



State of Utah

JON M. HUNTSMAN, JR.  
Governor

GARY R. HERBERT  
Lieutenant Governor

Department of Administrative Services

KIMBERLY K. HOOD  
Executive Director

Division of Facilities Construction and Management

DAVID G. BUXTON  
Director

## ADDENDUM NO. 5

Date: July 29, 2009

To:	<u>Company</u>	<u>Contact</u>	<u>Fax</u>
	BBI Engineering	Phil Bailey	415-695-9276
	Boston Productions	Chet Kaplan	781-255-1556
	Electrosonic	Bryan Abelowitz	609-239-0089
	Mad Systems	Tricia Rodriguez	714-259-9901

From: Rick James, Project Manager, DFCM

Reference: Audio Visual Integration – Utah Museum of Natural History  
University of Utah  
DFCM Project No. 02243750

Subject: **Addendum No. 5**

Pages	Addendum Cover Sheet	3 pages
	Revised Project Schedule	1 page
	Revised Bid Form	2 pages
	Attachment No. 1	24 pages
	<u>Drawing</u>	<u>1 page</u>
	Total	31 pages

**Note:** *This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.*

While we contend that SB220 should only be potentially applicable to a contract issued after the effective date of said bill, this is to clarify that for purposes of this contract, regardless of the execution or effective dates of this contract, the status of Utah Law and remedies available to the State of Utah and DFCM, as it relates to any matter referred to or affected by said SB220, shall be the Utah law in effect at the time of the issuance of this Addendum.

**5.1 SCHEDULE CHANGES:** The selection process now resuming. Reference attached Revised Project Schedule.

**5.2 GENERAL ITEMS:**

5.2.1 Revised cost estimate for the project is \$943,000.

- 5.2.2 The drawings and specifications which are now to be used for bidding are the original documents included in the original RFP modified by the requirements of the previously issued Addenda 1 through 4 and all additional addenda. DFCM and the Utah Museum of Natural History wish to thank all of the interested firms for their participation in the process to this point.
- 5.2.3 The agreement will be made with two parts: The initial agreement for Coordination and Approvals, and the change order for Materials, Equipment and Installation.
- 5.2.3.1 Initial Agreement for Coordination and Approvals: The initial agreement between DFCM and the Audio/Visual Integrator will be for the limited amount of up to 8% of the total Lump Sum Bid. This initial agreement will include the following: coordination with the CM/GC, and subcontractors, review of current construction documents, verification of conduit locations and other information required for construction, Attendance to the Partnering Schedule on the date indicated on the Project Schedule Revised and preparation of shop drawings and submittals for the reviews by the owner and the exhibit designer.
- 5.2.3.2 After the work of the Initial Agreement is complete, it is the intent of DFCM to issue a change order to the A/V Integrator's agreement to add the balance of the total bid amount for the completion of the agreement. The change order will be for equipment, materials and installation.
- 5.2.3.3 DFCM reserves the right to terminate the agreement at the completion of the work of the Initial Agreement in which case the A/V Integrator will be paid only the amount of the initial agreement.
- 5.2.3.4 Change Order for Materials, Equipment and Installation: It is anticipated that the Change Order for Materials and Equipment will be made by January 30, 2010. Once this change order is fully executed and incorporated in the original agreement, the A/V Integrator will be authorized to proceed with the balance of the work, including all work required by the contract documents. It is requested that the work of the Change Order for Materials, Equipment and Installation be substantially complete by October 3, 2011.
- 5.2.4 Refer to the attached PDF file "AV130.pdf": This sheet is to be included in Addendum No. 5. Note that the graphic bubble title refers to "Addendum No. 2". Please correct that note on the sheet to read as "Addendum No. 5".

### **5.3 CLARIFICATIONS/REVISIONS**

- 5.3.1 Reference attached "Attachment No. 1". This specification section is to replace the corresponding specification section in the original specification and in previous addenda. The Lab equipment has been revised in this spec as per AV130.pdf attached
- 5.3.1.1 Base bid for NV5.E06.av01 to be for a single 65" AV Monitor. AVI to provide an Additive Alternate for five frameless 42" Displays (as per Contract Documents). See Revised Bid Form.

- 5.3.1.2 X4-LF-3.11 Life microscopes and monitors should be by XC (not AVI)
- 5.3.1.3 Spec clarifications on Section 11130 AV Systems for Land Plate Tectonics (AV Integration scope) for the 32" Omni globe spherical display system including:
- a. Diameter spherical screen with enhanced contrast screen treatment
  - b. \*All required optical elements and alignment assemblies
  - c. 17" touch screen monitor with appropriate mounting hardware (TBD)
  - d. Cylindrical base projector enclosure and Pedestal
  - e. One (1) 4000 lumens min. projector with lens
  - f. computer with high performance video
  - g. OmniExplorer presentation software & Geometer conversion software
  - h. 600 million year Paleo animation
  - i. installation training, warranties by Arcscience
- 5.3.1.4 Exhibit Contractor to provide and install rail at 3' viewing distance for touchscreen monitor prior to Omniglobe install & final connection to Master show control & Master Audio Control while Arcscience is onsite for Owner training.

Contact:  
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**MULTI-STEP PROJECT SCHEDULE – REVISED  
PER ADDENDUM NO. 5 DATED JULY 29, 2009****PROJECT NAME: AUDIO VISUAL INTEGRATION - UTAH MUSEUM OF NATURAL HISTORY  
UNIVERSITY OF UTAH – SALT LAKE CITY, UTAH****DFCM PROJECT NO. : 02243750**

<b>Event</b>	<b>Day</b>	<b>Date</b>	<b>Time</b>	<b>Place</b>
Project reactivated via Addendum No. 5	Wednesday	July 29, 2009	4:00 PM	Fax and DFCM Web Site*
Last Date to Submit Questions for Final Addendum	Tuesday	August 4, 2009	4:00 PM	Rick James – DFCM E-mail <a href="mailto:rjames@utah.gov">rjames@utah.gov</a> Fax 801-538-3267
Final Addendum Deadline (exception for bid delays)	Thursday	August 6, 2009	4:00 PM	DFCM Web Site*
Prime Contractors Turn in Bid and Bid Bond Bid Opening in DFCM Conference Room	Wednesday	August 12, 2009	3:30 PM	DFCM 4110 State Office Bldg SLC, UT
Subcontractor List Due	Thursday	August 13, 2009	3:30 PM	DFCM 4110 State Office Bldg SLC, UT Fax 801-538-3677
Partnering Session	Monday	August 24, 2009		To Be Announced
Substantial Completion Date	Monday	October 3, 2011		

\* DFCM's web site address is <http://dfcm.utah.gov>.



