified in individual task orders. Each copy shall include the owner's operating/service manuals for each item of equipment used in the specified system.
- B. Contents of the Audiovisual Operations Manual:
 - (1) Title Page - Provide a title page with the name of the exhibit, the site, and installation date.
 - (2) Table of Contents - Provide a list of contents.
 - (3) Systems Block diagram(s), 11"x17".
 - (4) Systems Overview description(s).

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- (5) Daily System Startup and Shutdown Procedures.
- (6) System Adjustments.
 - (a) Audio.
 - (b) Video.
 - (i) Troubleshooting Guide:
 - 1) Video.
 - 2) Audio.
 - 3) Controls.
 - (ii) Maintenance Procedures:
 - 1) Describe routine procedures required with time intervals. This includes audiovisual programs, lighting equipment, computer interactive displays, mechanical interactive displays, and other electrical, electronic or mechanical equipment provided and/or installed by the contractor.
 - 2) For each audiovisual display, provide a list of parts needed for routine maintenance with make, model, time frequency needed, quantity per year, and price at the time of purchase.
 - 3) Provide a written proposal at installation for an optional Service Contract for audiovisual equipment or audiovisual systems as specified in individual task orders. Include proposed pricing for service at scheduled intervals as well as for fixed labor rates for individual service calls. Provide the contractor's contact information including name, address, telephone numbers, and names of the project manager, sales representative, and service manager.
- (7) As-built wiring diagrams for each audiovisual system. Provide hard copies as well as the electronic files in PDF format.
- (8) Programs - A hard copy and electronic version of the final control program(s) shall be included on CD-ROM or DVD-ROM in the manual.

- (9) Manuals - The manufacturer's installation, maintenance, and user instruction manuals for all components of the system. When electronic versions are available, they shall be included on CD-ROM or DVD-ROM in the manual.
- (10) Warranties - Provide manufacturer's warranties for all off-the-shelf equipment purchased by the contractor. Include documentation for date of purchase of the equipment.

29.5 As-Built Drawings

- A. As-Built Drawings - General Requirement: The purpose and general requirement of the As-Built Drawings shall be to provide detailed documentation of the actual, installed, completed exhibit conditions. The drawings shall document and incorporate changes in content, materials, or fabrication details which were made in the exhibits prior to final completion, but which are not reflected in the most current drawings.
- B. The As-Built Drawings shall be included in the Maintenance Manual and shall incorporate all final exhibit design and detail drawings. The drawings shall be in accordance with Section 13, Exhibit Drawings.
- C. All original drawings produced under this contract shall be the property of the government.

29.6 Operational Training

- A. After inspection and acceptance of the installed exhibits, the contractor shall conduct operational training session(s) for the COR and park staff. The number of staff to be included and the quantity of sessions required will be specified in the individual task order. The contractor shall provide a minimum of two operational training sessions. The training sessions shall include, but are not be limited to:
 - (1) Day-to-day cleaning of the exhibits - In addition, during the training session, the contractor shall provide and identify the components of the Maintenance Kit, assembled in accordance with this Section, 29.6, Maintenance Kit.
 - (2) Minor repair and touch-up procedures;
 - (3) 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 life-size figures;

- (4) Start-up and shutdown procedures for audiovisual equipment, lighting, and other electrical equipment, including troubleshooting in the event of a power outage, lightning surge, or other potential hazard.
 - B. Operational Training Video - In addition, the contractor shall provide to the COR two copies of a prerecorded video that demonstrates all key topics covered in the Operational Training Session, for reference by park staff. The videos shall be on CD or DVD, and available for submittal to the COR at or prior to the Operational Training Session. The video shall be divided into four chapters that cover the work specified above. The contractor shall submit a rough cut of the Operational Training Video for use during the Operational Training Session, and the final, revised version for the Closeout Package.
- 29.7 Specialized 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 three copies of each type of key and tool. Each key and tool shall be identified with the exhibit project name and number.
- 29.8 Maintenance Kit**
- A. Container - A heavy-duty plastic storage container, with a lid.
 - B. Touch-up Materials - Bottles or cans of each paint, stain, wax, and other finishes 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. Provide a minimum of one full quart of each paint and stain, one two-ounce bottle of each screen ink, and one full quart of each type of protective finish, such as polyurethane, except as otherwise specified on individual task orders.
 - C. Cleaning Materials - Cleaning materials for each type of surface in the exhibit, including glass, acrylic, plastic laminate, metal, and wood. Provide one full bottle of each type of cleaner. Provide appropriate applicators for use with each type of cleaning product in sufficient quantities to clean the entire exhibit for a minimum of 60 days. 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:

