

UTAH MUSEUM OF NATURAL HISTORY

100% FINAL DESIGN DOCUMENTS

ADDENDUM Nr. 5

EXHIBIT AUDIO VISUAL SYSTEMS

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RAA Project No. 0275

University of Utah Project No. 0872-9630

Division of Facilities Construction Management Project No. 02243750

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. Cost of shipment and insurance is the responsibility of the AV Systems Integrator. Delivery times should be coordinated with the Exhibit Contractor.

- (c) The AV Systems Integrator is responsible for defining and coordinating equipment and media program requirements including native file formats for playback with the Media Producer(s). AV Systems Integrator shall cover the cost of online tests to optimize file and compression formats for the specified AV Systems 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, terminations 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 Producer(s) 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 Owner.
 - 11. Provide on-site support for opening week events.
 - 12. Provide a one-year warranty covering all systems installed under this specification

2) RELATED WORK

A. Related Work Specified Elsewhere

- 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 Systems 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. Code compliance is mandatory. Inform the owner if work is shown that appears to conflict with federal, state, and local codes and requirements.

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
CANYON		
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
SKY		
Demo Area	SK.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Weather Station	SK3.E01.av01	46" monitor,CPU (Instrument N.I.C.), split screen ctrl + weather cam
Snowflake Video	SK3.E01.av02	20" AV monitor, S-Def
NATIVE VOICES		
Demo Area	NV.av01	Ceiling Spkrs, Controls, W/L mic, floating ALS
Storytelling	NV6.E01.av01-04	MP3 w/ focused spkr (4) caption reader
Generational Memory	NV5.E06.av01	(5) frameless 42" Displays S-Def, speakers
Welcome	NV1.E01.av01	MP3 player, speaker, motion sensor
Language Station	NV3.E01.av01	CPU, 17" monitor, KBD / trackball, headphones
LIFE		
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	LF3.E02.av01	Video projector, S-Def, focused spkr
Populations Interactive	LF5.E02.av01	Touch interactive
Ecosystems	LF6.E01-E04.av01	(4x) 4 Sprk. Soundscape
Human Interactions	LF6.E05.av01	(4) handsets w/ buttons
Talkback Station	LF6.E05.av02	CPU, 17" monitor w/ kbd station

THE LAND

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" AV Monitor, S-Def,
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
Ceramics, Tools, Weaving	FP5.E02.av01 FP5.E05.av01 FP5.E06.av01	(3x) 20" AV monitors 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	<i>LK2.E01.av01</i>	(8) speaker soundscape
Watershed	<i>LK2.E06.av01</i>	46" AV Monitor, S-Def, speakers, Cap Snr
People and the Lake	<i>LK2.E05.av01</i>	46" AV Monitor, S-Def, speakers, Cap Snr

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 Lab	PW7.E01.av01	20" AV monitor, S-Def, w/ sound
Cleveland Lloyd Quarry	PW5.E03.av01	(4) 32" AV monitor, S-Def, w/ sound
Late Cretaceous	PW4.E01.av01	(6) speaker soundscape

UTAH FUTURE

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

OUR BACKYARD

Our Backyard Animal Sounds	OB2.E01.av01	(5x) MP3 players & speakers + 5 spkrs, 2 tracks in trees
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LEARNING LABS	Earth, Naturalist & Dry Cave	(3x) Ceiling Spkrs, Laptop Iface, Controls, Proj,W/L mic, floating ALS
NATURAL HISTORY NOW	HV.AV01-AV03	(3x) 20" monitor, CPU, KBD, Trkball
CENTRAL EXHIBIT DIMMER RACK & CONTROLS	N/A	Dimmer rack, modules, controls, no installation

- 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 docent 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. Required Submittals:
 1. Provide the Exhibit Designer with 3 copies of all required submittals and allow a minimum of 14 days for review for each submittal. Provide enough time in the schedule to allow for at least (3) rounds of submittals.
 2. Submittals must be approved prior to equipment procurement and systems fabrication.
 3. Substitutions: Submit product literature and manufacturers data on all proposed equipment substitutions for review and approval by Exhibit Designer.
 4. Submit 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) Structural details of ceiling attachments and mounts.
 - (d) Audio, video and network patch panels.
 - (e) Detailed riser diagram.

- (f) Panel details showing all engraving for all systems.
- (g) Schematics of all custom circuits.
- (h) Detail any modifications to equipment supplied by manufacturers.
- (i) 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.
- (j) 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. Prototypes: Some larger exhibits will require full-scale prototyping in coordination with Exhibit Contractor and media producers. It is assumed that the AV Systems Integrator will provide all necessary staging, equipment and facilities for these working prototypes and will host a meeting for coordination and review. These exhibits include:

a.	Populations Interactive	LF5.E02.av01
b.	What Cells Can Do	LF3.E02.av01
c.	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 functionality of interactive programs as provided by the media producer.
6. Mock-ups and prototypes 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:
 - image quality, contrast, color, brightness, edge blending (if any), etc
 - geometry, screen dimensions, lenses, etc.
 - user interface components, accessibility, ergonomics and ease of use
 - integration of all hardware, products and systems with surrounding exhibits

- durability and maintenance

C. Documentation: 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 AV Systems Integrator 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. AV Systems Integrator must identify the name, relevant experience and qualifications of the project manager and lead programmer who will remain on this project from initiation to completion. Lead programmer must be on AV Systems Integrator'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. See 'Warranties' Section for additional requirements.
- 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.
- D.

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(s). AV Systems Integrator to coordinate the installation of media, coordinate formats and system requirements including optimized compression formats.
- C. AV Systems Integrator will be responsible for setting up any computers 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 Utah licensed engineer for design of seismic 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

3.01 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. AV Systems Integrator 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: AV Systems Integrator will provide system meeting the following design criteria.
- a. Acceptable systems: Media Matrix, BSS, MSC
 - b. All audio signals will run through the master audio system.
 - 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: Commercial grade major manufacturer PC's with the following minimum features.
- a. Intel Core 2 duo processor > 3Ghz
 - b. 2Gb Ram, 80GB hard drive, DVD-ROM drive
 - c. NVidia Quadro video card.
 - d. 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.

3.02 SPECIFIC EXHIBITS

A. 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

B. UTAH 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 |
| 1) | Sky Cam 5mp @15mps camera | Custom or TimeScience |
| 1) | CPU and software for time-lapse rec. | |
- 1) Hardware and software to display split screen of
- Live weather instruments
 - Live time-lapse sky cam
 - Feed from UofU Meteorology dept remote sites

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

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

C. NATIVE VOICES

Storytelling Audio playback w/4 Caption readers.
NV6.E01.av01-04

- | | | |
|----|--------------|------------------------|
| 1) | Speaker | Dakota FA-501 |
| 1) | MP3 playback | Alcorn 8-TraXX or 4MP3 |

4)	Caption Displays	Densitron LM4790
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 *5 seamless plasma, 5 ch synch SD playback*
NV5.E06.av01 *Portrait orientation*

5)	42" seamless plasma	Akira/Orion MIS 4220
1)	SD Media Players (see general notes above)	Alcorn DVM \ P DoReMi Nugget
2)	Display Speakers	Innovox FD-H2
1)	Amplifier	QSC CX-302
1)	Sync gen a/r	
a/r	Master Show Control	
a/r	Master Audio Control	

Welcome *Triggered audio message*
NV1.E01.av01

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 *17" touch monitor, CPU, kbd & trackball, mic & headphones*
NV3.E01.av01

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

D. LIFE

Keratin Interactive *~24 2" 2 digit readouts, electronics package & programming to*
LF2.E02.in01 *run game*

30)	2" 5x7 Led Dot Array	LiteON LTP-2157AY Verify color with designer
30)	circuit cards for above including Drivers, controller and touch sensor (note this must be PCB)	Custom
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 (see general notes above)	Alcorn DVM \ P 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

(4) areas of natural sounds

LF6.E01-E04.av01

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 Systems Integrator.

- | | | |
|-----|-----------------------------------|-------------------|
| 1) | multi channel headphone amplifier | Behringer HA-8000 |
| 4) | Capacitive sensors/ buttons | Custom / Happ |
| a/r | Master Audio Control | |

Talkback Station *computer blogging station (text only)*
LF6.E05.av02

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

E. THE LAND

Plate Tectonics
LD1.E03.av01

Video Globe

- | | | |
|-----|--|-----------------|
| 1) | 32" Video Globe
w/ 600Myr Paleo Animation | Omni Globe |
| 1) | 15" Monitors | NEC ALSCD52V-BK |
| a/r | Master Show Control | |
| a/r | Master Audio Control | |

B&R Biogeography
LD4.E08.av01

46" SD video playback

- | | | |
|-----|---|---------------------------------|
| 1) | 26" LCD flat panels | Sharp LC26SB24U |
| 1) | SD Media Players
(see general notes above) | Alcorn DVM \ P
DoReMi Nugget |
| a/r | Master Show Control | |
| a/r | Master Audio Control | |

Talkback Station
LD4.E04.av01

computer blogging station text and still cam

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

- | | | |
|----|----------------|----------------------|
| 1) | Cat-5 Extender | TBD/ Magenta |
| 1) | Still Camera | Quick Cam Vision Pro |
| 1) | USB interface | TBD |

**Jump Seismometer
LD4.E03.av01**

CPU, 15" Monitor. Seismometer by owner

- | | | |
|----|-------------|---|
| 1) | 15" Monitor | NEC ALSCD52V-BK |
| 1) | Computer | HP/Dell Pentium (see computer spec above) |

F. FIRST PEOPLES

**Ceramics, Tools & Weaving (3) 20" video playback w/ sound, linear media
FP5.E02.av01**

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

**Tools Interactive
FP5.E06.in01**

triggered MP3 playback

- | | | |
|-----|----------------------|---------------------------------|
| 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

G. GREAT SALT LAKE

**Sounds of the Lake
LK2.E01.av01**

(8) speaker natural sound soundscape

- | | | |
|-----|----------------------|-------------------------|
| 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
LK2.E06.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
(see general notes above) | Alcorn DVM \ P
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 (see general notes above)	Alcorn DVM \ P DoReMi Nugget
a/r	Master Show Control	
a/r	Master Audio Control	

H. 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 (see general notes above)	Alcorn DVM \ P 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 (see general notes above)	Alcorn DVM \ P 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
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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	

I. 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 w/ rugged keyboard/trackball	HP/Dell Pentium (see computer spec above)
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

J. 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

K. OTHER SYSTEMS

Central Dimmer

- 1) 96 ch ETC Sensor Rack 48 dimmer modules
- a/r Pharos controls to implement "Life Intro" gobo effects
DMX input from "Ecosystems"

The installation and wiring of this unit is part of the base building electrical package. Factory turn-on services and control wiring by AV Systems Integrator.

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

Equipment list is for all (3) labs

- 3) DLP Projectors Panasonic PT-D5700UL
- 3) lenses 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
- 12) Ceiling Speakers JBL Control 126
- 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

Natural 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 HP/Dell Pentium (see computer spec above)
w/ rugged Keyboard/trackball

Demo Areas *Wireless mic, controls, speakers*

Equipment list is for all (7) Demo Areas

- 14) Ceiling Speakers JBL Control 126
- 2) 70V amp QSC CX-204V
- 7) Headworn w/l 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 (connect all video players)	Extron/ Honeywell
a/r)	Ethernet Switch 24port, 1Ghz (connect all computers & controllers)	Netgear/Cisco (coord w/ owner)
a/r)	KVM w/ 2 outputs (connect all computers)	Unimux 32x4
1)	15" Monitors	NEC ALSCD52V-BK
1)	Rack mount keyboard shelf	Custom/ TBD
	2min) UPS	Triplite Smart2200RMXL2U
	Size ups to power racks	

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. AV Systems Integrator is responsible for assuring that no CAT5 cable runs provided by the AV Systems Integrator 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 Owner 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 Exhibit Designer 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 AV Systems Integrator.

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. AV Systems Integrator 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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SECTION 01050 — APPLICABLE STANDARDS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Work of this section, as shown or specified, shall be in accordance with the requirements of Division 1 Specifications and the Exhibit Contract Documents and Owner provided General Conditions.
- B. Work Included:
 - 1. In the Contract Documents reference is made to codes and standards which establish qualities and types of workmanship and materials and which establish methods for testing and reporting on the pertinent characteristics.
 - 2. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is the Exhibit Fabricator's responsibility to provide materials and workmanship that meet or exceed the specifically named code or standard.
 - 3. It is also the Exhibit Contractor's responsibility, when so required by the Contract Documents or requested by the Exhibit Designer, to deliver to the Exhibit Designer all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested by the Exhibit Designer.
- B. Related work: Specific naming of codes or standards occurs on the Drawings and in other Sections of these Specifications.

1.02 QUALITY ASSURANCE

- A. Rejection of non-complying items: the Exhibit Designer reserves the right to reject items incorporated into the work that fail to meet the specified minimum requirements. The Exhibit Designer further reserves the right to accept non-complying items subject to an adjustment in the contract amount as approved by the Exhibit Designer and the Exhibit Contractor without prejudice to other recourse the Exhibit Designer may take.
- B. Applicable standards listed in these specifications include, but are not necessarily limited to, standards and requirements promulgated by all pertinent government agencies having jurisdiction.

END OF SECTION

SECTION 01110 – SUMMARY OF WORK

PART 1- GENERAL

1 .1 RELATED DOCUMENTS

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

1 .2 SUMMARY

- A. The work of this contract consists of the general construction and installation of exhibits for the Utah Museum of Natural History comprising 37,500 square feet of permanent exhibits that explore topics ranging from Utah's ancient ecosystems and Utah's first peoples to cutting-edge science in the areas of biogeography and genetics. These permanent exhibitions are organized in a series of eight thematic exhibit galleries located within which are three embedded Learning Labs. These galleries include Utah Sky, Native Voices, Life (with an adjacent Naturalists Lab), The Land, First Peoples (with an adjacent Dry Cave Lab), Great Salt Lake, Past Worlds (with an adjacent Earth Lab), and Utah Futures. On the main floor, a discovery room titled Our Backyard, serves a younger audience. The Canyon, a grand space at the heart of the building, offers views into collections core of the building and provides a general orientation to the museums public programs.

1 .3 CONTRACTS

- A. Project will be constructed under multiple Prime Contracts.
- B. Multiple contracts are separate contracts, representing significant construction activities, between the DFCM and separate contractors. See Division 1 Section "Project Coordination" for a description of work and responsibilities included under each separate contract. Each contract is performed concurrently and coordinated closely with construction activities performed on Project under other contracts. Contracts for this Project include the following:
 - 1. General Construction Contract, designated as the "General Contractor" or "GC". This contract includes the base building and related site work and Interior Fit out.
 - 2. Exhibit Fabrication and Installation designated from here on as the "Exhibit Contractor" or "XC". This contract includes all fabricated graphics, casework, exhibit furnishings, environments, scenic work, interactives, etc.
 - 3. Exhibit AV Systems Integration Contractor. This contract includes all exhibit-related audio visual systems, controls, playback and display equipment.
 - 4. Media Producer(s). These contracts include the production of all media including interactive media, log form film media and other software for exhibits.
 - 5. Mountmaking and Installation Contractor(s). This work includes the provision of dinosaur casts and fossil mounts and the creation of custom mounts for all objects (artifacts and specimens) owned by the museum and their installation within the exhibits.

1 .4 LOCATION

- A. The site for the new museum is located at 301 Wakara Way, Salt Lake City, Utah.

1 .5 EXHIBIT FABRICATOR'S USE OF PREMISES

- A. Prior to the scheduled Dust free date, Exhibit Contractor may obtain E lot parking passes from the U of U and shuttle to the project site. The freight elevator will be in use by the Building General Contractor and use thereof would need to be coordinated as well as contribution toward monthly elevator cost. After the scheduled Dust Free date, Exhibit Contractor could set up offices in the parking lot on site. The Building General Contractor would transition the freight elevator use agreement to the Exhibit Contractor.
- B. The project site will be closed to the public during construction.
- C. Exhibit Fabricator shall at all times conduct his operations to ensure the least inconvenience to the public.
- D. Confine storage of materials to within staging areas defined by the Owner.
- E. Hauling Restrictions: Comply with all State of Utah load restrictions in the hauling of materials. Load restrictions on all roads are identical to the state load restrictions with such additional regulations as may be imposed by the Owner. Information regarding rules and regulations for vehicular traffic on roads may be obtained from DFCM. A special permit will not relieve Exhibit Fabricator of liability for damage that may result from moving of equipment.

1.6 FIELD VERIFICATION

- A. Field verify all new and existing dimensions affecting the work of this contract before ordering products.

1.7 PERMITS, FEES AND NOTICES

- A. The Exhibit Fabricator shall obtain and pay for all permits, licenses and certificates required by the State of Utah's Laws for the proper execution and completion of their work. The Exhibit Fabricator shall furnish proof of payment for all such permits, licenses and certificates, or proof that no permits, licenses and certificates are required. This proof must be furnished prior to the second request for payment.
- B. The Exhibit Fabricator shall give all notices and comply with all applicable codes, laws, ordinances, regulations, rules and orders of any public authority bearing on the performance of the work. If the Exhibit Fabricator observes that any of the Contract Documents is at variance therewith in any respect, it shall promptly notify the Owner in writing. Any necessary modifications will be made by the Owner. If the Exhibit Fabricator performs any work knowing it be contrary to such applicable laws, ordinances, regulations, rules or orders, and without such written notice to the contracting officer, it assumes full responsibility therefore and shall bear all costs attributable thereto.
- C. The Exhibit Fabricator shall obtain and pay for permits required for temporary traffic lane closings, no parking zones, and sidewalk closings as required by the City of Salt Lake City and the State of Utah. The street closings, no parking designations, and sidewalk closings are required from the commencement of construction through construction completion. The Exhibit Fabricator shall furnish proof of payment for all such permits.