**BID FORM - REVISED  
PER ADDENDUM NO. 5 DATED JULY 29, 2009**

NAME OF BIDDER \_\_\_\_\_ DATE \_\_\_\_\_

To the Division of Facilities Construction and Management  
4110 State Office Building  
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **AUDIO VISUAL INTEGRATION - UTAH MUSEUM OF NATURAL HISTORY - UNIVERSITY OF UTAH – SALT LAKE CITY, UTAH – DFCM PROJECT NO. 02243750** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: \_\_\_\_\_

**BASE BID:** For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$\_\_\_\_\_)

(In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 1:** For all work shown on the Drawings and described in the Specifications and Contract Documents for five frameless 42” Displays, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$\_\_\_\_\_)

(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by **October 3, 2011**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$1,000.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor’s Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of \_\_\_\_\_

The undersigned Contractor's License Number for Utah is \_\_\_\_\_.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization:

\_\_\_\_\_  
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

\_\_\_\_\_

Respectfully submitted,

\_\_\_\_\_  
Name of Bidder

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Authorized Signature

## Attachment No. 1 – Addendum No. 5 – Audio Visual Integration

### SECTION 11130 AUDIO-VISUAL SYSTEMS

#### PART 1 - GENERAL

##### 1.01 GENERAL CONDITIONS

A. Work of this section, as shown or specified, shall be in accordance with the requirements of Division 1 Specifications of the Contract Documents and Owner provided General Conditions.

##### 1.02 SUMMARY

###### A. Scope of Work

1. The range of audio visual technologies used include experiences based on simple media playback such as immersive audio environments, audio cues within mechanically interactive exhibits, a number of LCD screens and video projections in varying formats. Other exhibits involve larger video projections with touch activated interfaces to content. Additionally there are a number of interactive audio visual based 'trails' through the exhibits. These experiences are based on site specific interactive content that is accessed by handheld devices including the visitor's own smart phones through the University's wireless broadband Ethernet.
2. Furnish and install audio-visual systems as shown on the project drawings and described in this specification. The drawings and specifications do not describe all work required to fulfill the contract. In addition, provide any additional equipment, materials and labor required to make complete and working systems consistent with the intent embodied in the project drawings and specifications
3. Prepare shop drawings and other submittals for review by the exhibit design team prior to construction.
4. Provide all necessary connectors, terminals, punch blocks, patch bays, connector panels, and cover
5. Provide all necessary conduit, surface raceway, boxes, wire and fiber except those items specifically listed as work by others.
6. Provide all equipment required to meet the performance requirements defined in the AV design documents.
7. Coordination
  - (a) The Av Systems integrator will be required to work with University of Utah and existing service providers to insure that exhibits and wireless technologies work within the operating parameters and standards of the University's campus IT department (NetCom).
  - (b) All AV hardware that is built into millwork and graphics must be provided to the exhibit contractor for measurement and integration into exhibit housings and other surrounds. Shipment and delivery of this hardware should be coordinated with the Exhibit Contractor.
  - (c) The AV Systems Integrator is responsible for coordinating equipment requirements including native file formats for playback with the media producers. It may be necessary to conduct

online tests of optimal file formats and compression formats prior to installation of media content on site.

- (d) The AV Systems Integrator will be responsible for coordinating with the work of the Exhibit Contractor and the General Contractor's MEP and IT Subcontractors to insure that all systems are properly integrated into the base building's IT, electrical and mechanical infrastructure. Terminate of all wiring at panels, terminal closets and equipment racks. Test all installed cabling and equipment.

8. Provide for shipping sample equipment to Exhibit Contractor s & media producers as required.
9. Prepare all as built documentation
10. Provide on-site training in the operation and maintenance of the systems for personnel designated by the museum
11. Provide on-site support for opening week events.
12. Provide a one-year warranty covering all systems installed under this specification

2)

#### B. Related Work

1. Division 16: Conduit, raceway and standard electrical boxes shall be provided by General Contractor. All 120 VAC circuits for A/V, teleconferencing, and network devices. Installation of AV Integrator provided dimmer racks.
2. CAT5 and fiber optic cables, jacks and patch bays for connection of AV systems to building LAN. Exhibit specific CAT and fiber optic cables are included in AV integrators scope.

### 1.01 REFERENCES

#### A. Codes

1. Federal, state, and local codes and requirements.
2. Code compliance is mandatory. Inform the owner if work is shown that appears to conflict with codes.

#### B. Standards:

1. CSA, UL or other nationally recognized testing laboratory standards.

### 1.02 SYSTEM DESCRIPTION

- A. General: Provide audio-visual systems for sound playback, video projection, computer graphics display, and AV interactive elements
- B. The system consists of the exhibits listed in the following chart;

Exhibit Name	Ref	notes
<b><i>CANYON</i></b>		
Trail Head	CN4.E01.av01-06	(6x) 17" touchscreen, CPU , 1 CPU & laser printer in gift shop
Trail System	N/A	Server for Trail System
<b><i>SKY</i></b>		
Demo Area	SK.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS 46" monitor,CPU (Instrument N.I.C.),trackball
Weather Station	SK3.E01.av01	Install OFE weather cam.
Snowflake Video	SK3.E01.av02	20" AV monitor, S-Def
<b><i>NATIVE VOICES</i></b>		
Demo Area	NV.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Storytelling Generational Memory	NV6.E01.av01-04	MP3 w/ focused spkr (4) caption reader
Welcome	NV5.E06.av01	(5) frameless 42" Displays S-Def, (4) handsets
Language Station	NV1.E01.av01	MP3 player, speaker, motion sensor
	NV3.E01.av01	CPU, 17" touchscreen, mic, headphones
<b><i>LIFE</i></b>		
Demo Area	LF.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Keritan Interactive	LF2.E02	(24) 2" 5x7 LED displays & electronics
What Cells Can Do Populations	LF3.E02.av01	Video projector, S-Def, focused spkr
Interactive	LF5.E02.av01	Touch interactive
Ecosystems	LF6.E01-E04.av01	(4x) 4 Sprk. Soundscape
Human Interactions	LF6.E05.av01	4) handsets w/ optical hook switch to trigger sounds
Talkback Station	LF6.E05.av02	CPU, 17" monitor w/ kbd station
<b><i>THE LAND</i></b>		
Demo Area	LD.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Plate Tectonics	LD1.E03.av01	Globe on/off control only Allowance for 32" Omni Globe+software
B&R Biogeography	LD4.E08.av01	26" LCD, CPU, Buttons
Talkback Station	LD4.E04.av01	CPU, 17" monitor, still cam
Jump Seismometer	LD4.E03.av01	CPU, 15" monitor, local