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- (1) Brilliantize, as manufactured by:

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

- (2) 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

29.9 Toolbox - Provide one toolbox to store in the exhibit space. Identify the box with the park and visitor center name. At a minimum, the toolbox shall contain the following:

- A. One rubber hammer;
- B. One claw hammer;
- C. One flat pry bar;
- D. Two glass suction cups in a case;
- E. Two straight screwdrivers: one large and one small;
- F. Two Phillips screwdrivers: one large and one small;
- G. Two pairs of heavy-duty work gloves; and
- H. One of the sets of specialized tools required for the exhibits in the individual task order.

29.10 Photography of Completed Exhibits

The contractor shall document the completed, operational exhibit with digital photographs that clearly show the overall exhibit, with additional photos of each of the exhibit areas and close-up photos that show the details within each exhibit area. The quality of the photos shall be within a range of contrast that clearly shows the details of the exhibit without being washed-out or too dark.

Section 30. CLOSEOUT

30.1 General Requirements

At the conclusion of work, the contractor shall return all government furnished property and all other outstanding materials, as specified in individual task orders, to the COR. All material generated by the contractor in the process of completing a task order is the property of the government.

30.2 Design and Planning Phase

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

30.3 Fabrication Phase

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

Assemble, organize, and submit a Closeout Package consisting of all government-furnished references and graphic sources, along with all materials generated during the production process including drawings, digital files, samples, one copy of the final maintenance manual, and photographs of the installed exhibits.

30.4 Specific Requirements - Fabrication Phase

A. Closeout Package Contents:

- (1) Digital media, photo negatives, transparencies, original artwork, and other image source materials - In accordance with Section 17, Use Rights and Licenses, and as specified in 30.4B of this Section.
- (2) Maintenance Manual - In accordance with Section 29, Operational Training and References.
- (3) As-Built Exhibit Drawings - In accordance with Section 29, Operational Training and References.
- (4) Audiovisual Operations Manual - In accordance with Section 29, Operational Training and References.
- (5) As-Built Lighting Plan - In accordance with Section 29, Operational Training and References.
- (6) Photographs of the Completed, Installed Exhibits – In accordance with this Section.

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- B. Closeout Package
- (1) Digital Media - Assemble and organize in accordance with Section 17, Media Acquisition, and the following
 - (a) As-Built Exhibit Plan Database - Stored on CD-ROM or DVD-ROM, and in accordance with Section 11, Content Management.
 - (b) As-Built Graphic Layouts - Stored on CD-ROM or DVD-ROM in accordance with Section 15, Two-Dimensional Exhibit Graphics, 15.5 and 15.6.
 - (c) High-resolution Scans of Art and Photos - Stored on CD-ROM or DVD-ROM in accordance with Section 15, Two-Dimensional Exhibit Graphics, 15.5 and 15.6.
 - (d) Digital Photos of the Completed, Operational Exhibit - As specified in this Section.
 - (2) Photo Negatives and Image Sources - Assemble and organize in accordance with Section 17, Use Rights and Licenses.
 - (3) Artwork - 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) Government-Furnished References - The contractor shall return all government-furnished reference materials, drawings, plans, and samples.
 - (5) Samples - All samples, models, and mock-ups required as submittals to the COR for review are the property of the government, including samples returned to the contractor for reference or stored in the contractor's shop. The COR will inform the contractor which samples are no longer of use and can be discarded and which shall be included in the closeout package.
 - (6) Maintenance Manuals - In accordance with Section 29, Operational Training and References.
 - (7) Photographs of the Completed, Installed Exhibits - The contractor shall photograph the installed exhibits and provide the digital images on CD-ROM, or as specified in the individual task order. A CD-ROM disk containing the images shall be included with each copy of the Maintenance Manual.