PART 2 – MEASUREMENT AND PAYMENT

- A. Payment will be based upon an approved schedule of values. No payments for work complete will be made until Exhibit Fabricator provides proof of payment for material and performance bonds.

END OF SECTION 01110

SECTION 01305 — PROJECT COORDINATION

PART 1-GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination and Survey Drawings.
 - 4. Administrative and supervisory personnel.
- B. Related Sections: The following Sections contain requirements that related to this Section:
 - 1. Division 1 Section “Summary of Work” for a description of the division of Work among Separate contracts and responsibility for coordination activities not in this Section.
 - 2. Division1 Section “Project Schedule” for preparing and submitting the Contractor’s Construction Schedule.
 - 3. Division 1 Section “Project Closeout” for coordinating Contract closeout.

1.03 COORDINATION

- A. Project Coordinator shall be responsible for coordination between the General Construction Contract and the Exhibit Construction Contract.
 - 1. The Exhibit Contractor shall assign a Project Coordinator.
 - 2. The Project Coordinator is responsible for for coordination of Exhibit Contract Work and the Work of General Construction.
 - 3. The Exhibit Contractor shall appoint a qualified Exhibit Project Manager to act as a single point of contact and coordinate all aspects of the Exhibit Contract Work with the GC’s Project Coordinator and other prime contractors.

1.04 EXHIBIT PROJECT COORDINATOR

- A. Exhibit Project Coordinator: Project Coordinator shall be experienced in administration and supervision of building construction, including exhibit construction work.
 - 1. Coordination activities of Project Coordinator include, but are not limited to, the following:
 - a. Provide overall coordination of the Work.
 - b. Coordinate shared access to work spaces.
 - c. Coordinate product selections for compatibility; Provide coordination and support for Base Building LEED submittals.

- d. Provide overall coordination of temporary facilities and controls.
 - e. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
 - f. Coordinate construction and operations of the Work with work performed by each contract.
 - g. Prepare Coordination Drawings to coordinate work by more than one contract.
 - h. Coordinate sequencing and scheduling of the Work. Include the following:
 - i) Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with separate contractors and the Owner and Exhibit Designers for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 - ii) Prepare a combined Contractor's Construction Schedule for entire Project. Base schedule on Preliminary Construction Schedule. Secure time commitments for performing critical construction activities from separate contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary of sheet indicating combined construction activities of contracts.
 - iii) Distribute copies of schedules to the Owner, and separate contractors.
 - i. Provide quality-assurance and quality-control services.
 - j. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
 - k. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
 - l. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
 - m. Provide field surveys of in-progress construction and site work and final property survey.
 - n. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
 - o. Coordinate cutting and patching.
 - p. Coordinate protection of the Work.
 - q. Coordinate firestopping.
 - r. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
 - s. Collect Record Specification Sections from other contractors, collate Sections into numeric order, and submit complete set.
 - t. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
2. Responsibilities of Project Coordinator for temporary facilities and controls include, but are not limited to, the following:
- a. Provide common-use field office for use by all personnel engaged in construction activities.
 - b. Provide telephone service for common-use facilities.

1.05 EXHIBIT PROJECT MANAGER

- 1. The Exhibit Project Manager must have a experience coordinating exhibit fabrication and installation with a general contractor on a project of similar scale and type. Coordination responsibilities of the Exhibit Project Manager include the following:
 - a. Provide overall coordination of the Exhibit Contract Work with the Project Coordinator and all other Prime Contractors.
 - b. Attend all Project Coordination Mtgs, Quality Control Inspections, Pre-Installation Mtgs and Project Closeout Mtgs. See Division 1 – Project Meetings.

- c. Coordinate product selections for compatibility.
 - d. Prepare and submit all Shop Drawings, RFIs and Submittals.
 - e. Coordinate and schedule use of permanent and temporary utilities, including those necessary to make connections for temporary services as required for the Exhibit Contract Work.
 - f. Review Coordination Drawings and coordinate work with the General Contractor. Prepare a Site Survey verifying all conditions in the field and prepare Shop Drawings.
 - g. Coordinate sequencing and scheduling of the Work described in the Exhibit Contract Documents. Include the following:
 - i) Initial Coordination Meeting: at earliest possible date, arrange and conduct a meeting with separate contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 - ii) Prepare an Exhibit Fabrication and Installation Schedule (Exhibit Schedule) and coordinate its incorporation within the Overall Construction Schedule with the work of other prime contractors.
 - iii) Base the Exhibit Schedule on Preliminary Construction Schedule.
 - iv) Secure time commitments for performing critical fabrication and installation activities.
 - v) Indicate and include construction milestones including turnover conditions for exhibit installation and AV systems installation, mount making and object installation.
 - h. Provide quality-assurance and quality control services specified.
 - i. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
 - j. Locate existing permanent benchmarks, control points, and similar reference points, and establish new permanent benchmarks on Project site.
 - k. Provide a field survey of all dimensions and conditions on the site as-built in preparation for exhibit shop drawings.
 - l. Coordinate protection of the work.
 - m. Coordinate preparation of project record documents and provide to Project Coordinator.
 - n. Collect Record Specification Sections and provide to Project Coordinator for inclusion in the master document.
 - o. Coordinate preparation of operation and maintenance manuals and provide to Project Coordinator for inclusion in the master document.
2. Responsibilities of Exhibit Project Manager for temporary facilities and controls include, but are not limited to, the following:
- a. Share and maintain common-use field office and office equipment for use by all personnel engaged in construction activities.

1.06 CONTRACTS, GENERAL

- A. Extent of Contract: Unless the Contract Documents contain a more specific description of the work, the names and terminology on drawings and in specification sections determine which contract includes that specific element of the project.
 - 1. Unless otherwise indicated, work for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Exhibit Contract Documents.
 - 2. Local custom and trade-union jurisdictional settlements do not control the scope for the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimized interruption and delays.

3. Trenches needed for the work of each contract shall be provided by the General Construction Contract.
 4. Cutting and patching needed for the work of each contract shall be provided by the General Construction Contract.
 5. Firestopping needed for the work of each contract shall be provided by the General Construction Contract.
 6. Within five working days after preliminary horizontal bar-chart-type construction schedule submittal has been received from Project Coordinator, the Exhibit Project Manager shall submit a matching preliminary horizontal bar-chart schedule showing construction operations sequenced and coordinated with overall construction.
- B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.
- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 1 Section "Temporary Facilities and Controls," each contractor is responsible for the following:
1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 3. Its own field office, complete with necessary furniture, utilities, and telephone service.
 4. Its own storage and fabrication sheds.
 5. Temporary enclosures for its own construction activities.
 6. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
 7. Progress cleaning of its own areas on a daily basis.
 8. Secure lockup of its own tools, materials, and equipment.
 9. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
- D. Temporary heating, cooling, and ventilation: The General Construction Contract is responsible for temporary heating, cooling, and ventilation, including utility-use charges.
- E. Use Charges: Divide cost of providing and using common-use temporary services and facilities, including use charges, among the General Construction Contract and the Exhibit Contract. The Contract Sum of each contract shall include cost of providing and using temporary services and facilities, including use charges.
- F. Use Charges: Comply with the following:
1. Sewer Service: Include the cost for sewer service use by all parties engaged in construction activities at Project site in the General Construction Contract.
 2. Water Service: Include the cost for water service, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site in the General Construction Contract.
 3. Electric Power Service: Include the cost for electric power service, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site in the General Construction Contract.

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, which depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in the sequence needed to obtain the best results, especially when the installation of one part of the work depends on the installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Pre-installation conferences.
 - 7. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.07 SUBMITTALS

- A. Coordination of Prime Contractors. Each Prime Contractor shall notify in writing any occurrence where their work may interfere with the work of other Prime Contractors. Conflicts that become apparent during coordination meetings shall be brought to the attention of the affected Prime Contractors and conflicts shall be resolved prior to commencement of by any Prime Contractor of the effected work. The Exhibit Contractor shall arrange a meeting with the Prime Contractors to discuss any and all areas of conflict, resolve the conflicts, prepare any necessary coordination drawings, and submit the drawings to the Owner, Designer and other Prime Contractors for review.
- B. Site Survey and Exhibit Coordination Drawings: The Exhibit Project Manager shall conduct his own site survey, verifying dimensions and conditions of the site as-built and document any coordination issues with other Prime Contractors. This work shall be done and submitted to the Designer as a submittal, prior to the commencement of shop drawings and fabrication of

exhibits. The site survey may utilize the drawings prepared by the General Contactor or the Designer but these drawings in no way constitute a substitute for field verification of as-built dimensions. The site survey should be scaled dimensioned drawing(s) 1/8"=1'-0" scale drawings (30" x 42" sheet size) that indicate;

1. Any special or typical conditions requiring coordination of the Exhibit Contract Work with the Work of other prime contractors.
2. Required installation sequences.
3. Any variance with Contract Documents in dimensions or conditions as-built.
4. Any proposed changes to the Exhibit Contract Documents to rectify errors or omissions, or to account for variances.

The Site Survey and Exhibit Coordination Drawings must be completed and all issues resolved in conference with the Owner and the Exhibit Designer prior to the commencement of any Work by the Exhibit Contractor.

- C. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.08 TURNOVER CONDITIONS

- A. During turnover of exhibit space from General Contractor to Exhibit Fabricator, it is the responsibility of the GC to establish and achieve turnover dates for dust controlled and dust free environments on the construction schedule.

The following milestones must be established in the construction schedule for coordination of work between the Exhibit Fabricator, General Contractor (GC), AV Systems Integrator and museum staff and contractors who will be installing specimens and artifacts.

1. Dust Controlled Environment

This environment is established when the General Contractor's scope of work in all exhibit spaces is substantially complete. These spaces are broom cleaned & turned over to the Exhibit Contractor free and clear of all gang boxes, obstructions, construction materials, trash and debris. General access to the exhibit areas by non- Exhibit Contractors are to be limited and tightly controlled. Clear and unobstructed access paths for Exhibit Contractors to and from loading docks & exhibit areas are required and are coordinated with the General Contractor.

If a "phased installation" is required, the General Contractor is to provide temporary barriers to divide work areas and to ensure adequate isolation of exhibit areas. "Adequate isolation" can be defined as a framed plywood barrier (or other mutually agreed upon device or material) to inhibit dust infiltration and insure security against theft or vandalism, if required."

The Exhibit Contractor will commence delivery of exhibit cases and components; the AV Systems Integrator will phase in delivery and installation of AV equipment and components, the Mount making Contractor will phase in delivery and installation of large-scale artifacts and specimens.

Construction Turnover Conditions (at Dust Controlled) indicates:

- a. All wall, floor, ceiling construction finishes are completed.
- b. Windows and doors are installed.
- c. The space is water-tight.
- d. Normal or temporary power and preliminary grounding systems are completed and emergency power and integration of all systems are in progress.
- e. All GC (or sub GC) responsible lighting is complete.
- f. HVAC systems will have start up completed and are operational with clean filters and are distributing continuous conditioned air within 5 degrees F of an agreed upon set point.
- g. Sprinkler system piping is completed, but the system will not be active.
- h. All conduit paths are completed with anti-short bushings installed on the conduit ends.
- i. All sharp edges on the cable trays and ladders will be covered or filled.
- j. Drag lines are installed in all conduit paths.
- k. Final adjustments (e.g. lighting systems, electrical hardwiring of exhibits, etc.) are a comeback operation.

2. Dust Free Environment

A Dust Free Environment is established when all Contractors work in all exhibit spaces is completed to the point of zero dust generation from remaining work. All of the buildings systems are performing as they will under normal operating conditions.

The Exhibit Contractor will deliver and install exhibit elements (e.g. graphics, photos, facsimiles, etc.). The AV Systems Integrator will integrate, install, balance and test all AV equipment and systems components. The Media Producers will install and test all media software. The Exhibit Lighting Designer will aim and balance the exhibit lighting and the Mount making Contractor will deliver and install mounts and small scale and/or sensitive/valuable artifacts and specimens.

Construction Turnover Conditions (at Dust Free) indicates:

- a. HVAC systems will be fully commissioned and operational and approved by the Architect and the Owner.
- b. Clean filters and are distributing continuous conditioned air as described in the conservation standards – Section 01811 Air Management.
- c. Permanent power is provided.

END OF SECTION 01305

SECTION 0131 – PROJECT MEETINGS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this section, as shown or specified, shall be in accordance with the requirements of Division 1 Specifications and the Exhibit Contract Documents and Owner provided General Conditions.
- B. Schedule meetings and conferences throughout progress of Work; each session scheduled, administered, and presided by entity indicated. Requirements for meetings and conferences include:
 - 1. Prepare an agenda for each conference and meeting.
 - 2. Distribute written notice to participants seven days in advance of scheduled date.
 - 3. Make physical arrangements.
 - 4. Record minutes and attendees; include significant proceedings and decisions.
 - 5. Reproduce and distribute copies of minutes within three days after each meeting.
 - 6. Distribute one copy of minutes to each participant and to entities affected by decisions made at meeting
 - 7. Distribute one copy of minutes each to Exhibit Designer, Architect and Owner.
 - 8. Maintain in field office one copy of agenda and minutes for each conference and meeting.
- C. Representatives attending meetings shall be qualified and authorized to act on behalf of entity each represents.
 - 1. Exhibit Designer and Professional Consultants may attend meetings to ascertain that Work is consistent with the Exhibit Contract Documents.
 - 2. Architect may also be present at meetings and may propose agenda items.
- D. The Exhibit Contractor is responsible for all costs associated with travel to and from Coordination Meetings.

1.02 PRE-CONSTRUCTION CONFERENCES

- 1. Schedule pre-construction conferences no later than seven days prior to commencement of Work. Convene at Project site. The Exhibit Contractor presides over meeting and is responsible for minutes
- B. Attendees:
 - 1. Exhibit Project Coordinator.
 - 2. Exhibit Project Manger.
 - 3. Representatives of all Prime Contractors.

4. Owner's Construction Manager.
5. Owner's Representatives
6. Exhibit Designer.
7. Architect.
8. Professional Consultants.
9. Others as appropriate.

C. Minimum Agenda:

1. Administrative and Procedural Issues:
 - a. Designation of key personnel.
 - b. Review and clarify responsibilities of parties to contract.
 - c. Communications procedures.
 - d. Review of proposed Contractors, materials, equipment, and products.
 - e. Application for payment procedures; schedule of values, proposal requests, change orders.
 - f. Critical work sequencing; long lead-time items.
 - g. Submittal and construction progress schedules.
 - h. Submittal requirements; complete, correct, and timely submittals; scheduled dates.
 - i. Procedures for submitting product data, shop drawings, samples, and other submittals.
 - j. Product options and substitutions procedures.
 - k. Procedures for requests for interpretations (RFI), minor changes, field decisions, construction change directives, proposal requests, change orders, and filing claims.
 - l. Procedures for testing and inspection, including timely notification
 - m. Responsibilities and limitations of authority of geotechnical engineer and testing laboratories; distribution of reports.
 - n. Procedures for maintaining Project Record Documents.
 - o. Schedule for progress meetings.
 - p. Issue notice to proceed.
2. Review of Exhibit Plan and all Exhibit Contract Documents.
3. Review of Owner Furnished Reference and Source Materials including:
 - a) original art work for reproduction.
 - b) artifacts and objects.
5. On-Site inspection & measurement of artifacts
 - a) meet with museum conservation and mount making staff
 - b) discuss artifact mount making procedures
 - c) verification of artifact dimensions and weights.
6. Exhibit Contractor familiarization with the project site and project office.
 - a) site walk and survey

1.03 PROGRESS MEETINGS

1. Schedule periodic meetings as necessary by progress of Work; day, location, and time to be determined. Convene at Project site a minimum of one monthly Project Coordination Meeting prior to installation (the rest being conducted by teleconference). The Exhibit Contractor presides over meeting and is responsible for minutes.

B. Attendees:

1. Exhibit Project Coordinator.
2. Exhibit Project Manger.
3. Representatives of all Prime Contractors (as appropriate to agenda).
4. Owner's Construction Manager.
5. Owner's Representatives
6. Exhibit Designer.
7. Architect.
8. Professional Consultants.
9. Others as appropriate.
10. Others as appropriate to agenda.