**FIRST PEOPLES**

Demo Area	FP.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Mapping Ceramics, Tools, Weaving	FP2.E01.ino1 FP5.E02.av01 FP5.E05.av01 FP5.E06.av01	Lighting control only. (3x) 20" AV monitor S-Def w/ sound
Tool Interactive	FP5.E06.in01	Triggered Audio

**LAKE**

Demo Area	LK.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Sounds of the Lake Watershed	LK2.E01.av01 LK2.E06.av01	(8) speaker soundscape 46" AV Monitor, S-Def, speakers, Cap Snsr
People and the Lake	LK2.E05.av01	46" AV Monitor, S-Def, speakers, Cap Snsr

**PAST WORLDS**

Demo Area	PW.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Pleistocene Dinner Table	PW2.E04.av01	Triggered Audio (x5)
Paleo Prep Cleveland Lloyd Quarry	PW7.E01.av01 PW5.E03.av01	20" AV monitor, S-Def, w/ sound (4) 32" AV monitor, S-Def, w/ sound
Late Cretaceous	PW4.E01.av01	(6) speaker soundscape

**UTAH FUTURE**

Sustainability (basic) UF Talkback Station2	UF3.E01.av01 UF3.E01.av02	single 10K LCD, CPU, 15 gobo & sensor CPU, 12" monitor spkrs, microphone, repeat monitor
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**OUR BACKYARD**

Our Backyard Animal Sounds	OB2.E01.av01	(5x) MP3 players & speakers + 5 spkrs, 2 tracks in trees
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	PW8.av01 FP3.av01 LF7.av01	
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**Labs** (3x) Ceiling Spkrs, Laptop Iface, Controls, Proj,W/L mic, floating ALS

**History Now** HV.AV01-AV03 (3x) 20" monitor, CPU, KBD, Trkball

Mockup Allowance

**Central Exhibit Dimmer & Control** Dimmer controls only, dimmer by GC

- C. Systems includes KVM switch to monitor all computers in rack room
- D. System includes video multiplexor for monitoring video playback in rack room

- E. Many exhibits have motion sensors covering area in front of exhibit to trigger the start of the show. Selecting, providing, installing and wiring a motion sensor is in this scope.
- F. Many exhibits have hidden momentary pushbutton switches to start and stop specific exhibits. Providing, installing and wiring this momentary switch is in this scope as required
- G. Projection exhibits may have dual projectors for back-up. There is no intention to run both projectors at the same time so pixel resolution alignment is not required.

### 1.03 SUBMITTALS

#### A. Submittals Required Prior to Fabrication:

1. Provide 3 copies of all submittals and allow a minimum of 14 days for review.
2. Submittal shop drawings to include the following
  - (a) Functional block diagrams for the audio, video, room control, and network/telecom systems. Label all inputs and outputs.
  - (b) Rack, frame and backboard elevations for all systems.
  - (c) Audio, video and network patch panels.
  - (d) Detailed riser diagram.
  - (e) Panel details showing all engraving for all systems.
  - (f) Schematics of all custom circuits.
  - (g) Detail any modifications to equipment supplied by manufacturers.
  - (h) Screen images of the audio processor programs showing blocks and all control pages, and a listing of statistics from the compiler showing board, processor and net utilization if applicable.
  - (i) Chart or other documentation of exhibit programming functionality. This should document:
    1. How the exhibit operates on the floor
    2. How the exhibit is turned on & off
    3. Any staff controls for test/debug

#### B) Prototyping:

1. General Some larger exhibits will require a level of full-scale prototyping in coordination with exhibit contractor and media producers. It is assumed that the AV Systems Integrator will provide staging, equipment and facilities for these working prototypes for designer and owner review prior to full implementation Specific exhibits requiring mockup

Populations Interactive LF5.E02.av01  
Sustainability Interactive UF3.E01.av01

2. Prior to final fabrication and installation of all interactives shall be prototyped and tested by the Exhibit Contractor and reviewed by Exhibit Designer and Owner.
3. Fabrication schedule should be planned so that a minimum four weeks are allowed for prototyping testing and review prior to installation.
4. Notify Exhibit Designer one month in advance of dates and times when prototype will be fabricated and ready for review.
5. Prototypes shall demonstrate the aesthetic effects and functional qualities of materials and systems as well as the defined visitor experience, ergonomics and mechanical functioning of all interactives
6. Mock-up will take place in the AV Integrators shop.
7. Build mockups and prototypes to comply with the following requirements, using materials and products indicated for the completed Work to demonstrate the following:
  - functionality
  - accessibility, ergonomics and ease of use
  - integration of hardware, products and systems
  - durability

C. On completion of the Installation:

1. Submit written notification to the Owner of completion of initial tests, and coordinate checkout schedule.
2. Submit as-built drawings, to include:
  - a. Functional block diagrams for the audio, video, room control, and network/telecom systems. Label all inputs and outputs
  - b. Rack, frame and backboard elevations for all systems.
  - c. Audio, video and network patch panels
  - d. Wire lists for all systems, assigning wire numbers for every wire
  - e. Schematic of all custom circuits.
  - f. Detail any modifications to equipment
  - g. Submit System Operation and Maintenance Manuals as specified in Section 01730, to include:
    - h. All manufacturers' manuals. In a narrative section illustrated as necessary, describe the typical procedures to be followed in configuring and operating the systems. This manual should be written for a technically literate reader who is not an expert.
    - i. A programmer's manual, intended to guide an experienced programmer through the custom software, with appropriate references to manufacturer's manuals.
    - j. A maintenance manual, describing programmed maintenance procedures with appropriate references to manufacturer's manuals.

