PART 1 - GENERAL

This section of the Audio/Visual Construction Guide Specification has references, products, procedures, processes, and work descriptions/summaries that are common to many Washington State University (Pullman) Audio/Visual projects. This information is provided in specification format to serve as a guide to the Designer in producing a CSI-compliant specification that will meet the unique requirements of WSUP Audio/Visual projects. However, this document is not intended to be a Master Specification. The information included in this section is not intended to be all-inclusive for any given project.

The Designer shall edit this section (adding and/or removing content where required) to meet the requirements of a given project.

Prior to publishing the specifications for bid or construction purposes, all edits shall be made using the MS Word Tracking Changes feature. ***When submitting the specifications for review at each progress milestone, print the specifications showing the revision markings***.

Text in shaded boxes (such as this text) is included to aid the Designer in understanding areas of this section that may require modification for a particular circumstance. Although this text is generally written in declarative form, the Designer shall consider it guidance only. The Designer shall not assume that the content of this specification section is suitable or sufficient for any given project in its current form, and shall remain responsible for developing a thorough and complete specification that meets the requirements of the project being designed.

1.1 SUMMARY

Review and edit the following list of generic type products for relevance to this project. This listing should not include procedures or processes, preparatory work, or final cleaning.

A. Provide all materials, software, cabinets, racks, enclosures, cabling, connectors, power hardware, equipment and labor for the installation of audio/visual systems.

1.2 QUALITY ASSURANCE

A. See section 27 05 00 for Audio/Visual contractor pre-qualification requirements.

1.3 SYSTEM DESCRIPTION

Review and edit the following statement(s) for applicability to this project, restricted to describing performance, design requirements and functional tolerances of a complete system.

A. Furnish, install, test and place into satisfactory and successful operation all equipment, materials, devices, and necessary appurtenances associated with audio/visual equipment cabinets, racks, frames, enclosures, cable management, and power hardware to support standards-compliant audio/visual systems as shown on the Contract Documents.

B. The work shall include all materials, equipment, software, and apparatus not specifically mentioned herein or noted on the plans but which are necessary to make a complete working system, compatible with and complementary to the existing campus systems.

C. Provide the systems listed below and as shown on the Contract Drawings, unless otherwise indicated:
   1. Wiring and cabling
   2. Equipment racks, cabinets, and enclosures

3. Furniture
4. Amplifiers
5. Microphones
6. Speakers
7. Assistive listening devices
8. DVD players
9. Video cameras
10. Projection screens
11. Video projectors
12. Video panels
13. Video conferencing systems
14. Interactive display devices
15. Digital signage
16. Interactive door signage
17. A/V scaling switchers
18. Touch panels
19. Room control software
20. Window shade control
21. Lighting control
22. Equipment mounts
23. Lecture capture systems
24. Audio DSP (Digital Signal Processor)

1.4 SUBMITTAL INFORMATION

Review and edit the following list of submittals as applicable to this project. Note that the submittals listed below are specific to this section only. Division 1, Section 01300 (or equivalent) – Submittals should include general administrative requirements (e.g. schedule, number of copies, distribution, etc.). Either Section 01300 or this section should include a statement similar to the following, "The Contractor shall apply Contractor's stamp, sign, or initial certifying that review, verification of required Products, and coordination of information is in accordance with the requirements of the work and Contract Documents.

Any deviations from the Contract Documents or specified product data shall be clearly noted, and must be approved by the Designer prior to start of construction. The Designer shall obtain approval from WSUP prior to approving a Contractor-submitted deviation.

If the deviation is not approved by the Designer it remains the Contractor's responsibility to provide what is required in the Contract Documents".

A. Product Data Submittals: Provide submittal information for review before materials are delivered to the job site. Combine product submittals for all products and submit together as a single submittal.
   1. Submit a cover letter stating that the materials will be provided as specified, and specifically listing any items that will not be provided as specified. State in the letter that the Contractor has reviewed the specified items, and agrees that they are applicable to this project in all respects.
   2. Provide standard manufacturer's cut sheets and the operating and maintenance (O&M) instructions at the time of submittal review for each device in the system, regardless of whether it is submitted as specified or as an approved equal. These instructions shall detail how to install and service the equipment and shall include information necessary for rough-in and preparation of the building facilities to receive the materials.
   3. For those items noted as allowing "or equal," and which are not being provided as specifically named, submit a written description detailing the reason for the substitution, along with standard manufacturer's cut sheets or other descriptive information.