C. Minimum Agenda:

1. Approval of minutes of previous meeting.
2. Work Progress Since Previous Meeting:
 - a. Current activities.
 - b. Critical activities.
 - c. Deviations from schedule.
3. Field observations, problems, conflicts, and decisions.
4. Deficiencies:
 - a. Identification of items.
 - b. Status of correction.
5. Requests for Interpretations (RFIs):
 - a. Status of clarification.
 - b. Status of proposal requests.
6. Changes and Modifications:
 - a. Status of change orders.
 - b. Pending changes.
 - c. Pending claims and disputes.
 - d. Clarification decisions of Owner or Exhibit Designer.
7. Problems and conflicts that impede planned progress.
8. Construction Progress and Submittal Schedules:
 - a. Off-site fabrication and delivery schedules..
 - b. Effect of proposed changes on construction progress schedule and coordination.
 - c. Submittal schedules, status of submittals, and effect on construction progress schedule.
 - d. Corrective measures to regain projected schedule.
9. Planned progress during succeeding Work period.
10. Adequacy of work forces.
11. Coordination between elements of Work.
12. Maintenance of Project Record Documents.

13. Other business relating to progress of Work.

D. Meeting Minutes:

1. Include column to indicate who is required to take action and date action is to be completed. Each of these items requiring action will be carried in subsequent minutes of meeting as "old business" until noted as "resolved."
2. As minimum, separate into following categories:
 - a. Old business.
 - b. New business.
 - c. Work progress.
 - d. Deficiencies.
 - e. RFIs.
 - f. Proposed changes.
 - g. Schedules.
 - h. Submittals.
 - i. Other business, including events to be accomplished by next meeting.

1.04 OFF-SITE PROGRESS MEETINGS AND QUALITY CONTROL REVIEWS

A. Schedule Off-Site Meetings and Quality Control Reviews at the Exhibit Contractor's facility in coordination with regular progress meetings. These meeting shall occur when it is necessary to review mock-ups and prototypes prior to completion of work for each section. The Exhibit Contractor presides over meeting and is responsible for minutes.

B. Attendees:

1. Exhibit Project Coordinator.
2. Exhibit Project Manger.
3. Owner's Construction Manager.
3. Owner's Representatives
4. Exhibit Designer.
5. Professional Consultants.
6. Others as appropriate.

C. Minimum Agenda:

1. All items in regular Progress Meetings as noted above.
2. Review of Work completed to date.
3. Determination of conflicts and impediments to progress of the Work.
4. Resolution of impediments.

D. Meeting Minutes:

1. Record observations, recommendations and directives offered by the attendees.

1.05 PRE-INSTALLATION CONFERENCES

- A. Schedule pre-installation conferences required in individual Specification sections. Convene at Project site prior to commencing Work of the section.
- B. Attendees:
 - 1. Exhibit Project Coordinator.
 - 2. Exhibit Project Manger.
 - 3. Owner's Construction Manager.
 - 3. Owner's Representatives
 - 4. Exhibit Designer.
 - 5. Professional Consultants.
 - 6. Local Subcontractors (installer, applicator, or erector).
 - 7. Material or equipment supplier.
 - 8. Manufacturer's representative.
 - 9. Others directly affecting, or affected by the work.
 - 10. Testing agency (if necessary).
- C. Minimum Agenda:
 - 1. Access to work and conditions of proper installation.
 - 2. Site mobilization and utilization:
 - a. Use of premises; office and storage areas ; Owner's requirements.
 - b. Temporary utilities and services
 - c. Waste management plan and procedures.
 - d. Conditions of installation, such as substrates, existing and surrounding conditions, and environmental conditions.
 - 3. Conditions detrimental to installation.
 - 4. Preparation procedures, including protection of adjacent work.
 - 5. Verify installers' receipt and understanding of installation instructions.
 - 6. Review submittals, installation procedures, and sequence.
 - 7. Review coordination with other work.
 - 8. Evaluate delivery schedule and Construction Progress Schedule.
 - 9. Observe sample installation.
 - 10. Required protection procedures.

1.06 CLOSEOUT CONFERENCE

- A. Schedule Project Closeout conference with sufficient time to prepare for requesting Final Completion.
- B. Attendees:

1. Exhibit Project Coordinator.
2. Exhibit Project Manger.
3. Owner's Construction Manager.
4. Owner's Representatives (museum staff, facilities operations and security personnel, etc)
5. Exhibit Designer.
6. Others as appropriate.

C. Minimum Agenda:

1. Start-up of facilities and systems.
2. Operations and Training and Exhibit Maintenance Manuals.
3. Testing, adjusting, and balancing.
4. System demonstration and observation.
5. Operations and Training and maintenance instructions for the museum's personnel.
6. Exhibit Contractor's inspection of work.
7. Exhibit Contractor's preparation of an initial "punch list."
8. Procedure to request Exhibit Designer inspection to determine date of substantial completion.
9. Completion time for correcting deficiencies.
10. Inspections by authorities having jurisdiction.
11. Certificate of occupancy and transfer of insurance responsibilities.
12. Partial release of retainage.
13. Preparation for final inspection.
 1. Closeout submittals
 - a. Project Record Documents.
 - b. Operating and maintenance documents.
 - c. Operating and maintenance materials.
 - d. Warranties and bonds.
 - e. Affidavits.
 2. Final application for payment.
 3. Final cleaning.
 4. Exhibit Contractor's demobilization of site.
 5. Maintenance.

END OF SECTION 01312

SECTION 01323 – PROJECT SCHEDULE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Summary: The work of this section consists of project schedule requirements including preparation of a project schedule, schedule updates, schedule revisions and time impact analysis. The project schedule shall be based upon the Critical Path Method (CPM) for planning, scheduling and reporting progress of the Work.
- B. Purpose: The purpose of the project schedule is to ensure adequate planning, coordination, scheduling, and reporting during execution of the work by the Exhibit Contractor. The project schedule will assist the Exhibit Contractor, General Contractor's Project Coordinator and Owner in monitoring the progress of the work, evaluating proposed changes and potential impacts to overall schedule.

1.3 SUBMITTALS:

- A. As specified in Section 01330
- B. Project Schedule: Within 5 calendar days after Notice to Proceed, submit one electronic copy (pdf) and 3 paper copies of the proposed project schedule, and accompanying CPM Schedule Reports to the Owner.
- C. Project Schedule Updates: Submit estimates of the completion time required for each scheduled activity. The submittal shall include 3 paper copies and one electronic copy of the previous month's Schedule Update indicating actual activity start and/or complete dates, revised (current) remaining durations, and percent complete information. The Exhibit Contractor shall also indicate in writing those activities the Exhibit Contractor plans to work on during the following update month, any anticipated conditions which may delay the work, or any additional information necessary to support the above.
- D. Project Schedule Revisions and Time Impact Analysis: Submit one electronic copy and two paper copies of a Time Impact Analysis. Each analysis shall demonstrate how the Exhibit Contractor proposes to incorporate a modification, change, delay, or Exhibit Contractor request into the project schedule.

1.4 PRELIMINARY REQUIREMENTS

- A. Meeting: The Exhibit Contractor shall meet with the Owner on the day of the preconstruction conference to conduct a joint review of the project schedule requirements of the contract to assure the Owner of the Exhibit Contractor's and subcontractors' understanding of the requirements of this section.

- B. Exhibit Contractor's Schedule Representative: Before or at the preconstruction conference, designate in writing and provide the qualifications of an authorized representative in the Exhibit Contractor's organization who shall be responsible for coordinating with the Exhibit Designer and Owner during the preparation and maintenance of the project schedule.

1.5 PROJECT SCHEDULE

A. Schedule Development:

1. The late finish date shown on the schedule shall be the same date as the last day of the contract period.
2. The Exhibit Contractor shall carefully plan the durations between scheduled activities so as not to effect the completion of the work. The Exhibit Contractor's project schedule shall consist of procurement activities (including mobilization, submittal, and the fabrication and delivery of key and long-lead procurement items) and construction activities.
3. The Exhibit Contractor's project schedule shall consist of, but not be limited to, the following for each activity:
 - a. Identify each and every activity number with numerical designations (maximum 5-digit). Numbering of activities shall be in increments of 10 digits.
 - b. Concise description of the work represented by the activity (maximum 48 characters). Avoid the use of non-standard abbreviations. The work related to each activity shall be limited to one work trade.
 - c. Activity duration in whole working days with a maximum duration of 15 work days each, unless otherwise approved by the Owner, except for non-construction activities including mobilization, shop drawing and sample submittals, fabrication of materials, delivery of materials and equipment.
 - d. Identify if activity is a "critical path" activity.
4. In developing the project schedule, ensure that work of all sub contractors at all tiers, as well as the prime work, is included and coordinated in the project schedule.
5. The project schedule as developed shall show the sequence and interdependence of activities required for complete performance of the work. Ensure all work sequences are logical and the project schedule shows a coordinated plan of the work.
6. Proposed duration assigned to each activity shall be the Exhibit Contractor's best estimate of time required to complete the activity considering the scope and resources planned for the activity.
7. Resource loading of each activity shall list all personnel by labor category and equipment type and capacity proposed to complete the activity in the duration shown.
8. Consider seasonal weather conditions in planning and scheduling all work influenced by high or low ambient temperatures, wind and/or precipitation to ensure completion of all work within the contract time. Show anticipated weather conditions on project calendar.

B. Joint Review, Revision, and Acceptance:

UTAH MUSEUM OF NATURAL HISTORY
RALPH APPELBAUM ASSOCIATES

PROJECT SCHEDULE 01323
100% FINAL DESIGN

1. Within seven calendar days of receipt of the Exhibit Contractor's proposed project schedule, the Exhibit Designer, the Owner and Exhibit Contractor shall meet for joint review, correction, or adjustment of the proposed project schedule. Any areas which, in the opinion of the Owner or the Exhibit Designer, conflict with timely completion of the project shall be subject to revision by the Exhibit Contractor.
2. In the event the Exhibit Contractor fails to define any element of work, activity, or logic, and the Owner review does not detect this omission or error, such omission or error, when discovered by the Exhibit Contractor, the Exhibit Designer or Owner, shall be corrected by the Exhibit Contractor at the next monthly project schedule update and shall not affect the contract time.
3. Within seven calendar days after the joint review between the Exhibit Contractor, the Project Coordinator and Owner, the Exhibit Contractor shall revise and resubmit the project schedule in accordance with agreements reached during the joint review.
4. Upon acceptance of the project schedule by the Owner, the project schedule will be used to evaluate the Exhibit Contractor's monthly applications for payment based upon information developed at the monthly project schedule update meeting.

1.6 PROJECT SCHEDULE UPDATES

- A. General: Update the project schedule on a monthly basis throughout the entire contract time and until project substantial completion.
- B. Procedure: The Exhibit Contractor shall meet with the Owner and Exhibit Designer each month at a project schedule update meeting to review actual progress made through the status date of the project schedule update, including dates activities were started and/or completed and the percentage of work completed on each activity started and/or completed. In case of disagreements at the schedule update meeting concerning actual progress to date, the Owner's determination shall govern.

1.7 PROJECT SCHEDULE REVISIONS

- A. Required Revisions: If, as a result of the monthly schedule update, it appears the project schedule no longer represents the actual prosecution and progress of the work, the Owner will request, and the Exhibit Contractor shall submit, a revision to the project schedule. The Exhibit Contractor may also request reasonable revisions to the project schedule in the event the Exhibit Contractor's planning for the work is revised. If the Exhibit Contractor desires to make changes in the project schedule, the Exhibit Contractor shall notify the Owner in writing, stating the reason for the proposed revision. Accepted revisions will be incorporated into the project schedule at the next monthly schedule update.
- B. Procedure: If revision to the project schedule is contemplated, the Exhibit Contractor or Owner shall so advise the other in writing at least seven calendar days prior to the next schedule update meeting, describing the revision and setting forth the reasons therefore. Government-requested revisions to the project schedule will be presented in writing to the Exhibit Contractor, who shall respond in writing within seven calendar days.

1.8 TIME IMPACT ANALYSIS FOR CONTRACT MODIFICATIONS, CHANGES, DELAYS, AND EXHIBIT CONTRACTOR REQUESTS

- A. Requirements: When contract modifications or changes are initiated, delays are experienced, or the Exhibit Contractor desires to revise the project schedule, the Exhibit Contractor shall submit as part of the proposal for modified work to the Owner a written time impact analysis illustrating the influence of each modification, change, delay, or Exhibit Contractor request on the contract time.
- B. Time Extensions: Activity delays shall not automatically mean that an extension of the contract time is warranted or due the Exhibit Contractor. It is possible that a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the project schedule, thereby not causing any effect on the contract time. Time extensions will be granted in accordance with the terms of the contract.
- C. Float: Float is not for the exclusive use or benefit of either the Owner or the Exhibit Contractor. Extension of the contract time will be granted only to the extent the equitable time adjustments to the activity or activities affected by the modification, change, or delay exceeds the total (positive or zero) float of a critical path activity and extends the contract completion date.
- D. Procedure: Each time impact analysis shall be submitted within the time period stated in a request for proposal, or the time period designated under the clauses entitled Changes or Default. In cases where the Exhibit Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Exhibit Contractor request does not require an extension of the contract time. Upon acceptance, the time impact analysis shall be incorporated into the project schedule at the next monthly schedule update.

END OF SECTION 01323

SECTION 01330 – SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. The work of this section consists of submittal requirements before and during construction.

1.3 RELATED REQUIREMENTS

Section 01770 Project Closeout

1.4 SUBMITTAL AND APPROVAL PROCEDURES

- A. All submittals shall be transmitted using the form provided at the end of this section. No action will be taken on a submittal item unless accompanied by the transmittal form. No verbal communication or other documented form of communication shall serve as a substitution for required submittals and the required forms and transmittals.
- B. As specified in the individual sections, forward submittals to Exhibit Designer at least 45 days before need for a final approval. Exhibit Designer and Consultants require 14 days (exclusive of shipping time) for review and notation of each submittals. Assume that each submittal will require repeat submittals and incorporate enough time in the schedule to accommodate at least 3 rounds of submission and review for each submittal required.
- C. Unless a different number is specified, submit one original and two copies of each shop drawing, three copies of manufacturer's catalog sheets (cut sheets), three specimens of each sample, and three copies of all other submittals requested.
- D. All submittals must be provided as full size hardcopies, not delivered electronically.
 - 1. Site Survey and Exhibit Coordination Drawings: Include the following information with each copy of survey drawings:
 - a. Date.
 - b. Date of revisions (when applicable).
 - c. Exhibit Contractor's certification that coordination drawing has been checked for accuracy by field measurement of existing conditions and for compliance with contract documents.
 - d. Details of fabrication, coordination, assembly and erection including connections and engagement to contiguous work.

- e. Any special or typical conditions requiring coordination of the Exhibit Contractor's Work with the Work of other Prime Contractors.
 - f. Note required installation sequences.
 - g. Note any variances with Exhibit Contract Documents in dimensions or conditions as-built.
 - e. Note any proposed changes to the Exhibit Contract Documents to rectify errors or omissions, or to account for variances.
 - f. The term "by others" shall not be used. All work to be performed by others shall be identified by Exhibit Contractor or subcontractor name, discipline, or trade.
2. Shop Drawings: Include the following information with each copy of shop drawings:
- a. Date.
 - b. Date of revisions (when applicable).
 - c. Exhibit Contractor's certification that shop drawing has been checked for compliance with contract documents.
 - d. Details of fabrication, assembly and erection including connections and engagement to contiguous work.
 - e. Materials used (including all hardware and fasteners)
 - f. All required dimensions.
 - f. The term "by others" shall not be used. All work to be performed by others shall be identified by Exhibit Contractor or subcontractor name, discipline, or trade.
2. Samples: Samples shall be large enough to illustrate clearly the functional characteristics and full range of color, texture, pattern and workmanship.
3. Manufacturers' Catalog Sheets: Submit only pertinent pages; mark each copy of standard printed data to identify specific products proposed for use.
4. Manufacturer's Installation Instructions: When contract documents require compliance with manufacturer's printed instructions, provide one complete set of instructions for Owner and keep another complete set of instructions at the project site until substantial completion for their records.
- E. Owner reserves the right to require submittals in addition to those called for in individual sections.
- F. Approved Equals:
- 1. For each item proposed as an "approved equal," submit supporting data, including:
 - a. Drawings and samples as appropriate.

- b. Comparison of the characteristics of the proposed item with that specified.
 - c. Changes required in other elements of the work because of the substitution.
 - d. Name, address, and telephone number of vendor.
 - e. Manufacturer's literature regarding installation, operation, and maintenance, including schematics for electrical and hydraulic systems, lubrication requirements, and parts lists. Describe availability of maintenance service, and state source of replacement materials.
2. A request for approval constitutes a representation that Exhibit Contractor:
- a. Has investigated the proposed item and determined that it is equal or superior in all respects to that specified.
 - b. Will provide the same warranties for the proposed item as for the item specified.
 - c. Has determined that the proposed item is compatible with interfacing items.
 - d. Will coordinate the installation of an approved item and make all changes required in other elements of the work because of the substitution.
 - e. Waives all claims for additional expenses that may be incurred as a result of the substitution.
3. Construction Materials: The Exhibit Contractor is encouraged to submit for approval products made out of recycled or environmentally responsible material. Every effort will be made by the National Park Service to approve these materials.
- F. Coordinate all submittals and review them for legibility, accuracy, completeness, and compliance with contract requirements. Forward submittals that are related to, or affect one another, as a package to facilitate coordinated review. Each transmittal shall contain only data specific to that individual submittal. Delays resulting from the return of submittals without processing, are not the responsibility of the Exhibit Designer. Submittals will be returned without processing if:
1. They have not been reviewed and stamped by the Exhibit Contractor and Owner for coordination of work and for conformance with the Contract Documents prior to submission to the Exhibit Designer.
 2. They are not initialed or signed by the authorized person.
 3. They are not dated.
 4. It becomes evident that they are incomplete or have not been properly reviewed.
- G. Submittal Identification:
4. Owner will provide a project identification stamp which shall be applied by the Exhibit Contractor. Identification shall include the park name-package number, project title, contract number, and transmittal number.