- k. A troubleshooting guide.
- l. A summary in tabular form of the operating settings of all adjustable components

#### 1.04 QUALITY ASSURANCES

- A. The fabricator and the installer shall be one of the same firm who can substantiate that the firm has been continuously engaged in the fabrication and installation of museum audio-visual work similar in scope and scale to that described herein for not less than seven (7) years.
- B. Contractor must identify name and experience and contact information for the project manager and lead programmer who will remain on this project from initiation to completion. Lead programmer must be on contractor's permanent staff and not a subcontractor.

#### 1.05 OTHER GENERAL REQUIREMENTS

- A. Field Cooperation: Cooperate at all times with all trades doing work on site to minimize lost time, work stoppages and interference.
- B. Store all material until it can safely be installed on site. Coordinate delivery times, storage and protection of the equipment at the site, and acceptance with the Owner

#### 1.06 WARRANTY

- A. Provide a 1 year warranty on the installed systems. Warranty period shall begin on acceptance of the system by the Owner.
- B. Warranty shall cover labor and materials required to keep systems functioning as they were at the time of acceptance. Consumables such as projector lamps are not covered by the warranty. Damage or loss due to improper operation of the equipment, fire, flood, earthquake or theft shall not be covered by the warranty.
- C. During the warranty period, inspect the system annually and restore all equipment to original performance.

### Part-2 PRODUCTS

#### 2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new and shall meet or exceed the latest published specifications of the manufacturer in all respects.
- B. Supply the latest model of each piece of specified equipment available at the time of bidding. In the event that models are superseded between bidding and ordering of equipment, notify the Owner and provide the latest model with equal or superior specifications if the cost does not exceed that of the equipment as bid. If the cost of the newer piece exceeds the bid amount the Owner may elect to purchase the newer piece as a change order at additional cost.

#### 2.02 SOFTWARE

- A. Show control software will be the responsibility of the contractor. Show control software will operate exhibits as described in media briefs. In addition software will provide for:
- Scheduled system on/off following museum operation hours
  - Manual override of schedule for events
  - Global volume controls
  - System status reporting via graphical “map” of exhibit
  - Any Code mandated fire shutdown.
- B. Media software will be the responsibility of Media Producer.
- C. Contractor will be responsible for setting up any computers supplied by contractor so they will auto boot with no login to the operating system.

### 2.03 CUSTOM FABRICATION

- A. Unless otherwise specified, custom plates shall be 1/8” brushed aluminum with beveled edges. Labels shall be engraved and paint filled. Anodized finish and infill colors to be approved by Owner.
- B. Adopt either EIA 568-A or –B wiring standard for Cat-5 cable to coordinate with data/telecom contractor.
- C. Avoid use of mini-din connectors for S-video on custom plates. Use dual 75 ohm BNC on plate and adapters at equipment.
- D. Equipment mounted in racks shall be labeled
- E. Seismic safety: Attach all permanently installed equipment to the building to minimize risks to personnel and the equipment in the event of earthquake. Brace all hanging equipment appropriately. Obtain the services of an appropriately licensed engineer for design of attachments and mounts where required by codes or prudent practice.
- F. All custom fabricated circuits employing integrated circuits and/or discrete components will be built using custom printed circuit boards. Wire wrap or soldered construction on prototyping boards is not acceptable. Exception: Pads and other simple networks that can be built into connector bodies or barrels.

## PART 3 EQUIPMENT SCHEDULE

### 3.1 OVERALL SYSTEMS

#### 1. Show Control

- a. Acceptable systems; Crestron / AMX / MSC, Alcorn-Mcbride

- b. All exhibits will be under control of a master show control system. Contractor will provide system meeting the following design criteria.
- c. System will be modular. No more than (3) exhibits will be connected to a single controller element to prevent single point failure from affecting other exhibits. Units will be networked to allow for overall monitor system however removal of monitor system will not affect exhibit operation.
- d. System will provide an overall status monitor to show the status of:
  - The whole museum (on graphical floor plan)
  - Individual exhibits
  - Individual pieces of equipment.
- e. System shall be programmable to achieve all functionality in specification including
  - Master on/off via schedule and buttons with override.
  - Global Volume Control
  - Specific exhibit functionality & monitoring

## 2. Master Audio Control

- a. Acceptable systems Media Matrix, BSS, MSC
- b. All audio signals will run through the master audio system. Contractor will provide system meeting the following design criteria.
- c. System will be DSP based.
- d. System will be modular. No more than (3) exhibits will be connected to a single controller. Single point failure will not affect other exhibits
- e. All inputs and outputs will be balanced.
- f. Each output channel will have volume control, 5 band parametric EQ, delay and limiting functions. Each inputs will have 5 band parametric EQ, limiting and matrix mixing capabilities.

## 3. Computers

- a. Computers will be commercial grade major manufacturer PC's with the following minimum features
  - Intel Core 2 duo processor > 3Ghz
  - 2Gb Ram, 80GB hard drive, DVD-ROM drive
  - NVidia Quadro video card.
  - Vista Operating system

## 4. Media Players

1. At bid time this project is based on Standard Definition playback. The project is aware of the transition to HD and this may be revisited however for the purpose of this bid each video playback will include:
  - a. Standard Definition Media player with solid state memory with demonstrated record of at least 3 years operation in a museum environment
  - b. Simultaneous Y/U/V and composite outputs (or DA to achieve this functionality)
  - c. Cable for future HD upgrade including one Cat5/6 low skew cable and one HD-SDI (SMPTE-292) coax.