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Specific requirements include:

- (a) The quantity of images shall be at least 20, with a mixture of close-up and wide-view shots of the exhibits.
 - (b) All images shall be sharp-focused and high-resolution, with even lighting, minimal "hot spots" and dark shadows, and accurate color rendering.
 - (c) The exhibits shall be thoroughly cleaned and the viewpoints shall be prepared for the shots to eliminate construction dirt, tools, equipment, etc., visible in the background of the image.
 - (d) The images shall be provided in a TIFF or JPEG format unless specified otherwise in the individual task order.
- (8) The units of the National Park Service are required to manage their interpretive media assets through a centralized database. As a part of the closeout requirement of this contract, the contractor shall prepare and submit the required data for the media project completed under the contract, which the park will use to enter into the database.

The contractor shall submit a Component Inventory Schedule Spreadsheet using the template created in Microsoft Excel and government-furnished as Attachment K. An example of a Component Inventory Schedule which has been filled-in for another project is government-furnished as Attachment L.

- (a) The general categories of inventory are as follows:

Wayside - Wayside Panel - An outdoor exhibit graphic element fabricated to NPS Wayside specifications.

Wayside - Wayside Base - Outdoor support hardware fabricated to NPS Wayside specifications. Also, outdoor ancillaries such as audio stations, brochure holders, and coin boxes.

Exhibit - Exhibit Structure - Support features built or purchased specifically for the exhibition. These elements provide structural support and or operational support for the interpretive elements. These include platforms, walls, rail systems, soffit/ceiling/overhead support, bases, information desks, and benches/seating.

2-Dimensional Exhibit Graphic - An exhibit element whose primary purpose is to display a 2-dimensional graphic image. This includes the image on its substrate and any backing material to which it is permanently attached.

Exhibit Case - An exhibit element whose primary purpose is to hold and display objects that require protection from the surrounding exhibit environment. Includes Exhibit Case Base, Vitrine, Internal Lighting System, and Ancillary Lighting Equipment.

Exhibit Lighting System - System components used for general exhibit lighting not integrated into other exhibit elements.

Custom 3-Dimensional Exhibit Element - 3-Dimensional objects and assemblies within the exhibition that are informational, interpretive or artistic in nature and have been purchased or custom-fabricated by artists, sculptors, or technical specialists.

Exhibit Reproduction Historic Furnishing - Reproduction of an object from a specific historical era, depicted in an historic furnishing exhibit. This also includes historic room treatments such as floor coverings, window treatments, and wall papers.

Exhibit Audiovisual System - A combination of electrical, electronic and ancillary equipment that supports one or more audio, video, slide, film, and/or multimedia presentations within an interpretive media asset. Includes playback equipment, displays, control systems, audio equipment, projection screens, programmed lighting systems, and other ancillary equipment.

ID and Wayfinding Signage - Non-interpretive exterior directional and information signs and hardware.

(b) Required cost and technical data:

The cost and technical data required for each of the itemized components in the exhibition include the following minimum information. The contractor shall refer to Attachment L, the template of the Component Inventory Spreadsheet, which illustrates how this information is organized and other specific itemized data that is required depending on the type of media component.

- Tracking number
- Short description
- Acquisition cost

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- Quantity
- Installation date
- Estimated design life in years
- Exhibit number
- Dimensions
- GPS data for installed location
- Specific type, for that element (structure, graphic, 3-D element, audiovisual component, and so on)
- Accessibility compliance (in consultation with COR)
- Exposure to outside environment

(c) References:

Prior to preparation of the Component Inventory, the contractor shall consult with the COR for guidance on how the exhibition components shall be itemized and identified into their component parts, for the specific project under that contract. Attachment M, "NPS Interpretive Media Inspection Guidance" was developed as a guideline for parks to use for management and inventory of their interpretive media assets. The contractor can refer to this document as a reference for guidance on how to determine what constitutes individual components, how to determine dimensions of components, how much detail is required in the inventory, what are examples of components that may be custom or unique elements, and so forth. The contractor shall contact the COR with any question regarding preparation of the inventory.