5. All sets of shop drawings, manufacturer's catalog sheets, samples, and other documents submitted to the Owner must have the identification information stamped on the submittal.
6. Identification information shall be applied to the bottom right margin on each page. Identification information on samples shall be applied to the most readily visible area on the sample or on tags attached to sample.

H. Submittal Numbering:

7. Number each submittal consecutively.
8. For re-submittals use the original submittal number, plus a letter suffix beginning with A.
9. Additional re-submittals of the same item shall contain the original number with the next consecutive letter.

I. Designer's Review:

10. Submittals will be returned disapproved without technical review if identification information is missing, not filled in, or if placed on the back of the submittal; an incorrect number or format of submittals is provided; the transmittal form is incorrectly filled out; submittals are not coordinated; or submittals do not show evidence of Exhibit Contractor's approval.
11. Any work done or orders for materials or services placed before approval shall be at the Exhibit Contractor's own risk.
12. After reviewing submittals, the Designer will return one copy of form and one copy of applicable (marked up) submittal sheets to the Exhibit Contractor and One Copy to the Owner. Shop drawing review notations will be returned on the reproducible original shop drawing. All other submitted items will be retained. The Exhibit Contractor is responsible for producing additional copies for his/her own use.
13. The returned submittal will be marked in one of three ways as defined below:
 - a. APPROVED: Acceptable with no corrections.
 - b. APPROVED WITH NOTATIONS: Minor corrections or clarifications required. All comments are clear and no further review is required. The Exhibit Contractor shall address all review comments when proceeding with the work.
 - c. DISAPPROVED - RESUBMIT: Rejected as not in accordance with the contract or as requiring major corrections or clarifications. The Designer will identify the reasons for disapproval. The Exhibit Contractor shall revise and resubmit with changes clearly identified.
 - d. RECEIVED – NO ACTION REQUIRED: Contents of submittal were in appropriate or were sent in error: Not subject to review and record.
 - e. NOT SUBJECT TO REVIEW: Informational submittal. No copies will be returned. Copy will be kept as record. No review of submittal will be conducted.

1.4 USE OF ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Design Drawings: May only be used to expedite production of Shop Drawings for this Project. Use for other project or purpose not allowed. Contact Exhibit Designer directly for CAD Files.
- B. Electronic CAD Files of Design Drawings: Will be distributed only under following conditions:
1. Source information used to generate electronic CAD files was not prepared by Exhibit Designer and Exhibit Designer is not responsible for accuracy of information contained in files.
 2. Use of files is solely at receiver's risk. Exhibit Designer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions and quantities set forth in the Exhibit Contract Documents. In event of ambiguity, discrepancy or conflict between information on electronic media and that in Contract Documents, notify Exhibit Designer of discrepancy and use information in hard copy Drawings and Specifications.
 3. CAD Files: Do not necessarily represent latest Contract Documents, existing conditions, and as-built conditions. Receiver: Responsible to determine and comply with these conditions. Receiver: Responsible for incorporating addenda and modifications, Change Orders and Exhibit Designer's Supplemental Instructions.
 4. User: Responsible for removing information not normally provided on Shop Drawings and any references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and immediately returned.
 5. Files: Vectorworks files transmitted by electronic storage device (CD). There is no guarantee of integrity of data or completeness and form of translation. Receiver shall not hold Exhibit Designer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation or use of this electronic information.
 6. Receiver understands that even though Exhibit Designer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media. Receiver: Not hold Architect nor Exhibit Designer responsible for such viruses or their consequences, and shall hold Architect and Exhibit Designer harmless against costs, losses or damage caused by presence of computer virus in files or media.

END OF SECTION 01330

SECTION 01350 – LEED REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general requirements and procedures for compliance with certain U.S. Green Building Council's (USGBC) LEED prerequisites and credits needed for the Project to obtain LEED Certified certification.

- 1. Other LEED prerequisites and credits needed to obtain LEED certification are dependent on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests.
- 2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification are dependent on the Exhibit Designer's and Architect's design and other aspects of the Project that are not part of the Work of the Contract.

- B. Related Sections include the following:

- 1. Divisions'1 through 16 Sections for LEED requirements specific to the Work of each of those Sections. These requirements may or may not include reference to LEED.

1.3 DEFINITIONS

- A. LEED: Leadership in Energy & Environmental Design.
- B. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles (800 km) from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.
- C. Regionally Extracted, Harvested, or Recovered Materials: Materials that are extracted, harvested, or recovered and manufactured within a radius of 500 miles (800 km) from the Project site.
- D. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).
 - 1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.

2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

1.4 SUBMITTALS

- A. General: Submit additional LEED submittal requirements included in other sections of the Specifications.
- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project. Include statement indicating total cost of mechanical and electrical components.
- D. LEED Action Plans: Provide preliminary submittals within 14 days of date established for commencement of the Work indicating how the following requirements will be met.
 1. Credit MR"2.1 (and 2.2, if applicable): Waste management plan complying with Division"1 Section "Construction Waste Management."
 2. Credit MR"4.1 (and 4.1 if applicable): List of proposed materials with recycled content.
 - a. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 3. Credit MR"5.1 (and 5.2 if applicable): List of proposed regionally manufactured materials"and regionally extracted, harvested, or recovered materials.
 - a. Identify each regionally manufactured material, its source, and cost.
 - b. Identify each regionally extracted, harvested or recovered material, its source, and cost.
 4. Credit EQ"3.1: Construction indoor air quality management plan.
- E. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
 1. Credit MR"2.1"and 2.2: Waste reduction progress reports complying with Division"1 Section "Construction Waste Management."
 2. Credit MR"4.1"and 4.2: Recycled content.
 3. Credit MR"5.1"and 5.2: Regionally manufactured materials"and regionally extracted, harvested, or recovered materials.
- F. LEED Documentation Submittals:
 1. Credit WE 3.1: Product Data for plumbing fixtures indicating water consumption.

2. Prerequisite EA"3.0: Product Data for new HVAC equipment indicating absence of CFC refrigerants."Phase-out plan to replace CFC refrigerants in HVAC&R systems with CFC-free refrigerants within the Construction Period.
3. Credit EA"4.0: Product Data for new HVAC equipment indicating absence of HCFC refrigerants,"and for clean-agent fire-extinguishing systems indicating absence of HCFC and Halon.
4. Credit MR"2.1"and 2.2: Comply with Division"1 Section "Construction Waste Management."
5. Credit MR"4.1"and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
6. Credit MR"5.1"and 5.2: Product Data indicating location of material manufacturer for regionally manufactured materials.
 - a. Include statement indicating cost and distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating cost and distance from point of extraction, harvest, or recovery to Project for each raw material used in regionally manufactured materials.
7. Credit EQ"1.0: Product Data and Shop Drawings for carbon dioxide monitoring system.
8. Credit EQ"3.1:
 - a. Construction indoor air quality management plan.
 - b. Product Data for temporary filtration media.
 - c. Product Data for filtration media used during occupancy.
 - d. Construction Documentation: Six photographs at three different occasions during construction along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
9. Credit EQ"3.2:
 - a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
 - b. Product Data for filtration media used during flush-out and during occupancy.
 - c. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing conformance with IAQ testing procedures and requirements.
10. Credit EQ"4.1: Product Data for adhesives and sealants used on the interior of the building indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40"CFR"59, Subpart D (EPA method 24).

11. Credit EQ"4.2: Product Data for paints and coatings used on the interior of the building indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40"CFR"59, Subpart D (EPA method 24).
12. Credit EQ"4.3: Product Data for carpet products indicating VOC content of each product used.
13. Credit EQ"4.4: Product Data for composite wood and agrifiber products indicating that products contain no urea-formaldehyde resin.
 - a. Include statement indicating adhesives and binders used for each product.
14. Credit EQ"6.2: Product Data and Shop Drawings for sensors and control system used to provide individual airflow and temperature controls for minimum 50 percent of non-perimeter, regularly occupied space.
15. Credit EQ"7: Product Data and Shop Drawings for sensors and control system used to monitor and control room temperature and humidity.

PART 2 PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

- A. Credit MR"4.1: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of five percent of the cost of materials used for the Project.
- B. Credits MR"4.1"and MR"4.2: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10 percent of the cost of materials used for the Project.
 1. The cost of post-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
 2. The cost of post consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
 3. Do not include mechanical and electrical components in the calculation.
 4. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16"CFR 260.7"(e).

2.2 REGIONAL MATERIALS

- A. Credit MR"5.1: Provide 20 percent of building materials (by cost) that are regionally manufactured materials.

- B. Credit MR"5.2: Of the regionally manufactured materials required by Paragraph "Credit MR"5.1" above, provide at least 50 percent (by cost) that are regionally extracted, harvested, or recovered materials.

2.3 LOW-EMITTING MATERIALS

- A. Credit EQ"4.1: For interior applications use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40"CFR"59, Subpart D (EPA method 24):

1. Wood Glues: 30 g/L.
2. Metal to Metal Adhesives: 30 g/L.
3. Adhesives for Porous Materials (Except Wood): 50 g/L.
4. Subfloor Adhesives: 50 g/L.
5. Plastic Foam Adhesives: 50 g/L.
6. Carpet Adhesives: 50 g/L.
7. Carpet Pad Adhesives: 50 g/L.
8. VCT and Asphalt Tile Adhesives: 50 g/L.
9. Cove Base Adhesives: 50 g/L.
10. Gypsum Board and Panel Adhesives: 50 g/L.
11. Rubber Floor Adhesives: 60 g/L.
12. Ceramic Tile Adhesives: 65 g/L.
13. Multipurpose Construction Adhesives: 70 g/L.
14. Fiberglass Adhesives: 80 g/L.
15. Structural Glazing Adhesives: 100 g/L.
16. Wood Flooring Adhesive: 100 g/L.
17. Contact Adhesive: 250 g/L.
18. Plastic Cement Welding Compounds: 350 g/L.
19. ABS Welding Compounds: 400 g/L.
20. CPVC Welding Compounds: 490 g/L.
21. PVC Welding Compounds: 510 g/L.
22. Adhesive Primer for Plastic: 650 g/L.
23. Sealants: 250 g/L.

24. Sealant Primers for Nonporous Substrates: 250 g/L.
 25. Sealant Primers for Porous Substrates: 775 g/L.
- B. Credit EQ"4.2: For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40"CFR"59, Subpart D (EPA method 24) and the following chemical restrictions:
1. Flat Paints and Coatings: VOC not more than 50 g/L.
 2. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
 3. Anti-Corrosive Coatings: VOC not more than 250 g/L.
 4. Varnishes and Sanding Sealers: VOC not more than 350 g/L.
 5. Stains: VOC not more than 250 g/L.
 6. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 7. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.
- C. Credit EQ"4.4: Do not use composite wood and agrifiber products that contain urea-formaldehyde resin.

PART 3 EXECUTION

3.1 REFRIGERANT AND CLEAN-AGENT FIRE-EXTINGUISHING-AGENT REMOVAL

- A. Prerequisite EA"3.0: Remove CFC-based refrigerants from existing HVAC and refrigeration equipment indicated to remain and replace with refrigerants that are not CFC based. Replace or adjust existing equipment to accommodate new refrigerant as described in Division"15 Sections.
- B. Credit EA"4.0: Remove HCFC-based refrigerants from existing HVAC and refrigeration equipment indicated to remain and replace with refrigerants that are not HCFC based. Replace or adjust equipment to accommodate new refrigerant."Remove clean-agent fire-extinguishing agents that contain HCFCs or halons, and replace with agent that does not contain HCFCs or halons.
 - 1. Refer to Division"15 for additional requirements.

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR"2.1"and 2.2: Comply with Division"1 Section "Construction Waste Management."

3.3 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

- A. Credit EQ"3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.
 - 1. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and Controls," install filter media having a MERV"8 according to ASHRAE"52.2 at each return-air inlet for the air-handling system used during construction.
- B. Credit EQ"3.2:
 - 1. Conduct a two-week building air flush-out after construction ends with new air filters and 100 percent outdoor air. Replace air filters after building air flush-out. Replacement air filters shall have a MERV"13 according to ASHRAE"52.2.

END OF SECTION 013520

SECTION 01420 — REFERENCE STANDARDS

PART 1 - GENERAL

- 1.1 The following abbreviations, which may be used in the construction specifications, refer to the organizations and specifications of the organizations listed below:

AA	Aluminum Association 900 19th Street, NW, Suite 300 Washington, D.C. 20006-2168
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, D.C. 20005
AAMA	American Architectural Manufacturers Association 1827 Walden Office Square, Suite 104 Schaumburg, Illinois 60173-4268
AAN	see ANLA
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW, Suite 249 Washington, D.C. 20001
ABMA	American Boiler Manufacturers Association 950 N. Glebe Road, Suite 160 Arlington, Virginia 22203-1824
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, Michigan 48333-9094
ACPA	American Concrete Pipe Association 222 West Las Colinas Boulevard, Suite 641 Irving, Texas 75039-5423
ADC	Air Diffusion Council 11 South LaSalle Street, Suite 1400 Chicago, Illinois 60603
AFPA	American Forest and Paper Association 1111 19th Street, NW, Suite 800 Washington, D.C. 20036
AGA	American Gas Association 1515 Wilson Boulevard Arlington, Virginia 22209
AHA	American Hardboard Association 1210 W. Northwest Highway Palatine, Illinois 60067-1897
AHAM	Association of Home Appliance Manufacturers 20 N. Wacker Drive, Suite 1500 Chicago, Illinois 60606
AI	Asphalt Institute Research Park Drive P.O. Box 14052

Lexington, Kentucky 40512-4052

AISC American Institute of Steel Construction
1 East Wacker Drive, Suite 3100
Chicago, Illinois 60601-2001

AISI American Iron and Steel Institute
1101 17th Street, NW
Washington, D.C. 20036-4700

AITC American Institute of Timber Construction
7012 S. Revere Parkway, Suite 140
Englewood, Colorado 80112

ALSC American Lumber Standards Committee
P.O. Box 210
Germantown, Maryland 20875

AMCA Air Movement and Control Association International, Inc.
30 W. University Drive
Arlington Heights, Illinois 60004-1893

ANLA American Nursery and Landscape Association
1250 I Street, NW, Suite 500
Washington, D.C. 20005

ANSI American National Standards Institute
11 West 42nd Street, 13th Floor
New York, New York 10036

APA American Plywood Association (See EWA)

APWA American Public Works Association
106 West 11th Street, Suite 1800
Kansas City, Missouri 64105-1806

ARI Air-Conditioning and Refrigeration Institute
4301 Fairfax Drive, Suite 425
Arlington, Virginia 22203

ARMA Asphalt Roofing Manufacturers Association
Center Park, 4041 Powder Mill Road, Suite 404
Calverton, Maryland 20705

ASC Adhesive and Sealant Council
1627 K Street, NW, Suite 1000
Washington, D.C. 20006-1707

ASHRAE American Society of Heating, Refrigerating, and Air-Conditioning Engineers
1791 Tullie Circle, NE
Atlanta, Georgia 30329-2305

ASLA American Society of Landscape Architects
4401 Connecticut Avenue, NW
Fifth Floor
Washington, D.C. 20008-2369

ASME American Society of Mechanical Engineers
345 East 47th Street
New York, New York 10017

ASPE American Society of Plumbing Engineers
3617 Thousand Oaks Boulevard, Suite 210
Westlake, California 91362-3649

ASSE American Society of Sanitary Engineering
28901 Clemens Road, Suite 100

Westlake, Ohio 44145

ASTM American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, Pennsylvania 19428-2959

AWI Architectural Woodwork Institute
1952 Isaac Newton Square
Reston, Virginia 20190

AWPA American Wood-Preservers' Association
3246 Fall Creek Highway, Suite 1900
Granbury, Texas 76049-7979

AWPI American Wood Preservers Institute
1945 Old Gallows Road, Suite 550
Vienna, Virginia 22182

AWS American Welding Society, Inc.
550 NW LeJeune Road
Miami, Florida 33126

AWWA American Water Works Association
6666 W. Quincy Avenue
Denver, Colorado 80235

BHMA Builders Hardware Manufacturers Association, Inc.
355 Lexington Avenue, 17th Floor
New York, New York 10017-6603

BIA Brick Institute of America
11490 Commerce Park Drive
Reston, Virginia 22091-1525

BOCA Building Officials Code Administrators
4051 W. Flossmoor Road
Country Club Hills, Illinois 60478-5795

CBM Certified Ballast Manufacturers
1422 Euclid Avenue, Suite 402
Cleveland, Ohio 44115-2851

CDA Copper Development Association, Inc.
260 Madison Avenue, 16th Floor
New York, New York 10016-2401

CE Corps of Engineers
20 Massachusetts Avenue, NW
Washington, D.C. 20314

CID Commercial Item Description
See contract clauses

CISPI Cast Iron Soil Pipe Institute
5959 Shallowford Road, Suite 419
Chattanooga, Tennessee 37421