### 3.2 SPECIFIC EXHIBITS

#### ***1.CANYON***

**Trail Head** (6) computer interactives + gift shop printer)  
**CN4.E01.av01-06**

- |                           |   |
|---------------------------|---|
| 7) 17" Touch Monitors     | ELO 1739L                                 |
| 7) Computers              | HP/Dell Pentium (see computer spec above) |
| 6) Cat-5 Extender         | TBD/ Magenta                              |
| 1) Printer (in gift shop) | HP P4014N                                 |

**Trail System** *Server for Smart Phone System*

- 1) Server 3GH Intel Quad core, Raid 5, (8) 146GB 15Krpm drives  
Dual gigabit connection
- 1) 15" monitor
- 1) UPS 2200VA rack mount

#### ***2.SKY***

**Weather Station** *Weather display*  
**SK3.E01.av01**

- |                                      |                 |
|--------------------------------------|-----------------|
| 1) 46" Monitor                       | NEC 4620        |
| 1) Computers                         | HP/Dell Pentium |
| 1) Cat-5 Extender                    | TBD/ Magenta    |
| 1) Interface to owners weather inst. | TBD             |

The following are now OFE and installed by AVI

- 1) Sky Cam 5mp @15mps camera TimeScience
- 1) CPU and software for time-lapse rec.

**Snowflake Video** *Video playback w/sound, linear media*  
**SK3.E01.av02**

- |  |                                 |
|--|---------------------------------|
| 1) 20" LCD flat panels                           | ToteVision LCD-2007HDL          |
| 1) SD Media Players<br>(see general notes above) | Alcorn DVM \ P<br>DoReMi Nugget |
| a/r Master Show Control                          |                                 |
| a/r Master Audio Control                         |                                 |

#### ***3.NATIVE VOICES***

**Storytelling**  
**NV6.E01.av01-04**

*Audio playback w/4 Caption readers.*

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| 1) Speaker                      | Dakota FA-501                       |
| 1) MP3 playback                 | Alcorn 8-TraXX or 4MP3              |
| 4) Caption Displays             | Densitron LM4790+custom electronics |
| 4) electronic drivers for above | Custom                              |
| 1) Docent Switch / Sensor       | Custom key switch                   |
| a/r Master Show Control         |                                     |
| a/r Master Audio Control        |                                     |

**Generational Memory**  
**NV5.E06.av01**

*5 seamless plasma, 5 ch synch SD playback*  
*Portrait orientation*

- 5) 42" seamless plasma Akira/Orion MIS 4220
- 1) SD Media Players Alcorn DVM \ P
- (see general notes above) DoReMi Nugget
- 4) Small handsets (mushroom shaped)



Part # RU-9931  
Receiver, Western Elec.  
5 1/2" long  
Weighted hard rubber,  
original finish, NOT glossy

Note this is only the shell. Working parts and armored cable are custom by AV Integrator.

- 1) multi channel headphone amplifier Behringer HA-8000
- 1) Sync gen a/r
- a/r Master Show Control
- a/r Master Audio Control

**Welcome**  
**NV1.E01.av01**

*Triggered audio message*

- 1) Speakers JBL Control 25
- 1) MP3 playback Alcorn 8-TraXX or 4MP3
- 1) Sensor Passive Infrared / TBD
- 1) Amplifier QSC CX-302

**Language Station**  
**NV3.E01.av01**

*17" touch monitor, CPU, kbd & trackball, mic & headphones*

- 1) 17" Touch Monitors ELO 1739L
- 1) Computers HP/Dell Pentium (see computer spec above)
- 1) Trackball Happ
- 1) Trackball extender a/r
- 1) Cat-5 Extender TBD/ Magenta
- 1) Headphone Amp Berringer HA-8000
- 2) Headphone TBD Allow \$100 ea
- 1) Voice Processor Symetrix 528E
- 1) Microphone Shure MX-395 cardioid

#### **4.LIFE**

##### **Keritan Interactive LF2.E02.in01**

*~24 2" 2 digit readouts, electronics package & programming to run game*

- |   |                   |
|---|-------------------|
| 30) 2" 5x7 Led Dot Array                    | LiteON LTP-2157AY |
| Verify color with designer                  |                   |
| 30) circuit cards for above including       | Custom            |
| Drivers, controller and touch sensor        |                   |
| (note this must be PCB)                     |                   |
| 1) Central controller/computer to run game. | Custom            |
| 3) Capacitive sensors to start game         | Custom            |

All programming to provide complete functional interactive  
Per media brief.

##### **What Cells Can Do LF3.E02.av01**

*~4'x'6' projected image linear media w/ sound  
+ switch to video microscope.*

- |                            |                |
|----------------------------|----------------|
| 1) 5K lumen DLP Projector  | Eiki EIP-5000  |
| 1) Lens (contractor sized) |                |
| 1) Set spare lamps         |                |
| 1) Projector mounting      | Custom         |
| 1) SD Media Players        | Alcorn DVM \ P |
| (see general notes above)  | DoReMi Nugget  |
| 1) Directional Speaker     | Dakota FA-501  |
| 1) Pushbutton              | Happ / TBD     |
| 1) 12" video monitor       |                |
| a/r Master Show Control    |                |
| a/r Master Audio Control   |                |

##### **Populations Interactive LF5.E02.av01**

*~4'x'6' projected image linear media w/ sound*

- |                                  |  |
|----------------------------------|--|
| 1) 3K lumen Projector SXGA+      | Projection Design F30sx                        |
| 1) Lens (contractor sized)       |  |
| 1) Set spare lamps               |  |
| 1) Projector mounting            | Custom   |
| 1) Computers                     | HP/Dell Pentium (see computer spec above)      |
| 1) Fiber Extender                | Geffen DVI 1500HD                              |
| 1) DVI-VGA converter             | Extron DVI-RGB150                              |
| 1) Vip Touch Foil 30-40" max 4:3 | ViP (co-ordinate size with exhibit fabricator) |
| 1) Set USB extenders             |  |
| a/r Master Show Control          |  |

**Ecosystems**  
**LF6.E01-E04.av01**

*(4) areas of natural sounds*

Equipment list is for all (4) dioramas

- |                          |                            |
|--------------------------|----------------------------|
| 4) 4track MP3 player     | Alcorn 8Traxx / or 4MP3    |
| 8) Small speakers        | QSC AD-S52 (overhead)      |
| 8) Small speakers        | JBL Control 25 (in bushes) |
| 4) 4 channel amplifier   | QSC CX-404                 |
| 16) Speaker brackets     | Custom                     |
| a/r Master Show Control  |                            |
| a/r Master Audio Control |                            |

Note DMX feeds to dimmers from show control.

**Human Interactions**  
**LF6.E05.av01**

*(4) audio players with mushroom handsets*

- |                                     |                         |
|-------------------------------------|-------------------------|
| 1) 4 track MP3 player               | Alcorn 8Traxx / or 4MP3 |
| 4) Small handsets (mushroom shaped) |                         |



Part # RU-9931  
Receiver, Western Elec.  
5 1/2" long  
Weighted hard rubber,  
original finish, NOT glossy

Note this is only the shell. Working parts and armored cable are custom by AV Integrator.

- |                                      |                   |
|--------------------------------------|-------------------|
| 1) multi channel headphone amplifier | Behringer HA-8000 |
| 4) optical "hook" switch             | Sharp GP2A200LCS  |
| a/r Master Audio Control             |                   |

**Talkback Station**  
**LF6.E05.av02**

*computer blogging station text only*

- |                                  |   |
|----------------------------------|---|
| 1) 17" Monitors (touch optional) | ELO 1739                                  |
| 1) Computers                     | HP/Dell Pentium (see computer spec above) |
| w/ rugged Keyboard/trackball     |   |
| 1) Cat-5 Extender                | TBD/ Magenta                              |

## 5. THE LAND

### **Plate Tectonics** **LD1.E03.av01**

*Video Globe*

- 1) 32" Video Globe  
w/ 600Myr Paleo Animation
- 1) 15" Monitors  
a/r Master Show Control  
a/r Master Audio Control

Omni Globe  
NEC ALSCD52V-BK

### **B&R Biogeography** **LD4.E08.av01**

*26" Monitor Computer Interactive*

- 1) 26" LCD flat panels
- 1) Computers
- 1) Cat-5 Extender
- 2) Buttons  
a/r Master Show Control  
a/r Master Audio Control

Sharp LC26SB24U  
HP/Dell Pentium (see computer spec above)  
TBD/ Magenta

### **Talkback Station** **LD4.E04.av01**

*computer blogging station text and still cam*

- 1) 17" Monitors (touch optional)
- 1) Computers  
w/ rugged Keyboard/trackball
- 1) Cat-5 Extender
- 1) Still Camera
- 1) USB interface

ELO 1739  
HP/Dell Pentium (see computer spec above)  
TBD/ Magenta  
Quick Cam Vision Pro  
TBD

### **Jump Seismometer** **LD4.E03.av01**

*CPU, 15" Monitor. Seismometer by owner*

- 1) 15" Monitor
- 1) Computer

NEC ALSCD52V-BK  
HP/Dell Pentium (see computer spec above)

## 6. FIRST PEOPLES

### **Mapping Interactive** **FP2.E01.av01**

*lighting control only*

- 1) Button  
a/r Master Show Control

TBD

### **Ceramics, Tools & Weaving** **FP5.E02.av01, FP5.E05.av01 & FP5.E08.av01**

*(3) 20" video playback w/ sound, linear media*

- 3) 20" LCD flat panels ToteVision LCD-2007HDL
- 3) SD Media Players Alcorn DVM \ P
- (see general notes above) DoReMi Nugget
- a/r Master Show Control
- a/r Master Audio Control

**Tool Interactive** *triggered MP3 playback*  
**FP5.E06.in01**

- 1) MP3 player Alcorn 8Traxx / or 4MP3
- 1) Small speaker TBD coord w/ Exhibit Contractor
- 1) amplifier QSC CX-302
- a/r Master Show Control
- a/r Master Audio Control
- Note trigger switches by Exhibit Contractor

**7.LAKE**

**Sounds of the Lake** *(8) speaker natural sound soundscape*  
**LK2.E01.av01**

- 1) 4track MP3 player Alcorn 8Traxx / or 4MP3
- 8) Small speakers QSC AD-S52
- 1) 8 channel amplifier QSC CX-168
- 8) Speaker brackets Custom
- a/r Master Show Control
- a/r Master Audio Control

**Watershed** *46" video playback w/ sound, SD linear media*  
**LK2.E06.av01**

- 1) 46" LCD flat panels NEC LCD 4620-2-AV
- 2) Display Speakers Innovox FD-H2(cut to length)
- 1) Amplifier QSC
- 1) SD Media Players Alcorn DVM \ P
- (see general notes above) DoReMi Nugget
- a/r Master Show Control
- a/r Master Audio Control

**People and the Lake**  
**LK2.E05.av01**

*46" video playback w/ sound, SD linear media*

- |                           |                              |
|---------------------------|------------------------------|
| 1) 46" LCD flat panels    | NEC LCD 4620-2-AV            |
| 2) Display Speakers       | Innovox FD-H2(cut to length) |
| 1) Amplifier              | QSC                          |
| 1) SD Media Players       | Alcorn DVM \ P               |
| (see general notes above) | DoReMi Nugget                |
| a/r Master Show Control   |                              |
| a/r Master Audio Control  |                              |

**8.PAST WORLDS**

**Paleo Prep**  
**PW7.E01.av01**

*video playback w/ sound, SD linear media*

- |                           |                        |
|---------------------------|------------------------|
| 1) 20" LCD flat panels    | ToteVision LCD-2007HDL |
| 1) SD Media Players       | Alcorn DVM \ P         |
| (see general notes above) | DoReMi Nugget          |
| a/r Master Show Control   |                        |
| a/r Master Audio Control  |                        |

**Pleistocene Dinner Table**  
**PW2.E04.av01**

*5 track triggered MP3 playback*

- |                          |                                 |
|--------------------------|---------------------------------|
| 1) 5track MP3 player     | Alcorn 8Traxx / or 4MP3         |
| 1) Small speaker         | TBD coord w/ Exhibit Contractor |
| 1) amplifier             | QSC CX-302                      |
| a/r Master Show Control  |                                 |
| a/r Master Audio Control |                                 |

Note trigger switches by Exhibit Contractor

**Cleveland Lloyd Quarry**  
**PW5.E03.av01**

*4 ch sync video playback w/sound, linear media*

- |                           |                              |
|---------------------------|------------------------------|
| 4) 32" LCD flat panels    | NEC LCD-3220                 |
| 4) Display Speakers       | Innovox FD-H2(cut to length) |
| 1) Amplifier              | QSC CX-404                   |
| 4) SD Media Players       | Alcorn DVM \ P               |
| (see general notes above) | DoReMi Nugget                |
| 1) Sync gen a/r           |                              |
| a/r Master Show Control   |                              |
| a/r Master Audio Control  |                              |