CLFMI Chain Link Fence Manufacturers Institute
9891 Broken Land Parkway, Suite 300
Columbia, Maryland 21046

CRA California Redwood Association
405 Enfrente Drive, Suite 200
Novato, California 94949

CRI Carpet and Rug Institute
310 S. Holiday Avenue

Dalton, Georgia 30722-2048

CRSI Concrete Reinforcing Steel Institute
933 N. Plum Grove Road
Schaumburg, Illinois 60173-4758

CS Commercial Standard of NBS
(U.S. Department of Commerce)
Government Printing Office
Washington, D.C. 20402

CSSB Cedar Shingle and Shake Bureau
515 116th Avenue, NE, Suite 275
Bellevue, Washington 98004-5294

DHI Door and Hardware Institute
14170 Newbrook Drive
Chantilly, Virginia 22021-2223

EPA Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

EWA APA- The Engineered Wood Association
P.O. Box 11700
Tacoma, Washington 98411-0700

FHA Federal Housing Administration
(U.S. Department of Housing and Urban Development)
451 7th Street, SW
Washington, D.C. 20410

FHVA Fine Hardwood Veneer Association
260 S. First Street, Suite 2
Zionsville, Indiana 46077

FM Factory Mutual System
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062-9102

FS Federal Specifications
See contract clauses

GA Gypsum Association
810 First Street, NE, Suite 510
Washington, D.C. 20002

GANA Glass Association of North America
3310 SW Harrison Street
Topeka, Kansas 66611-2279

HI Hydronics Institute
35 Russo Place
P.O. Box 218
Berkeley Heights, New Jersey 07922

HMA Hardwood Manufacturers Association
400 Penn Center Boulevard, Suite 530
Pittsburgh, Pennsylvania 15235-5605

HPMA Hardwood Plywood Manufacturers Association
P.O. Box 2789
Reston, Virginia 22090-2789

IA Irrigation Association
1911 N. Fort Myer Drive, Suite 1009

Arlington, Virginia 22209-1630

IBC International Building Code, 2000 Edition

ICBO International Conference of Building Officials
5360 S. Workman Mill Road
Whittier, California 90601

ICEA Insulated Cable Engineers Association, Inc.
P.O. Box 440
South Yarmouth, Massachusetts 02664

IEEE The Institute of Electrical and Electronics Engineers
345 E. 47th Street
New York, New York 10017-2394

IES Illuminating Engineering Society of North America
120 Wall Street, 17th Floor
New York, New York 10005-4001

IGCC See ITS

ILIA Indiana Limestone Institute of America, Inc.
Stone City Bank Building, Suite 400
Bedford, Indiana 47421

ITS Internek Testing Services
3393 Route 11
P.O. Box 2040
Cortland, New York 13045-7902

KCMA Kitchen Cabinet Manufacturers Association
1899 Preston White Drive
Reston, Virginia 22091-4326

LIA Lead Industries Association, Inc.
295 Madison Avenue
New York, New York 10017

MBMA Metal Building Manufacturers Association
c/o Thomas Associates, Inc.
1300 Sumner Avenue
Cleveland, Ohio 44115-2851

MFMA Maple Flooring Manufacturers Association
60 Revere Drive, Suite 500
Northbrook, Illinois 60062

MIA Marble Institute of America
30 Eden Alley, Suite 201
Columbus, Ohio 43215

MIMA Mineral Insulation Manufacturers Association
1420 King Street
Alexandria, Virginia 22314

MLSFA Metal Lath/Steel Framing Association - A Division of NAAMM
8 South Michigan Avenue, Suite 1000
Chicago, Illinois 60603

MS Military Standardization Documents
See contract clauses

MSHA Mine Safety and Health Administration
4015 Wilson Boulevard, Room 601
Arlington, Virginia 22203

MSS Manufacturers Standardization Society of the Valve and Fittings Industry

127 Park Street, NE
Vienna, Virginia 22180-4602

NAAMM The National Association of Architectural Metal Manufacturers
8 South Michigan Avenue, Suite 1000
Chicago, Illinois 60603

NACE National Association of Corrosion Engineers
1440 South Creek Drive
P.O. Box 218340
Houston, Texas 77218-8340

NAIMA North American Insulation Manufacturers Association
44 Canal Center Plaza, Suite 310
Alexandria, Virginia 22314

NAPA National Asphalt Pavement Association
NAPA Building
5100 Forbes Boulevard
Lanham, Maryland 20706-4413

NAPCA National Association of Pipe Coating Applicators
8th Floor, Commercial National Bank Building
333 Texas Street, Suite 800
Shreveport, Louisiana 71101-3673

NBS National Bureau of Standards
(U.S. Department of Commerce)(See NIST)

NCMA National Concrete Masonry Association
2302 Horse Pen Road
Herndon, Virginia 20171-3499

NEC National Electrical Code (by NFPA)

NECA National Electrical Contractors Association
3 Bethesda Metro Center, Suite 1100
Bethesda, Maryland 20814

NELM Northeastern Lumber Manufacturers' Association
272 Tuttle Road
P.O. Box 87A
Cumberland Center, Maine 04021-0687

NEII National Elevator Industry, Inc.
185 Bridge Plaza North, Suite 310
Fort Lee, New Jersey 07024

NEMA National Electrical Manufacturers Association
1300 N. 17th Street, Suite 1847
Rosslyn, Virginia 22209

NFPA National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, Massachusetts 02269-9101

NHLA National Hardwood Lumber Association
P.O. Box 34518
Memphis, Tennessee 38184-0518

NHPMA Northern Hardwood and Pine Manufacturers Association, Inc.,
c/o Northern Softwood Lumber Bureau
Box 217
Dear River, Minnesota 56636

NIOSH National Institute for Occupational Safety and Health
NIOSH Building 1, Room 3007
1600 Clifton Road, NE
Atlanta, Georgia 30333

NIST National Institute of Standards and Technology
(US Department of Commerce)
Building 101, #A1134
Route I-270 and Quince Orchard Road
Gaithersburg, Maryland 20899

Send requests for publications to:
Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

NOFMA National Oak Flooring Manufacturers Association
P.O. Box 3009
Memphis, Tennessee 38173-0009

NPA National Particleboard Association
18928 Premiere Court
Gaithersburg, Maryland 20879-1569

NRCA National Roofing Contractors Association
O'Hare International Center
10255 W. Higgins Road, Suite 600
Rosemont, Illinois 60018-5607

NSF NSF International
(Formerly National Sanitation Foundation)
3475 Plymouth Road
P.O. Box 130140
Ann Arbor, Michigan 48113-0140

NTMA The National Terrazzo and Mosaic Association
3166 Des Plaines Avenue, Suite 121
Des Plaines, Illinois 60018

NWWDA National Wood Window and Door Association
1400 East Touhy Avenue, Suite G-54
Des Plaines, Illinois 60018

OSHA Occupational Safety and Health Administration
U.S. Department of Labor
200 Constitution Avenue, NW
Washington, D.C. 20210

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, Illinois 60077-1083

PCI Precast/Prestressed Concrete Institute
175 W. Jackson Boulevard
Chicago, Illinois 60604

PDI Plumbing and Drainage Institute
45 Briston Drive, Suite 101
South Euston, Massachusetts 02375

PEI Porcelain Enamel Institute, Inc.
4004 Hillsboro Pike, Suite 224-B
Nashville, Tennessee 37215

PI Perlite Institute, Inc.
88 New Dorp Plaza
Staten Island, New York 10306

PS Product Standard of NBS (U.S. Department of Commerce)
Government Printing Office
Washington, D.C. 20402

RFCI Resilient Floor Covering Institute
966 Hungerford Drive, Suite 12-B
Rockville, Maryland 20850-1714

RIS Redwood Inspection Service (Grading Rules)
405 Enfrente Drive, Suite 200
Novato, California 94949

RMMI Rocky Mountain Masonry Institute
1780 South Bellaire Street, No. 602
Denver, Colorado 80222

SCMA Southern Cypress Manufacturers Association
400 Penn Center Blvd., Suite 530
Pittsburgh, Pennsylvania 15235

SDI Steel Deck Institute
P.O. Box 25
Fox River Grove, Illinois 60021

SDI Steel Door Institute
30200 Detroit Road
Cleveland, Ohio 44145-1967

SFPA Southern Forest Products Association
P.O. Box 52468
New Orleans, Louisiana 70152

SGCC See ITS

SIGMA Sealed Insulating Glass Manufacturers Association
401 N. Michigan Avenue
Chicago, Illinois 60611-4267

SJI Steel Joist Institute
3127 10th Avenue, North Ext.
Myrtle Beach, South Carolina 29577-6760

SMACNA Sheet Metal and Air-Conditioning Contractors' National Association, Inc.
4201 Lafayette Center Drive
P.O. Box 221230
Chantilly, Virginia 20151-1209

SPIB Southern Pine Inspection Bureau (Grading Rules)
4709 Scenic Highway
Pensacola, Florida 32504-9094

SSPC Steel Structures Painting Council
40 24th Street, 6th Floor
Pittsburgh, Pennsylvania 15222-4643

SWI Steel Window Institute
c/o Thomas Associates, Inc.
1300 Sumner Avenue
Cleveland, Ohio 44115-2851

TCA Tile Council of America
100 Clemson Research Boulevard

Anderson, South Carolina 29625

TIMA Thermal Insulation Manufacturers Association (See NAIMA)

TPI Truss Plate Institute
583 D'Onofrio Drive, Suite 200
Madison, Wisconsin 53719

UBC Uniform Building Code (by ICBO)

UL Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, Illinois 60062

USDA U.S. Department of Agriculture
14th Street and Independence Avenue, SW
Washington, D.C. 20250

WCLB West Coast Lumber Inspection Bureau (Grading Rules)
P.O. Box 23145
Portland, Oregon 97281-3145

WIC Woodwork Institute of California
P.O. Box 980247
West Sacramento, California 95798-0247

WMMPA Wood Moulding and Millwork Producers Association
507 First Street
Woodland, California 95695

WRI Wire Reinforcement Institute, Inc.
203 Loudoun Street, SW
Leesburg, Virginia 20175-2718

WSFI Wood and Synthetic Flooring Institute (See MFMA)

WWPA Western Wood Products Association (Grading Rules)
Yeon Building
522 SW 5th Avenue
Portland, Oregon 97204-2122

WWPA Woven Wire Products Association
2515 Nordica Avenue
Chicago, Illinois 60635

WWPI Western Wood Preservers Institute
7017 NE Highway 99 #108
Vancouver, Washington 98665

END OF SECTION 01420

SECTION 015000 -- CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

PART 1 GENERAL

1.1 GENERAL REQUIREMENT

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

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the construction facilities and temporary controls as shown on the drawings and specified herein, including but not limited to, the following:
 - 1. Construction signs.
 - 2. Hoists, stairs, and ladders.
 - 3. Rodent control.
 - 4. Temporary elevator.
 - 5. Construction fence.
 - 6. Field office.
 - 7. Fire protection.
 - 8. Temporary utilities.
 - 9. Temporary toilets.
 - 10. Temporary site access.
 - 11. Security.
 - 12. Water and snow control.
 - 13. Environmental controls.

1.3 RELATED SECTIONS

- A. Materials and Equipment - Section 016000.

PART 2 PRODUCTS

2.1 GENERAL

- A. Arrange for and provide temporary facilities and controls as specified herein and as required for the proper and expeditious prosecution of the work. Pay all costs, except as otherwise specified, until final acceptance of the work unless the Owner makes arrangements for the use of completed portions of the work after substantial completion.

- B. Make all temporary connections to utilities and services in locations acceptable to the local authorities having jurisdiction thereof; furnish all necessary labor and materials, and make all installations in a manner subject to the acceptance of such authorities; maintain such connections; remove the temporary installation and connections when no longer required; restore the services and sources of supply to proper operating condition.
- C. Unless otherwise noted, pay all costs for temporary electrical power, temporary water, and temporary heating; provide metering as necessary.

2.2 PROJECT IDENTIFICATION

- A. No signs or advertisements will be allowed to be displayed on the premises without the approval of the Architect.
- B. One construction sign on the site shall be provided by the Exhibit Contractor and shall be subject to the approval of the Owner. Text and lettering shall be provided for at a later date.
- C. Erect the construction sign on the site where directed by the Owner approximately 4 ft. x 8 ft. in size, of 3/4 in. plywood with suitable frame, moldings, and supports. Use Douglas Fir Overlaid Plywood, Grade B-B high density, exterior, good two sides, complying with PS-1. The sign shall be primed and given two coats of approved white paint. Lettering shall be black of a type, size, and lay-out as directed by the Owner. Sign shall contain the name of the building, Owner, Designer, Contractor, and such other reasonable information as the Designer or Owner may require.

2.3 MATERIAL HOIST

- A. Provide a material hoist as required for use by all trades. Provide all necessary guards, signals, safety devices, and so on, required for safe operations, and suitable runways from the hoists to each floor level and roof. The construction and operation of the material hoist shall comply with all applicable requirements of ANSI A10.5, the ACG Manual of Accident Prevention in Construction and to all applicable state and municipal codes. Prohibit the use of the material hoist for transporting personnel.

2.4 RODENT CONTROL

- A. Institute an effective program of rodent control for the entire site within the construction limits. Cooperate with local authorities and provide the regular services of an experienced exterminator who shall visit the site at least once a month for the entire construction period. Provide marked metal containers for all edible rubbish and enforce their use by all employees. Containers shall be emptied and the contents removed from the site as often as required to maintain an adequate rodent control program. If the program of rodent control used is not effective, take whatever steps are necessary to rid the project of rodents, and such action shall not be the basis of a claim for additional compensation or damages.

2.5 TEMPORARY CONSTRUCTION OPENINGS

- A. Provide openings in slabs, walls, and partitions where required for moving in large pieces of equipment of all types. Close and/or restore all openings and finish them after the equipment is in place. Structural modification, if required, shall be subject to review by the Architect and Exhibit Designer.

2.6 TEMPORARY ELEVATOR

- A. Provide a temporary elevator for necessary service during construction operations after the hoistway enclosures are completed and electrical power is available; use temporary machines, or at the Exhibit Contractor's option, use permanent machines, if they are available in due time for the required services.
- B. The temporary elevator shall include temporary wood cars with suitable gates, including temporary hoistway doors, all designed in accordance with the local and state safety requirements.
- C. The temporary services shall include qualified operating and maintenance personnel to perform the work in connection with the temporary operations.
- D. Upon completion of temporary use, all work or damaged permanent parts are to be replaced and all equipment placed in first-class condition equal to new.

2.7 TEMPORARY FENCE

- A. If not already provided by the General Contractor, provide and maintain an 8 foot high temporary fence to enclose the area at the job site and to guard and close effectively the designated area. Provide gates at locations where required for access to the enclosed area. Gates shall be cross-braced, hung on heavy strap hinges, and shall have hasps and padlocks. Paint the fence with two coats of an approved paint.
- B. Remove the fence upon completion of the work or at such time before final completion as directed by the Owner.

2.8 TEMPORARY FIELD OFFICES

- A. Provide and maintain a field office at the job site. The office shall be complete with light, heat, air conditioning, toilet facilities, electric water cooler, plan racks, four-drawer metal file with lock, shelves for samples, tables, chairs, and janitor service. When it becomes possible to establish an office in the building, office accommodation of approximately the same size as those in the field offices, including the services above, shall be provided and maintained until the issuance of a certificate of substantial completion. Temporary offices shall be removed when no longer required. Provide a telephone, computer with E-mail service and a fax line with machine and pay all charges for installation and calls, including long distance calls.

2.9 FIRE PROTECTION

- A. Provide and maintain adequate fire protection, ready for instant use, distributed around the project.
- B. Make arrangements for periodical inspection by municipal fire protection authorities and insurance underwriters inspections. Cooperate with said authorities and promptly carry out their recommendations.
- C. Open fire will not be permitted within the building enclosure or on the project site.

2.10 TEMPORARY HEAT AND VENTILATION

- A. Provide temporary heat as required during construction to protect the work from freezing or frost damage, and as necessary to ensure suitable working conditions for the construction operations of all trades. In areas of the building where work is being

conducted, the temperature shall be maintained as specified in the various sections of the Specifications, but not less than 45 degrees Fahrenheit. Under no circumstances shall the temperature be allowed to reach a level that will cause damage to any portion of the work that may be subject to damage by low temperatures.