**Late Cretaceous Soundscape**  
**PW4.E01.av01**

*(6) speaker natural sound soundscape*

- |                          |                         |
|--------------------------|-------------------------|
| 1) 4track MP3 player     | Alcorn 8Traxx / or 4MP3 |
| 6) Small speakers        | QSC AD-S52              |
| 1) 8 channel amplifier   | QSC CX-168              |
| 6) Speaker brackets      | Custom                  |
| a/r Master Show Control  |                         |
| a/r Master Audio Control |                         |

**9.UTAH FUTURES**

**Sustainability Interactive**  
**UF3.E01.av01**

Diorama Projections & interactive

- |                       |                             |
|-----------------------|-----------------------------|
| 1) 10K Lumen DLP      | Panasonic PT-DW-10000U      |
| 1) lens               | contractor sized            |
| 1) set spare lamps    |                             |
| 2) CPU                | HP/Dell                     |
| 1) Graphics Card      | TBD                         |
| 1) Fiber Extender     | Geffen DVI 1500HD           |
| 1) DVI-VGA converter  | Extron DVI-RGB150           |
| 3) Gesture Cameras    | Sentec STV-160BC            |
| 3) Lens               | contractor select to cover. |
| 3) Screw on IR filter | Custom                      |
| a/r Camera interfaces |                             |
| 8) IR Illuminators    | Custom                      |
- 1) Custom gesture capture software per interactive write up. This is only the capture system. Media production by others.

**Talkback Station**  
**UF3.E01.av02**

*AudioVideo recording station + Playback station*

- |                              |   |
|------------------------------|---|
| 1) 20" Monitor w/ camera     | Dell SP2009W                              |
| 1) 32" LCD monitor           | NEC LCD 3220                              |
| 2) Computers                 | HP/Dell Pentium (see computer spec above) |
| w/ rugged keyboard/trackball |   |
| 2) Cat-5 Extender            | TBD/ Magenta                              |
| 2) Wall speakers             | JBL Control 126W                          |
| 1) Amplifier                 | QSC CX-302                                |
| 1) Voice Processor           | Symetrix 528E                             |
| 1) Microphone                | Shure MX-395 cardioid                     |

## 10. OUR BACKYARD

### Our Backyard Animal Sounds OB2.E01.av01

(5) speaker soundscape

- |                            |                                  |
|----------------------------|----------------------------------|
| 1) 8track MP3 player       | Alcorn 8Traxx / or 4MP3          |
| 5) Speakers in tree        | 3-4" Custom Coord w/ exhibit fab |
| 1) multi channel amplifier | QSC 168                          |

## 11. OTHER SYSTEMS

### Central Dimmer

a/r ETC Pharos (or equal to match contractor provided dimmer if not ETC) controls to implement:

- "Life Intro" gobo effects LF1.E01
- "Mapping Interactive" grid lighting FP2.E.01.av01
- "Ecosystems" LF6.E01-04.av01

These exhibits all have lights that are either looping, synchronized to AV or triggered by visitor buttons.

Wiring & Programming by AV integrator.

The dimmer itself will be purchased and installed by the base building electrical contractor.

**Labs** *Projection w/ laptop interface, Central SD media, speakers*

**PW8.av01** **Earth Lab**  
**FP3.av01** **Dry Cave Lab**  
**LF7.av01** **Naturalist Lab**

Equipment list is for all (3) labs

- |  |  |
|--|--|
| 3) DLP Projector                       | Panasonic PT-D5700UL                             |
| 3) lens                                | sized by contractor                              |
| 3) Sets spare lamps                    |  |
| 3) Laptop interface                    | Extron RGB 460xi                                 |
| 3) SD Media Players                    | Alcorn DVM \ P                                   |
| (see general notes above)              | DoReMi Nugget                                    |
| 26) Ceiling Speakers                   | JBL Control 26CT                                 |
| 1) 70V amp                             | QSC CX-204V                                      |
| 3) Headworn w/l mics                   | Sure ULXPro 14/30                                |
| 1) Complete Assistive listening system | Listen LS-02-072                                 |
| 3) Wall Control Stations               | AMX MET-6N                                       |
| a/r Control system                     |  |
| a/r Audio System                       | include individual volume control for each input |
| 1) 8.4" rack mount touch panel         | AMX  |
| 1) Control software                    | Custom   |

**“History Now” Stations  
HV.AV01-AV03**

*computer, monitor on rolling cart*

Equipment list is for all (3) carts

- |  |   |
|--|---|
| 3) 20” Monitors                              | NEC LCD205WNXM                            |
| 3) Computers<br>w/ rugged Keyboard/trackball | HP/Dell Pentium (see computer spec above) |

**Demo Areas**

*Wireless mic, controls, speakers*

Equipment list is for all (7) Demo Areas

- |  |  |
|--|--|
| 14) Ceiling Speakers                   | JBL Control 26CT                                 |
| 2) 70V amp                             | QSC CX-204V                                      |
| 7) Headworn w/1 mics                   | Sure ULXPro 14/30                                |
| 1) Complete Assistive listening system | Listen LS-02-072                                 |
| 7) Wall Control Stations               | AMX MET-6N                                       |
| a/r Control system                     |  |
| a/r Audio System                       | include individual volume control for each input |
| 1) 8.4” rack mount touch panel         | AMX  |
| 1) Control software                    | Custom   |

**Common Equipment**

- |   |                                |
|---|--------------------------------|
| a/r racks & accessories   | Middle Atlantic MRK series     |
| a/r AC power distribution & seq.  | Middle Atlantic                |
| 2) Rack drawer for remotes  |                                |
| 1) Dual Rack mount video monitor  | Custom / Marshall VR-82 series |
| a/r Video multiplexor<br>(connect all video players)                      | Extron/ Honeywell              |
| a/r Ethernet Switch 24port, 1Ghz<br>(connect all computers & controllers) | Netgear/Cisco (coord w/ owner) |
| a/r KVM w/ 2 outputs<br>(connect all computers)                           | Unimux 32x4                    |
| 1) 15” Monitors   | NEC ALSCD52V-BK                |
| 1) Rack mount keyboard shelf  | Custom/ TBD                    |
| 2min) UPS<br>Size ups to power racks                                      | Triplite Smart2200RMXL2U       |