- B. Until the building, or any major portion thereof, is enclosed, temporary heating shall be by smokeless portable unit heaters of type listed by Underwriter's Laboratories, Factory Mutual, and the Fire Marshall. Pay for fuel, maintenance, and attendants required in connection with the portable unit heaters. Interior or exterior surfaces damaged by the use of these space heaters shall be replaced by new materials or be refinished.
- C. The building shall be considered enclosed when it has reached the stage when exterior walls have been erected, the roof substantially completed, exterior openings closed up either by the permanently glazed windows and doors, or by adequate temporary closing, and the building is ready for interior masonry and plastering operations.
- D. After the building, or any major portion thereof, has been enclosed, the permanent heating system as specified below may be used for temporary heat.
- E. When the permanent heating system, or a suitable portion thereof, is in operating condition, the system may be used for temporary heating, provided that the Exhibit Contractor assumes full responsibility for the entire heating system, and pays all costs for fuel, operation, maintenance, and restoration of the system.
- F. Provide adequate ventilation as required to keep the temperature of the building within 10 degrees Fahrenheit of the ambient outdoor temperature when such ambient temperature exceeds 70 degrees Fahrenheit, and to prevent accumulation of excess moisture or to prevent excess thermal movement in the building.
- G. When the permanent air circulation system, or a suitable portion thereof, is in operating condition, it may be used without refrigeration or chilling, provided that the Exhibit Contractor assumes full responsibility for the system that he is using, and pays costs for power, operation, maintenance, and restoration of the system. Provide temporary filters to adequately filter air being distributed through the ductwork to the supply outlets; disposable filters shall be placed in front of all exhaust registers to keep construction dirt out of exhaust ductwork. The Exhibit Contractor shall thoroughly clean the interior of the air handling units and ductwork prior to acceptance of the work.
- H. Upon conclusion of the temporary heating period, remove all temporary piping, temporary heating units, or other equipment and pay all costs in connection with repairing any damage caused by the installation or removal of temporary heating equipment. Thoroughly clean and recondition those parts of permanent heating and air circulation systems used for temporary service.

2.11 TEMPORARY LIGHT AND POWER

- A. Make all arrangements with the General Contractor for temporary electrical service to the construction site; provide all equipment necessary for temporary power and lighting; and pay all charges for this equipment, the installation thereof, and for current used. The electrical service shall be of 120v and 240v for single-phase loads up to 30 amps for all construction tools and equipment without overloading the temporary facilities and shall be made available for power, lighting, and construction operations of all trades.
- B. In addition to the electrical service, provide power distribution as required throughout structure. The terminations of power distribution shall be at convenient locations in the

building. Terminations shall be provided for each voltage supply complete with circuit breakers, disconnect switches, and other electrical devices as required to protect the power supply system.

1. Provide double duplex outlets at not more than 200' o.c. both directions throughout this building.
- C. A temporary lighting system shall be furnished, installed, and maintained as required to satisfy minimum requirements of safety and security. The temporary lighting system shall afford general illumination in all building areas and shall supply not less than 150 watt lamps on 30' centers both directions of floor area for illumination in the areas of the building where work is being performed.
- D. All temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the governing codes. All temporary wiring shall be maintained in a safe manner and used so as not to constitute a hazard to persons or property.
- E. When the permanent electrical power and lighting systems are in operating condition, they may be used for temporary power and lighting for construction purposes, provided that the Exhibit Contractor assumes full responsibility for the entire power and lighting system, and pays costs for power, operations, maintenance, and restoration of the system.

2.12 TEMPORARY ROADS AND ACCESS TO SITE

- A. Construct and maintain in good usable condition all required temporary roads and access to site, and, when no longer required, remove all temporary construction and restore the site.
- B. Where streets now in use are within or adjacent to the work, keep the passageways of such streets open to vehicular and pedestrian traffic to building fronting thereon. Maintain constant access for police, fire and ambulance service.
- C. Mud carried off the site and into public roads shall be removed immediately by the Exhibit Contractor.
- D. Access to the site for delivery of construction material or equipment shall be made only from locations designated by the Owner.

2.13 TEMPORARY STAIRS, LADDERS, RAMPS

- A. Provide and maintain all equipment such as temporary stairs, ladders, ramps, runways, and chutes as required for the proper execution of the work.
- B. All such apparatus, equipment, and construction shall meet all requirements of the Labor Law and other state or local laws applicable thereto.
- C. As soon as permanent stairs are erected, provide temporary protective treads, handrails, and shaft protection.

2.14 TEMPORARY TOILETS

- A. Provide and maintain in a sanitary condition enclosed weather-tight toilets for the use of all construction personnel at a location within the contract limits. Upon completion of the work, toilets shall be removed. Installation shall be in accordance with all applicable

codes and regulations of authorities having jurisdiction. The number of toilet rooms required shall be in accordance with the ANSI Standard Safety Code for Building Construction or other local authorities.

2.15 TEMPORARY WATER SERVICE

- A. Provide at a point within 10 feet of the building (or buildings) all water necessary for construction purposes. Make all temporary connections to existing mains; provide temporary meter; and make arrangements to pay for the temporary water service including cost of installation, maintenance thereof, and water used.
- B. Furnish drinking water with suitable containers and cups for use of employees. Drinking water dispensers shall be conveniently located in the building where work is in progress.
- C. When the permanent water supply and distribution system has been installed, it may be used as a source of water for construction purposes, provided that the Exhibit Contractor assumes full responsibility for the entire water distribution system, and pays costs for operation, maintenance, and restoration of the system including the cost of water used.
- D. At the completion of the construction work or at such time after the Contractor makes use of the permanent water installation, all temporary water service equipment and piping shall be removed, and all worn or damaged parts of the permanent system shall be replaced and equipment placed in first class condition equal to new.

2.16 SECURITY

- A. Provide sufficient watchman service to prevent illegal entry or damage during nights, holidays, or other periods when work is not being executed, and such other control watchmen as required during working hours.
- B. Provide all temporary enclosures required for protecting the project from the exterior, for providing passageways, for the protection of openings both exterior and interior, and any other location where temporary enclosures and protection may be required.
- C. Take adequate precautions against fire; keep flammable material at an absolute minimum; and ensure that such material is properly handled and stored. Except as otherwise provided herein, do not permit fires to be built or open salamanders to be used in any part of the work.

2.17 WATER AND SNOW CONTROL

- A. From the commencement to the construction of the completion of the work, keep all parts of the site and the project free from accumulation of water, and supply, maintain, and operate all necessary pumping and bailing equipment.
- B. Remove snow and ice as necessary for the protection and prosecution of the work, and protect the work against weather damage.
- C. The Contractor shall take over responsibility for site drainage upon entering the premises and shall maintain such drainage until completion of the work so as not to adversely affect the adjacent areas.

2.18 ENVIRONMENTAL CONTROLS

- A. The Contractor shall comply with all applicable Federal, State and local laws, regulations, ordinances, codes and standards concerning environment control. Particular attention shall be given, without limitations, to:
 - 1. Minimization of dust, containment of chemical vapors, control of engine exhaust gases, and control of smoke from temporary heaters.
 - 2. Reduction of water pollution by control of sanitary facilities, proper storage of fuels and other potential contaminants, and prevention of siltation from land erosion.
 - 3. Minimization of noise levels.
 - 4. Proper and legal disposal, off site unless otherwise provided, of waste and spoil resulting from construction activities.
 - 5. See Section 01811 – Air Quality Management and Section 01812 - Waste Management for other requirements.

PART 3 EXECUTION

3.1 REMOVAL

- A. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the work. Remove all such temporary facilities and controls as rapidly as progress of the work will permit or as directed by the Designer or Owner.

END OF SECTION 01500

SECTION 01570 – TRAFFIC REGULATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the traffic regulation as specified herein, as follows:
 - 1. Flagmen.
 - 2. Flares and Lights.
 - 3. Haul Routes.
 - 4. Traffic Signs and Signals.
 - 5. Removal.

1.3 RELATED SECTIONS

- A. Construction facilities and temporary controls - Section 015000.

1.4 SIGNS, SIGNALS, AND DEVICES

- A. Post Mounted and Wall Mounted Traffic Control and Information Signs.
- B. Traffic Control Signals: As approved by local jurisdictions.
- C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- D. Flagmen Equipment: As approved by local jurisdictions.

1.5 FLAGMEN

- A. Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

1.6 FLARES AND LIGHTS

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

1.7 HAUL ROUTES

- A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.

- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

1.8 TRAFFIC SIGNS AND SIGNALS

- A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
- C. Relocate as Work progresses, to maintain effective traffic control.

1.9 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01570

SECTION 01600 – MATERIALS AND EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. The work of this section consists of the general procedures for handling, storing, and protecting material and equipment.

1.3 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of materials in accordance with construction schedules; coordinate to avoid conflict with work and conditions at the site. Deliver materials in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Contractor is encouraged to obtain materials in biodegradable or recyclable/reusable packaging that uses the minimum amount of packaging possible.

1.4 STORAGE AND PROTECTION

- A. Store materials in accordance with manufacturer's instructions, with seals and labels accessible for inspection.
- B. Interior Storage: Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- C. Exterior Storage:
 - 1. Store products subject to damage by the elements in weather tight enclosures.
 - 2. Store fabricated products above the ground, on blocking or skids; prevent soiling or staining. Cover products subject to damage or deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- D. Protection After Installation: It is important for all finished surfaces to remain protected during construction. Scratches, rubs, nicks and dents will not be acceptable in exposed finished building elements such as log columns, wood panels, concrete topping slabs, gypsum wallboard walls, painted finishes, etc. Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

END OF SECTION 01600

SECTION 01740 – WARRANTIES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

Section 01770 " PROJECT CLOSEOUT"

1.02 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Exhibit Contractor's special warranty of workmanship and materials.
 - 2. General closeout requirements are included in Section 01770 "PROJECT CLOSEOUT."
 - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections.
 - 4. Certifications and other commitments and agreements for continuing services to the Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Exhibit Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Exhibit Contractor.

1.03 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Exhibit Contract Documents. The Exhibit Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Exhibit Designer's Recourse: Written warranties made to the Exhibit Designer are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise

available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.

1. Rejection of Warranties: The Exhibit Designer reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
 - a. The Exhibit Designer reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to counter sign such commitments are willing to do so.
2. Special Warranties:
 - a. Shall not deprive the Owner of other rights they may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Exhibit Contractor under requirements of Contract Documents.
 - b. Commence on Date of Beneficial Occupancy for that space or system, as defined in General Conditions, unless specifically specified otherwise in particular specification section.

1.04 SUBMITTALS:

- A. Submit written warranties to the Owner prior to the date certified for Beneficial Occupancy.
 1. When a designated portion of the Work is completed and accepted for beneficial occupancy or used by the Owner, submit properly executed warranties to the Exhibit Designer within fifteen days of completion of that designated portion of the Work.
 2. When a special warranty is required to be executed by the, or the Exhibit Contractor General Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval prior to final execution.
 3. Refer to individual Sections of Division-2 through -16 for specific content requirements, and particular requirements for submittal of special warranties.
- B. Form of Submittal: At Final Completion, Exhibit Contractor shall compile two copies of each required warranty properly executed by the Exhibit Contractor, subcontractor, supplier, or manufacturer. Warranty documents shall be organized into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 2. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation.
 3. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
 4. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES," the Project title or name, and the name of the Exhibit Contractor.

5. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION 01740

SECTION 01770 – PROJECT CLOSEOUT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

Section 01740, "WARRANTIES"

Section 01781, "PROJECT RECORD DOCUMENTATION"

Section 01782, "OPERATION & MAINTENANCE DOCUMENTATION"

Section 01800, "CLEANING"

Section 018200, "DEMONSTRATION AND TRAINING"

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
1. Inspection procedures.
 2. Project record document submittal.
 3. Operating and maintenance manual submittal.
 4. Submittal of warranties
 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.03 PARTIAL ACCEPTANCE

- A. Partial Owner Acceptance: The Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Final Acceptance, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy, or beneficial occupancy shall not constitute acceptance of the total Work.
1. The Exhibit Designer will prepare a notice of Partial Acceptance for each specific portion of the Work to be occupied before Owner occupancy.
 2. Before partial Owner occupancy, exhibit systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain exhibit systems serving occupied portions of building.

3. On occupancy, Owner will assume responsibility for maintenance and cleaning of exhibits.

1.04 SUBSTANTIAL COMPLETION

- A. Substantial Completion is defined as that state when the Exhibit Contractor has complied with the Contract requirements, except for minor deviations, and the project is sufficiently complete and capable of being occupied and used by the Owner for the intended purpose.
- B. Preliminary Procedures: Before requesting inspection for Substantial Completion, complete the following:
 1. Notification: The Exhibit Contractor shall notify the Owner fourteen (14) days prior to the Exhibit Contractor's intended date for requesting inspection for Substantial Completion.
 2. Documentation: Provide supporting documentation for completion as indicated elsewhere in the Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 3. Punch List: Submit a list to the Owner of incomplete items, the value of incomplete construction, and reasons Work is not complete.
 4. Releases: Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Manuals: Submit operation and exhibit maintenance manuals and exhibit maintenance kit.
 6. Security: Make final changeover of permanent locks and transmit keys to the Owner. Advise Owner of changeover in security provisions.
 7. Startups: Complete startup testing of all exhibit systems and instructions of the Owner operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mock-ups, construction tools, and similar elements.
8. Commissioning: The successful functional performance tests for Commissioning shall be complete. See Section 01280 – Demonstration and Testing.
9. Training: Conduct Operational Training Sessions as required for museum staff to familiarize with the exhibit systems using the Exhibit Maintenance Manuals as an instructional aid.
- C. Inspection Procedures: On receipt of a request for inspection, the Exhibit Designer will either proceed with inspection or advise the Exhibit Contractor of unfulfilled requirements. The Exhibit Designer will notify the Exhibit Contractor of Substantial Completion following the inspection or advise the Exhibit Contractor of construction that must be completed or corrected before Substantial Completion.
 1. The Exhibit Designer will repeat the inspection when requested and when assured that the Work is substantially complete.
 2. Results of the completed inspection will form the basis of the requirements for Final Acceptance.

1.05 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Exhibit Designer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the CM.
 4. Submit consent of surety to final payment.
 5. Submit a final liquidated damages settlement statement.
 6. All Commissioning Corrective Action Report (CAR) logs shall be closed.
 7. Submit Record Documents and similar record information.
 8. Complete final clean-up requirements including touch-up painting of marred surfaces.
- B. Re-inspection Procedure: The Exhibit Designer will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Exhibit Designer.
1. Upon completion of re-inspection, the Exhibit Designer will prepare a certificate of final acceptance, or advise the Exhibit Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, re-inspection will be repeated. Additional re-inspections can be done, if needed, but will require that Exhibit Contractor directly reimburse Exhibit Designer.

1.06 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

- a. Per Owner's requirements.

1.07 FINAL ADJUSTMENT OF ACCOUNTS

- A. Final Statement of Accounting: Submit to Owner and Designer. Show adjustments to Contract Sum:
1. Original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Allowances.
 - c. Unit Prices.
 - d. Deductions for uncorrected Work.
 - e. Deductions for inspection payments.

- f. Other adjustments.
 - 3. Total Contract Sum as adjusted.
 - 4. Previous payments.
 - 5. Retainage.
 - 6. Sum remaining due.
- B. Owner will prepare final Change Order reflecting approved adjustments to Contract Sum that are not included in Change Orders previously processed.

1.08 FINAL APPLICATION FOR PAYMENT

- A. Final Application for Payment: Submit in accordance with procedures and requirements stated in Conditions of the Contract.

PART 2 – PRODUCTS Not Used

PART 3 – EXECUTION

3.01 CLOSEOUT PROCEDURES

- A. Operating and Maintenance Instruction: Arrange for each installer of equipment that requires regular maintenance to meet with the museum's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items.
 - 1. Exhibit maintenance manuals.
 - a) per Section .01782
 - 2. Record documents/ As-builts
 - 3. Exhibit Maintenance Kit
 - a) Spare parts and materials.
 - b) keys and tools
 - c) lubricants
 - d) fuels
 - e) cleaning products
- B. As part of instruction for operating equipment, demonstrate the following procedures:
 - 1. Start-up.
 - 2. Shutdown.
 - 3. Emergency operations.
 - 4. Noise and vibration adjustments.
 - 5. Safety procedures.

6. Economy and efficiency adjustments.

7. Effective energy utilization.

3.02 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and included in other Division 1 Sections.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
1. Complete the following cleaning operations before requesting inspection for Final Acceptance:
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Vacuum all surfaces of the interstitial spaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- C. Pest Control: Engage an experienced exterminator to make a final inspection, and rid the Project of rodents, insects and other pests.
- D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction. Remove temporary construction, if any, and restore site to original condition.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 01770

SECTION 01781 – PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This section includes administrative and procedural requirements for Project Record Documents. Required Project Record Documents include the following:
 - 1. Marked-up copies of Contract Drawings.
 - 2. Marked-up copies of Shop Drawings.
 - 3. Newly prepared drawings.
 - 4. Marked-up copies of Specifications, addenda, and Change Orders.
 - 5. Marked-up Product Data submittals.
 - 6. Record Samples.
 - 7. Field records for variable and concealed conditions.
 - 8. Record information on Work that is recorded only schematically.
 - 9. Requests for Interpretation
- B. Maintenance of Documents and Samples: Store record documents and samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make documents and samples available at all times for the Owner's and Exhibit Designer's inspections.

1.03 RECORD DRAWINGS

- A. Markup Procedure: During construction, maintain a set of blue- or black-line white prints of Contract Drawings and Shop Drawings for Project Record Document purposes.
 - 1. Mark these Drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:
 - a. Dimensional changes to the Drawings.
 - b. Revisions to details shown on the Drawings.
 - c. Depths of foundations below the first floor.
 - d. Locations and depths of underground utilities.

- e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directives.
 - k. Changes made following the Exhibit Designer's written orders.
 - l. Details not on original Contract Drawings.
2. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
 3. Mark record sets with red erasable colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 4. Mark important additional information that was either shown schematically or omitted from original Drawings.
 5. Note alternate numbers, Change Order numbers, and similar identifications.
- B. Responsibility for Markup: The individual, installer, subcontractor or other entity who obtained the record data shall prepare the markup on record drawings.
1. Accurately record information in an understandable drawing technique.
 2. Record data as soon as possible after obtaining it. Record and check the markup prior to enclosing concealed installations.
 3. Prior to Final Acceptance, submit record drawings to the Owner and Exhibit Designer for their records. Organize into sets, and bind and label.
- C. Preparation of Record Drawings: Prior to Final Acceptance, review completed marked-up record drawings with the Owner and Exhibit Designer. When authorized, prepare a full set of corrected copies of the Contract Drawings and Shop Drawings.
1. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each drawing. Include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each drawing.
 - a. Encircle each area of change or additional information with a free-form cloud-shape drawn on the reverse side of the transparency..
 - b. Identify changes and additional information by printing the Change Order Number or other change reference designation, when applicable, within the cloud-shape encircled area.
 2. Refer instances of uncertainty to the Owner for resolution.
 3. The Exhibit Fabricator is responsible for printing Record Drawings.
 4. Review: Before copying and distributing, submit corrected drawings and the original marked-up Contract Documents to the Owner for review and acceptance of the general scope of changes, additional information recorded and quality of drafting. If acceptable, the

Owner will return transparencies and the original marked-up prints to the Exhibit Fabricator for organizing into sets, printing, binding, and final submittal.

- D. Copies and Distribution: After completing the preparation of Record Drawings, print 4 copies of each drawing, whether or not changes and additional information were recorded. Organize the copies into manageable sets. Bind each set with durable-paper cover sheets. Include appropriate identification, including titles, dates, and other information on the cover sheets. A digital set should also be provided.
1. Organize and bind original marked-up set of prints that were maintained during the construction period in the same manner.
 2. Organize record transparencies into sets matching the print sets. Place these sets in durable tube-type drawing containers with end caps. Mark the end cap of each container with suitable identification.
 3. Submit the marked-up record set, transparencies, and the copy sets to the Owner for the Exhibit Designer's records.
- E. Newly Prepared Record Drawings: Prepare new drawings instead of following procedures specified for preparing record drawings where new drawings are required when neither the original Contract Drawings nor Shop Drawings are suitable to show the actual installation. New drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
1. Provide Drawings in a scale that allows for the scope of detailing and notations required to record the actual physical installation and its relationship to other construction.
 2. When completed and accepted, integrate newly prepared Drawings with procedures specified for organizing, copying, binding and submitting record drawings.

1.04 RECORD SPECIFICATIONS

- A. During the construction period, maintain 4 copies of the Project Specifications, including addenda and other modifications issued, for Project Record Document purposes.
1. Mark the Specifications to indicate the actual installation where the installation varies from that indicated in Specifications. Note related project record drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.
 - a. In each Specification section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
 - b. Record the name of the manufacturer, supplier, installer, and other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.
 2. Upon completion of markup, submit Record Specifications to the Owner for the Exhibit Designer's records.

1.05 RECORD PRODUCT DATA

- A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.
 - 1. Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site and changes in manufacturer's instructions and recommendations for installation.
 - 2. Give particular attention to information about concealed products and installations that cannot be readily identified and recorded later.
 - 3. Note related Change Orders and markup of record Drawings, where applicable.
 - 4. Upon completion of markup, submit a complete set of record Product Data to the Owner for the Exhibit Designer's records.
 - 5. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data.

1.06 RECORD SAMPLE SUBMITTAL

- A. Immediately prior to the date of Final Completion, the Exhibit fabricator shall meet with the Owner at the site to determine which of the Samples maintained during the construction period shall be transmitted to the Exhibit Designer for record purposes.
- B. Comply with the Owner 's instructions for packaging, identification marking and delivery to the Architect's sample storage space. Dispose of other samples in a manner specified for disposing of surplus and waste materials.

1.07 MISCELLANEOUS RECORD SUBMITTALS

- A. Refer to other Specification sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Prior to Final Acceptance, complete miscellaneous records and place in good order, properly identified and bound or otherwise organized to allow for use and reference.
- B. Submit to the Owner for the Exhibit Designer's records.
- C. Miscellaneous records include, but are not limited to, the following:
 - 1. Field records on excavations and foundations.
 - 2. Field records on underground construction and similar work.
 - 3. Survey showing locations and elevations of underground lines.
 - 4. Invert elevations of drainage piping.
 - 5. Surveys establishing building lines and levels.
 - 6. Authorized measurements utilizing unit prices or allowances.
 - 7. Records of plant treatment.

8. Ambient and substrate condition tests.
9. Certifications received in lieu of labels on bulk products.
10. Batch mixing and bulk delivery records.
11. Testing and qualification of tradespersons.
12. Documented qualification of installation firms.
13. Load and performance testing.
14. Inspections and certifications by governing authorities.
15. Leakage and water-penetration tests.
16. Fire-resistance and flame-spread test results.
17. Final inspection and correction procedures.

PART 2 –PRODUCTS Not used

PART 3 – EXECUTION Not used

END OF SECTION 01781

SECTION 01782 – OPERATION AND MAINTENANCE DOCUMENTATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This section includes administrative and procedural requirements for operation and maintenance manuals and instruction, including the following.
 - 1. Preparing and submitting instruction manuals covering the care, preservation and maintenance of exhibit materials and finishes
 - 2. Preparing and submitting exhibit operation and maintenance manuals for equipment and building operating systems.
 - 3. Instruction of Government operating personnel in the operation and maintenance of exhibit systems and equipment..
- B. Additional Requirements: Refer to the individual Specification sections for additional requirements for the care and maintenance of exhibit materials and finishes, and for the operation and maintenance of the various pieces of equipment and operating systems.
- C. Related Sections:
 - Section 01500 "CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS"
 - Section 01740 "WARRANTIES"

1.03 QUALITY ASSURANCE

- A. Exhibit Operation and Maintenance Manual Preparation: In preparation of manuals, use personnel thoroughly trained and experienced in the maintenance of the material or finish involved, or in the operation and maintenance of the equipment or system involved.
 - 1. Where manuals require written instructions, use the personnel skilled in technical writing where necessary for communication of essential data.
 - 2. Where manuals require drawings or diagrams, use draftspersons capable of preparing drawings clearly in an understandable format.
- B. Instructions for the museum's personnel: Use instructors thoroughly trained and experienced in the operation and maintenance of the equipment or system involved to instruct museum staff operation and maintenance personnel.

1.04 SUBMITTALS

- A. Submittal Schedule: Comply with the following schedule for submitting operation and maintenance manuals:
1. The Owner will return 1 copy of the draft with comments within 15 calendar days after receipt.
 2. Make corrections or modifications to comply with the Owner's comments.
 3. Submit 4 copies of each approved manual to the Owner within 15 calendar days after receipt of the Owner's comments.
- B. Form of Submittal: Prepare operation and maintenance manuals in the form of an instructional manual for use by museum staff and contract operating and maintenance personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar products into a single binder.
1. Binders: For each manual, provide heavy-duty, commercial-quality, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2-by-11-inch paper. Provide a clear plastic sleeve on the spine to hold labels describing contents. Provide pockets in the covers to receive folded sheets.
 - a. Where 2 or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Specifications table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the product.
 - b. Identify each binder on front and spine, with the printed title "EXHIBIT OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter covered. Indicate volume number for multiple volume sets of manuals.
 2. Dividers: Provide heavy paper dividers with celluloid-covered tabs for each separate section. Mark each tab to indicate contents. Provide a typed description of the product or major parts of equipment included in the section on each divider.
 3. Protective Plastic Jackets: Provide protective, transparent, plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
 4. Text Material: Where maintenance manuals require written material, use the manufacturer's standard printed materials, where available. If manufacturer's standard printed materials are not available, provide specially prepared data, neatly typewritten, on 8-1/2-by-11-inch , 20-lb/sq. ft. white bond paper.
 5. Drawings: Where manuals require drawings or diagrams, provide reinforced, punched binder tabs on drawings and bind in with text.
 - a. Where oversize drawings are necessary, fold drawings to the same size as text pages and use as a foldout.
 - b. If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of binder. Insert a typewritten page indicating drawing title, description of contents and reference to the applicable location in the manual.
- C. Submittal for Final Manuals: If specifically requested by the Exhibit Contractor and approved by the Owner and Exhibit Designer, written and graphic portions of final manuals may be submitted in a CD ROM electronic format acceptable to the Architect. Manual content and specific information to be included in each type of manual shall comply as specified for bound manuals.

Content that is not included in CD ROM electronic format shall be assembled into binders with dividers and other requirements specified for bound manuals. CD ROM disks and binders shall be fully and clearly labeled, with disks and associated binders for each manual boxed or otherwise packaged for accessible storage together.

1.05 EXHIBIT MANUAL CONTENT

- A. In each exhibit manual, include information specified in the individual Specification section and the following information where applicable for each major component:
1. General material, finish, system or equipment description.
 2. Design factors and assumptions.
 3. Copies of applicable Shop Drawings and Product Data.
 4. Material, finish, system or equipment identification, including:
 - a. Name of manufacturer.
 - b. Model number.
 - c. Serial number of each component.
 5. Equipment operating data:
 - a. Operation instructions.
 - b. Emergency instructions.
 - c. Wiring diagrams.
 - d. Inspection and test procedures.
 6. Maintenance procedures and schedules.
 7. Precautions against improper use and maintenance.
 8. Copies of warranties and service contracts.
 9. Repair instructions, including listings of spare parts for equipment.
 10. Sources of required maintenance materials and related services.
- B. Organize each manual into separate sections for each related product or piece of equipment. To the extent applicable, each manual shall contain a title page, table of contents, general information, copies of Product Data, written text, drawings and copies of each warranty and service contract issued.
1. Title Page: Provide a title page in a transparent, plastic envelope as the first sheet of each manual. As a minimum, provide the following information:
 - a. Subject matter covered by the manual.
 - b. Name and address of the Project.
 - c. Name of Government user agency.
 - d. Date of submittal.
 - e. Name, address, and telephone number all contractors who produced work for the exhibit, identifying the portion of the work that they provided.

- f. Cross-reference to related products in other operation and maintenance manuals, if applicable.
2. Table of Contents: After title page, include a typewritten table of contents for each volume, arranged systematically according to the Specifications format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume. Where more than one volume is required to accommodate the data, provide a comprehensive table of contents for all volumes in each volume of the set.
3. General Information: Provide a general information section immediately following table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or installer and the maintenance contractor. Clearly delineate the extent of responsibility for each of these entities. Include a local source for replacement parts for equipment.
4. Product Data: General System or equipment description. Where the manuals include manufacturer's standard printed data, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where the Project includes more than one item contained in the product data, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation, and delete references to information that is not applicable.
5. Directories: listing names, addresses, and telephone numbers of Exhibit Designer, Engineers, Construction Manager, Exhibit Contractor and Contractor.
6. Written Text: Prepare written text to provide necessary information where manufacturer's standard printed data is not available, and the information is necessary for proper maintenance of materials or finishes, or for proper operation and maintenance of equipment or systems. Prepare written text where it is necessary to provide additional information or to supplement data included elsewhere in the manual. Organize text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operation or maintenance procedure. Mark product data to clearly identify specific products and component parts.
7. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems or to provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation. Provide reinforced punched binder tabs on drawings and bind in with text.
Oversize Drawings:
 - a. Fold drawings to same size as text pages and use as fold-out.
 - b. Drawings too large to be used as fold-out, place folded drawing in front or rear pocket of binder. Insert typewritten page indicating drawing title, description of contents, and drawing location at appropriate location in manual.
 - c. Copies of applicable shop drawings and product data.
 - d. Arranged by product, system, or process flow, and subdivided by Specification section. Identify the following as applicable to each drawing:
 - 1) Significant design criteria.
 - 2) List of equipment.
 - 3) System or equipment identification, including:
 - Name of manufacturer.
 - Model number.

- Serial number of each component.
 - 4) Parts list for each component.
 - 5) Operating instructions.
 - 6) Maintenance instructions and schedules for equipment and systems.
 - 7) Emergency instructions.
 - 8) Wiring and piping diagrams.
 - 9) Inspection and test procedures
 - 10) Precautions against improper use and maintenance.
- C. Warranties, and Service Contracts: Provide a copy of each warranty or service contract in the appropriate manual for the information of the Government's operating personnel. Provide written data outlining procedures to follow in the event of product failure. List circumstances and conditions that would affect the validity of warranty.
- D. Where required for full understanding, include a copy of applicable Project Record Drawings. Do not use original Project Record Documents as part of operation and maintenance manuals.

1.06 EXHIBIT MATERIAL AND FINISHES MAINTENANCE MANUALS

- A. Submit 3 copies of each materials and finishes manual, in final form, to the Exhibit Designer. Provide one section for architectural products, including applied materials and finishes. Provide a second section for products designed for moisture protection and products exposed to the weather.
- B. Architectural Products: Provide manufacturer's data and instructions for the care and maintenance of architectural products, including applied materials and finishes.
1. Manufacturer's Data: Provide complete information on architectural products, including the following, as applicable:
 - a. Manufacturer's catalog number.
 - b. Size.
 - c. Material composition.
 - d. Color.
 - e. Texture.
 - f. Reordering information for custom manufactured products.
 2. Care and Maintenance Instructions: Provide care and maintenance information, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information about cleaning agents and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance..
- C. Moisture Protection and Products Exposed to the Weather: Provide complete manufacturer's data with instructions for the inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes
1. Manufacturer's Data: Provide detailed manufacturer's information, including the following, as applicable:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Installation details.
 - d. Inspection procedures.

- e. Maintenance information.
 - f. Repair procedures
- D. Schedule: Provide complete information in the materials and finishes manual on products specified in the following sections.

1.07 EXHIBIT AV SYSTEMS OPERATION AND MAINTENANCE MANUALS

- A. General: Submit 6 copies of each equipment and systems maintenance manual, in final form, to the CM. Provide separate manuals for each unit of equipment, each building operation system, and each electric and electronic system.
- B. Equipment and Systems: Provide the following information for each piece of equipment, each building operation system, and each electric or electronic system, where applicable:
1. Description: Provide a complete description of each unit and related component parts, including the following, as applicable:
 - a. Equipment or system function.
 - b. Operating characteristics.
 - c. Limiting conditions.
 - d. Performance curves
 - e. Engineering data and tests.
 - f. Complete nomenclature and number of replacement parts.
 2. Manufacturer's Information: For each manufacturer of a component part or piece of equipment, provide the following, as applicable:
 - a. Printed operation and maintenance instructions.
 - b. Assembly drawings and diagrams required for maintenance.
 - c. List of items recommended to be stocked as spare parts.
 3. Maintenance Procedures: Provide information detailing essential maintenance procedures, including the following, as applicable:
 - a. Routine operations.
 - b. Troubleshooting guide.
 - c. Disassembly, repair, and reassembly.
 - d. Alignment, adjusting, and checking.
 4. Operating Procedures: Provide information on equipment and system operation procedures, including the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Instructions on stopping.
 - f. Shutdown and emergency instructions.
 - g. Summer and winter operating instructions.
 - h. Required sequences for electric or electronic systems.
 - i. Special operating instructions.

5. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.
 6. Controls: Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.
 7. Piping Identification: Provide as-installed, color-coded, piping diagrams, where required for identification.
 8. Valve Tags: Provide charts of valve-tag numbers, with the location and function of each valve.
 9. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following, as applicable:
 - a. Electric service
 - b. Controls.
 - c. Communication.
- C. Schedule: Provide complete information in the equipment and systems manual on products specified in the following sections.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide tools, spare parts, maintenance and extra stock materials in quantities specified in individual Specification sections.
 1. Deliver to Project site and place in locations as directed; obtain receipt from subcontractors and suppliers.
- B. Submit letter at time of inspection for Substantial Completion listing items and quantities; attach receipts.

1.09 INSTRUCTIONS FOR GOVERNMENT PERSONNEL

- A. Prior to the Substantial Completion inspection, instruct the Government's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Provide instruction at mutually agreed times.
- B. Use operation and maintenance manuals for each product, piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.
- C. Posted Logs and Instructions: Place operating logs and instructions in see-through vinyl or other weather protective sleeves or framed enclosures, and post for use by Government personnel in locations approved by the Exhibit Designer.
 1. Post operating log sheets with spares at or near the applicable equipment.
 2. Post flow schematics, wiring diagrams, valve lists, control sequences, start-up and shut-down instructions, and similar information and instructions in the appropriate equipment rooms.

END OF SECTION 01782

SECTION 01800 — CLEANING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

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

1.01 PROGRESS CLEANING

- A. Exhibit Contractor shall retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or the progress of other Work, and providing required protection of materials.
- B. Exhibit Contractor shall not allow accumulation of scrap, debris, waste material, and other items not required for construction of the Work, and shall maintain the site in a neat and orderly condition at all times.
- C. Exhibit Contractor shall provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology. Store volatile waste in covered metal containers and remove from premises daily. Disposal of volatile fluid wastes in storm or sanitary systems or streams or waterways is not permitted.
- D. Daily, and more often if necessary, contractor shall inspect the site and pick up all scrap, debris, and waste material.
- E. Weekly, and more often if necessary, Exhibit Contractor shall clean the job site and legally dispose of waste materials and rubbish off the Owner's property.
- F. Comply with the requirements of the Section 01811 Waste Management.