## PART 4- EXECUTION

### 4.01 EXAMINATION

- A. Prior to commencing installation, verify all critical dimensions and conditions under which work is to be installed. Notify Owner in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of work. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Insure that no devices (including cameras, monitors, projectors, microphones and loudspeakers) are prevented from achieving their intended function by interfering fixtures, architectural elements, or other audiovisual equipment. Notify Owner in writing of any such problems, and do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Contractor is responsible for assuring that no CAT5 cable runs provided by the Contractor exceed 90m. Notify Owner in writing of any runs that will exceed this distance.
- D. Carefully verify all required projection and camera lens focal lengths to achieve desired image sizes and projector locations. Notify Owner in writing if no lens will fit the requirements. Note this means no lens, not just the standard lens that comes with the projector.

### 4.02 INSTALLATION

- A. General
  - 1. All cables, regardless of length, will be marked with permanent, non-handwritten number or letter cable markers within six inches of both ends. There shall be no unmarked cables at any place in the system. Marking codes used on cables shall correspond to codes shown on drawings and/or run sheets.
  - 2. All cables shall be installed splice free from backboard, rack or frame to final destination.
  - 3. Each of the cable groups identified in the project drawings are to be run in separate conduit, bundled separately where run in trays, and grouped within racks except where specifically noted.
  - 4. Wherever possible, maintain 3" separation between cable groups. Maintain larger separations where necessary to avoid interference.
  - 5. All cable shall carry at least the NEC CM rating. Use plenum cable everywhere in project other than within racks or in runs completely within conduit.
  - 6. Provide sufficient ventilation within racks to insure that all equipment operates within manufacturer's recommendations.
  - 7. All boxes and equipment shall be mounted plumb and square.
- B. Audio
  - 1. Maintain phasing throughout the audio system.
  - 2. Use crimp type lugs where stranded wire is connected to barrier strips and binding posts.

3. Each rack shall contain a grounding bus bonded to the rack frame and connected to the audiovisual power distribution panel with a #6 or larger conductor. The rack shall show an impedance of at least 100 Kohm to ground when this conductor is lifted.
4. AC outlets within racks shall have ground wires, which shall be connected to the rack ground bus.
5. Connect audio cable shields at one end or both ends to produce best system noise performance. Mic lines and tie lines shall have shields connected at both ends.

C. Video

1. All coaxial cable connections shall be made with crimp type BNC connectors. Provide adapters from BNC to UHF, S-Video or RCA connectors where required.
2. All video receptacles shall be insulated from the panels in which they are installed.
3. Terminate all unused outputs with the appropriate impedance.
4. Video signals may not be looped through connections unless explicitly specified.
5. The lengths of the cables used to carry S-video and component video signals shall be matched to within 1".
6. Projectors and cameras shall be installed so that images do not move or vibrate perceptibly under normal operating conditions.

#### 4.02 FIELD QUALITY CONTROL

- A. In all cases, provide written documentation of tests including date, test equipment used, test equipment configuration and results.
- B. Initial Tests and Measurements:
  1. Verify the operation of all system equipment.
  2. Verify pinout and pairing of all wiring.
  3. Verify DCE/DTE (pin 2/3) requirements of all serial cables. Test to verify voltage on both pins. Wire cable as x-over (null modem) if required.
- C. Audio-Visual Systems:
  1. Verify that audio systems are free from perceptible hum and buzz.
  2. Conduct measurements and adjust audio systems to meet performance standards.
  3. Measure impedance of all loudspeaker circuits at 1 kHz and verify that transformer tapping is appropriate.
  4. Test that all coaxial cables are free from shorts and isolated from ground.
  5. Verify that video systems do not exhibit interference effects from AC power circuits (video hum).
  6. Align all video projectors and adjust color balance on projectors and monitors.

#### 4.03 MUSEUM TRAINING

- A. Provide 20 hours of training to persons designated by the Museum in the operation of the systems in 5 non-contiguous 4-hour sessions.
- B. See also "Section 01820 Demonstration and Training" for other requirements.

#### 4.03 FINAL ADJUSTING AND ACCEPTANCE TESTS

- A. Inventory all equipment on site and compare to equipment lists in contract documents.
- B. Demonstrate operation of all systems and equipment.
- C. Review initial testing measurements. Repair system and repeat measurements as required by the Owner. Provide the following test equipment for use in making adjustments and acceptance testing by the Owner:
  - 1. Composite, S video color bar generator.
  - 2. 1/3 octave real time analyzer, calibrated SPL meter, and RMS voltmeter capable of reading in dBu.
  - 3. Audio tone generator and pink noise generator.
  - 4. Audio impedance meter operating at 1 kHz.
  - 5. Audio analyzer capable of measuring frequency response: MLSSA 9.0, TEF 20 or SIA SMAART.
  - 6. Cat 5 tester
  - 7. Video Test Generator both SD & HD
- D. Provide personnel expert in the operation and programming of all installed equipment for up to 80 straight time hours and 10 overtime hours to assist owner and consultant for adjustment and acceptance testing.
- E. Tests may be suspended at the option of the Owner if the systems fail to operate or if defective equipment requires repair or replacement. Tests will be resumed when the problems have been corrected by the Contractor.

#### 4.04 CLEANUP AND REPAIR

- A. The job site should be left clean and any damage caused to premises by installers should be repaired at no cost to Owner.

#### 4.05 PROTECTION OF WORK

- A. It is the responsibility of the contractor to protect finished and unfinished work against damage or loss until the date of final acceptance. Contractor shall take measures to prevent damage by dust and other byproducts of construction. Repair damaged work at no cost to the Owner.
- B. Museums are full of artifacts and other irreplaceable objects. While most of your work will take place prior to the installation of artifacts there will be some overlap. It is imperative that you take extra care to avoid risks to these objects. If you are unsure ask the museum staff for assistance.

Also many of these items have deep cultural value and no jokes or disrespectful comments will be tolerated.

END OF SECTION

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