1.02 MATERIALS

- A. Exhibit Contractor shall use only the cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

1.03 FINAL CLEANING

- A. "Clean," for the purpose of this article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and material.
- B. Prior to completion of the work, contractor shall remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.
- C. Site: contractor shall clean all floor surfaces in the vicinity of the work to remove all debris, dust, and dirt.
- D. Furniture and furnishings:

1. Just prior to acceptance or occupancy contractor shall visually inspect all exposed surfaces.
2. Exhibit Contractor shall remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior of finished surfaces as follows:
 - a. Glass and Plexiglas: clean inside and out, leaving absolutely no streaks, fingerprints, paint droppings, etc.
 - b. Painted surfaces: remove marks, stains, fingerprints, and dirt, touch-up as required to match adjacent finish.
 - c. Tile: remove dust, dirt, excess grout or adhesive if any.
 - d. Casework: contractor shall apply the polish or cleaner recommended by the manufacturer of the material being polished or cleaned as required.
 - e. Metal: remove all temporary protective covering, clean as required.
- E. Exhibit Contractor shall schedule final cleaning as approved by the Owner or Owner's designated representative to enable the Owner to accept a completely clean work.

END OF SECTION 01800

SECTION 01811 – CONSTRUCTION AIR QUALITY MANAGEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 CONSTRUCTION AIR QUALITY MANAGEMENT GOALS FOR THE PROJECT

- A. The Owner has established that this Project shall minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction activities. Factors that contaminate indoor air, such as dust entering HVAC systems and ductwork, improper storage of materials on site, and poor housekeeping, shall be minimized.

1.3 SUMMARY

- A. This Section includes requirements for the development of a Construction Indoor Air Quality Management Plan.
 - 1. Management Plan (referred to as “the Plan”): Develop the Plan for approval by the Owner, Exhibit Designer and Architect. The Plan shall be implemented throughout the duration of the project construction and before occupancy, and shall be documented as outlined in the Submittal Requirements of this Section. The Plan is included as part of the LEED Building requirements for the project (EQ Credits 3.1 and 3.2).

1.4 RELATED SECTIONS

- A. All sections of the Specifications related to interior construction, MEP systems, and items affecting indoor air quality.
- B. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants & Architectural Coatings - Section 01811.
- C. Painting - Section 09900.

1.5 DEFINITIONS

- A. Volatile Organic Compounds (VOCs): Chemical compounds common in and emitted by many building products, including solvents in paints, coatings, adhesives and sealants, wood preservatives; composite wood binder, and foam insulations. Not all VOCs are harmful, but many of those contained within building products contribute to the formation of smog and can irritate (or worse) building occupants by their smell and/or health impact.
- B. Materials that Act as “Sinks” for VOC Contamination: Absorptive materials, typically dry and soft (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that

readily absorb VOCs emitted by “source” materials and release them over a prolonged period of time.

- C. Materials that Act as “Sources” for VOC Contamination: Products with high VOC contents that emit VOCs either rapidly during application and curing (typically “wet” products, such as paints, sealants, adhesives, caulks and sealers) or over a prolonged period (typically “dry” products such flooring coverings with plasticizers and engineered wood with formaldehyde).

1.6 REFERENCES

- A. “IAQ Guidelines for Occupied Buildings Under Construction,” First Edition, November 1995, Chapter 3; The Sheet Metal and Air Conditioner Contractors National Association (SMACNA), (703) 803-2980, www.smacna.org
- B. ANSI/ASHRAE 52.2-1999, “Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size,” www.ashrae.org

1.7 CONSTRUCTION IAQ MANAGEMENT PLAN

- A. The Contractor shall prepare and submit a Construction IAQ Management Plan to the Owner for approval. The Construction IAQ Management Plan shall meet the following criteria:
 - 1. Construction activities shall be planned to meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors! Association (SMACNA) “IAQ Guidelines for Occupied Buildings under Construction,” First Edition, 1995, Chapter 3.
 - 2. Absorptive materials shall be protected from moisture damage when stored on site and after installation.
 - 3. If air handlers are to be used during construction, filtration with a Minimum Efficiency Reporting Value (MERV) of 8 must be at each return air grill, as determined by ASHRAE 52.2-1999.
 - 4. All filtration media shall be replaced immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999.
 - 5. A “Sequence of Finish Installation Plan” shall be developed, highlighting measures to reduce the absorption of VOCs by materials that act as “sinks.”
- B. Upon approval of the Plan by the Owner and Architect, it shall be implemented through the duration of the construction process and before occupancy, and documented in accordance with the Submittal Requirements of this Section.
- C. Further description of the Construction IAQ Management Plan requirements is as follows:
 - 1. SMACNA Guidelines: Chapter 3 of the referenced “IAQ Guidelines for Occupied Buildings Under Construction,” outline IAQ measures in five categories as listed below. The Construction IAQ Management Plan shall be organized in accordance with the SMACNA format, and shall address measures to be implemented in each

of the five categories (including subsections). All subsections shall be listed in the Plan; items that are not applicable for this project should be listed as such.

- a. HVAC Protection
 - Return Side
 - Central Filtration
 - Supply Side
 - Duct Cleaning
- b. Source Control
 - Product Substitution
 - Modifying Equipment Operation
 - Changing Work Practices
 - Local Exhaust
 - Air Cleaning
 - Cover or Seal
- c. Pathway Interruption
 - Depressurize Work Area
 - Pressurize Occupied Space
 - Erect Barriers to Contain Construction Areas
 - Relocate Pollutant Sources
 - Temporarily Seal the Building
- d. Housekeeping
- e. Scheduling
 - Protect of Materials from Moisture Damage: As part of the “Housekeeping” section of the Construction IAQ Management Plan, measures to prevent installed materials or material stored on-site from moisture damage shall be described. This section should also describe measures to be taken if moisture damage does occur to absorptive materials during the course of construction.
 - Replacement of Filtration Media: Under the “HVAC Protection” section of the Construction IAQ Management Plan, a description of the filtration media in all ventilation equipment shall be provided. The description shall include replacement criteria for filtration media during construction, and confirmation of filtration media replacement for all equipment immediately prior to occupancy.
 - Sequence of Finish Installation for Materials: Where feasible, absorptive materials shall be installed after the installation of materials or finishes which have high short-term emissions of VOCs, formaldehyde, particulates, or other air-borne compounds.
Absorptive materials include, but are not limited to: carpets; acoustical ceiling panels; fabric wall coverings; insulations (exposed to the airstream); upholstered furnishings; and other woven, fibrous or porous materials. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paints, wood preservatives and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.
Pre-Occupancy Phase: Schedule a building flush-out by supplying air volume required by LEED Credit EQ3.2
Develop a separate sequencing plan that identifies feasible opportunities

to meet the above-stated goals for the project. The plan shall be submitted to the Architect and Owner in accordance with the Submittal Requirements of this Section.

1.8 LEED BUILDING SUBMITTALS

- A. The Contractor shall submit the following LEED required records and documents:
1. A copy of the Construction IAQ Management Plan and the Sequence Installation Plan, as defined in this Section.
 2. Product cut-sheets for all filtration media used during construction and installed immediately prior to occupancy, with MERV values highlighted. Cut sheets shall be submitted with the Contractor's or Subcontractor's "approved" stamp as confirmation that the products are the products installed on the project.
 3. Provide the Architect or Owner's Representative with a minimum of 18 photographs, comprised of at least six photographs taken on three different occasions during construction. The photographs shall document the implementation of the Construction IAQ Management Plan throughout the course of the project construction. Examples include photographs of ductwork sealing and protection, temporary ventilation measures, and conditions of on-site materials storage (to prevent moisture damage). Photographs shall include integral date stamping, and shall be submitted with brief descriptions of the Construction IAQ Management Plan measure documented, or be referenced to project meeting minutes or similar project documents which reference to the Construction IAQ Management Plan measure documented.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1 IMPLEMENTATION AND COORDINATION

- A. Implement the Construction IAQ Management Plan, and coordinate the Plan with all affected trades. Designate one individual as the Construction IAQ Representative, who will be responsible for communicating the progress of the Plan with the Owner and Architect on a regular basis, and for assembling the required LEED Building documentation. The Contractor shall include provisions in the Construction IAQ Management Plan for addressing conditions in the field that do not adhere to the Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.
- B. Subcontractors shall be responsible for the implementation of specific control measures, as specified in the Construction IAQ Management Plan. Subcontractors shall coordinate their responsibilities through the Construction Manager and their designated Construction IAQ Representative.

END OF SECTION 01811

SECTION 01812 — CONSTRUCTION WASTE MANAGEMENT

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. All sections of the Specifications involving demolition or construction activities.

1.3 SUMMARY

- A. This Section includes requirements for Construction Waste Management (CWM), with criteria for recycling and/or salvaging demolition and construction waste generated during the project. A Construction Waste Management Plan shall be developed for approval by the Owner and Architect. The Plan shall be implemented throughout the duration of the project, and shall be documented per the Submittal Requirements of this Section. Construction Waste Management is included as part of the LEED Building requirements for the project.

1.4 PROJECT WASTE MANAGEMENT REQUIREMENTS

- A. The Owner has established that this Project shall generate the least amount of waste possible, and that processes that ensure the generation of as little waste as possible due to error, inaccurate planning, breakage, mishandling, contamination, or other factors shall be employed.
- B. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be returned, reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.
- C. Diversion Requirements: The end-of-project recycling rate shall equal, at minimum, **75%** by weight of the total project waste from construction, demolition, and land clearing activities on site. Excavation soil and hazardous waste are excluded from the calculation.
- D. Due to the nature and location of the Site, recycling on site may not be possible (to be determined by the Contractor). The Waste Contractor(s) should include off-site opportunities to recycle and reuse removed materials in the Construction Waste Management Plan.
- E. As regards these requirements, the Contractor shall develop, for the Owner's review, a Construction Waste Management Plan for this project

1.5 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. The Contractor shall prepare and submit a Construction Waste Management Plan (CWM) to the Owner and Architect for approval. The CWM Plan shall outline the provisions to be implemented to recycle and salvage demolition and construction waste generated during the project.

- B. Upon approval of the CWM Plan by the Owner and Architect, it shall be implemented throughout the duration of the project, and documented in accordance with the Submittal Requirements of this Section.
- C. The CWM Plan shall include, but not be limited to, the following components:
1. *Listing of Targeted Materials:* Develop a list of the waste materials from the Project that will be targeted for reuse, salvage, or recycling. The following materials shall be accounted for (materials that will not be recycled shall be indicated as such):
 - a. Cardboard, paper, packaging.
 - b. Clean dimensional wood, palette wood.
 - c. Beverage containers.
 - d. Land clearing debris.
 - e. Concrete.
 - f. Concrete Masonry Units (CMU).
 - g. Asphalt.
 - h. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - i. Drywall.
 - j. Carpet and pad.
 - k. Paint.
 - l. Rigid foam.
 - m. Glass.
 - n. Plastics.
 2. *Landfill Information:* Provide the name of the landfill(s) where trash will be disposed of and the applicable landfill tipping fee(s).
 3. *Sorting Method:* Provide a description of the proposed means of sorting and transporting the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting).
 4. *Packaging Waste:* Provide an estimate of packaging materials generated, and note whether suppliers will eliminate or take back packaging.
 5. *Field Conditions:* Include provisions in the Construction Waste Management Plan for addressing conditions in the field that do not adhere to the CWM Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.
 6. *Recycling Facilities:* Provide the name of the recycling facilities(s) where materials will be sent for recycling, how it will be recycled, and the applicable fee(s).
 7. *Additional Information:* Include any additional information deemed relevant to describe the scope and intent of the CWM Plan to the Owner and Architect.
- D. Subcontractor Requirements: Construction Waste Management and recycling requirements shall be incorporated into all Subcontractor's contracts.

1.6 SUBMITTAL REQUIREMENTS

- A. The Contractor and/or Subcontractors shall submit the following LEED BUILDING certification items:
1. A copy of the Construction Waste Management Plan.

2. Calculations and supporting documentation to demonstrate end-of-project recycling rates which meet the requirements of the Construction Waste Management Plan of this Section.
- B. Monthly Reporting: The process for recording and assembling documentation shall be as follows:
1. Record and document the total weight (in tons) of all demolition and construction waste materials sent to the landfill. Monthly Waste Management Reporting Forms shall be used as the basis for determining the total amount of waste land filled for the project. The monthly reporting forms shall specify:
 - a. The number of Dumpsters or other containers sent to the landfill for that month;
 - b. The volume (in cubic yards) of each Dumpster or container sent to the landfill for that month;
 - c. The type of waste contained in each Dumpster or container, and the weight of the waste in each Dumpster or container. If the weight of the waste is not directly measured for each Dumpster or container, the following Solid Waste Conversion Factors shall be used to convert the volume of waste to weight:
 - 1). Solid Weight Conversion Factors:

Mixed Waste	350 lbs/cubic yard
Wood	300 lbs/cubic yard
Cardboard	100 lbs/cubic yard
Gypsum Wallboard	500 lbs/cubic yard
Rubble	1,400 lbs/cubic yard
Steel	1,000 lbs/cubic yard
 - d. Identification of the Landfill: Provide the name of the landfill that will be accepting the materials. Receipts or other proof of facility reception of materials is required.
 2. Record and document the total weight (in tons) of all demolition and construction waste materials recycled or salvaged. Monthly Waste Management Reporting Forms shall be used as the basis for determining the total amount of waste recycled or salvaged for the project. The monthly reporting forms shall specify:
 - a. The number of Dumpsters or other containers of recycled or salvaged materials for that month;
 - b. The volume (in cubic yards) of each Dumpster or container of recycled or salvaged materials for that month;
 - c. The type of recycled or salvaged material contained in each Dumpster or container; and
 - d. The weight of the recycled or salvaged material in each Dumpster or container. If the weight of the material is not directly measured for each Dumpster or container, the Solid Waste Conversion Factors listed for landfill waste (see above) shall be used, where applicable, to convert the volume of material to weight. For materials not contained in the Solid Waste Conversion Factors above (e.g. glass), propose a conversion factor for review by the Owner and Architect.
 - e. Provide the name of the receiving facilities/companies that will be purchasing or accepting the recycled or salvaged materials. Receipts or other proof of facility reception of materials is required.
 - f. For materials separated for recycling off-site, establish a method for tracking the weight of the recycled material. The method shall be included in the CWM Plan for the Owner's and Architect's review and approval.

3. Calculate the end-of-project recycling rate percentage by dividing the recycled and salvaged waste (in tons) by the total waste generated (recycled, salvaged, and land filled waste – also in tons), and multiplying by 100.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 IMPLEMENTATION

- A. The Contractor shall be responsible for coordination and implementation of the overall Construction Waste Management Plan, as well as coordination of the Plan with all affected trades.
- B. The Contractor shall designate one individual as the on-site Construction Waste Management Representative, who will be responsible for communicating the progress of the Plan with the Owner and Architect on a regular basis, and for assembling the required LEED documentation.
- C. The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.
- D. Separation Facilities: If waste sorting will be done on site, the Contractor shall lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

3.2 MEETINGS

- A. Conduct Construction Waste Management meetings. Meetings shall include Subcontractors affected by the CWM Plan. At a minimum, waste management goals and issues shall be discussed at the following meetings:
 1. Pre-bid meeting.
 2. Pre-construction meeting.
 3. Regular job-site meetings.
- B. Monthly Waste Management Reporting Forms: Monthly Waste Management Reporting Forms, as required in the Submittal Requirements of this Section, shall be submitted to the Owner and Architect for review throughout the duration of the project.

END OF SECTION 01812

SECTION 01820 – DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner 's operation and maintenance personnel, including the following:
 - 1. Demonstration of operation of all exhibit systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of exhibit systems, subsystems, and equipment.

1.03 SUBMITTALS

- A. Instruction Program: Submit 2 copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, instructors' names for each training module, and learning objective and outline for each training module.
 - 1. At completion of training, submit 2 complete training manuals for Owner's use.
- B. Qualification Data: For facilitator and instructors, to demonstrate their capabilities and experience include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
- E. Demonstration and Training Video: Submit 2 copies at end of each training module.

1.04 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that required for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: The Exhibit Fabricator, vacillator and instructors shall conduct a conference at the Project site to review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.

2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and other facilities.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.05 COORDINATION

- A. Coordinate instruction schedule with Owner operations. Adjust schedule as required to minimize disrupting Owner operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Exhibit Designer.

PART 2 - PRODUCTS

2.01 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections, and as follows:
 1. All equipment and systems listed in individual specification sections that also require Operations and Maintenance manuals
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.

5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.

7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.

8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 PART - EXECUTION

3.01 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training. Assemble training modules into a combined training manual.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

3.02 INSTRUCTION

- A. Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Exhibit Contractor and the Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with the Contracting Officer's Representative, with at least 7 days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, written or demonstration performance-based test.
- E. Demonstration and Training Videos: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. Record on high quality on Digital Video Disc (DVD).
 - 2. At beginning of each training module, record each chart containing learning objective and lesson outline.
- F. Cleanup: Collect and remove used and leftover educational materials. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01820