B. Preliminary Schematic Wiring Diagrams: Provide a schematic wiring diagram for each audio/visual application. The diagrams shall show all equipment with equipment model numbers. The diagrams shall also show all cables and wiring connections, indicating cable/wire types.

C. As-built Schematic Wiring Diagram: Upon successful operation of each audio/visual application, provide a schematic wiring diagram for each building and room having an audio/visual application. The diagrams shall show all equipment with equipment models and serial numbers. The diagrams shall show all cables and wiring connections, indicating cable/wire type and wire labeling.
   1. For rooms that have identical audio/visual systems (including wire numbers), a single drawing will be sufficient as long as it lists the building and rooms to which it applies.
   2. Sometimes name and number changes occur during construction. Before creating drawings and labeling, verify that the room names and numbers are correct.

D. Operation, Installation and Maintenance Manuals: At the conclusion of the project, provide electronic copies of the Operation, Installation and Maintenance Manuals for each piece of audio/visual equipment. Each document shall be provided in Adobe Acrobat PDF format on a CDROM or DVDROM. Each PDF file shall be an original document prepared by the manufacturer. For each document that is not available from a manufacturer's website, scan the hard-copy documentation provided with the equipment.
   1. Organize the PDF files on the CDROM or DVDROM in a folder structure as follows:
      a. Each room per building shall have a separate folder containing all documents for the equipment in that room.
      b. The folders shall be named in the following format: "BUILDING – NAME - ###" where BUILDING is the name of the building, NAME is the name (and/or number) of the room, and ### is the room number.
   2. Provide to the Owner a single set of hard-copy printed documentation for each piece of audio/video equipment. Organize the documentation in a 3-ring (or similar) binder. Dispose of all other copies of the original printed documentation after verification that the electronic (PDF) version of each is stored on the CDROM or DVDROM.

PART 2 - PRODUCTS

Ensure that products listed under the PART 2 – Products paragraphs have corresponding installation instructions in PART 3 – Execution, or in another specification section if furnished but not installed under this section.

WSUP has standardized on certain manufacturers and certain products for all new Structured Cabling Systems in WSUP facilities. Products shall be specified accordingly. The Designer shall ensure that the latest part numbers are used for specified products. Any substitutions require WSUP pre-approval before specification.

If the Designer wishes to use products that deviate from WSUP standards, a Standards Variance Request shall be made, as described in the Technology Infrastructure Design Guide (TIDG). If the alternative product is approved, the Designer shall adapt this to reflect the approved changes.

The products listed throughout Part 2 - Products below are not all-inclusive for any given project. The Designer shall ensure that all required products are specified. The Designer shall also verify that the most current part number of each specified product is listed in this section.

2.1 GENERAL

A. Unless specifically stated as “Or equal,” equal items are not acceptable. Provide items as specified. Pre-approval is required for all “or equal” substitutions.

B. Provide batteries for all hand-held remote controls.

2.2 GROUNDING AND BONDING

A. See Section 27 05 26 – “Grounding and Bonding for Communications Systems.”

2.3 STANDARD CABLE ASSEMBLIES/PATCH CORDS

A. General: The cabling listed below shall be used where referenced in this specification section. Cable colors shall be used consistently throughout as indicated.

B. Standard Audio Cabling:
   1. Non-plenum rated cabling shall be 22 AWG, solid, twisted pair, shielded with 22 AWG drain wire, neutral colored, unless otherwise indicated:
      a. Belden 8761
      b. or commercial grade equal from Gepco.
   2. Plenum-rated cabling shall be 22 AWG, stranded, twisted pair, shielded with drain wire, white colored, unless otherwise indicated:
      a. Belden 82761
      b. or commercial grade equal from Gepco.
   3. Permitted terminations shall be:
      a. XLR: Neutrik or Switchcraft.
      b. RCA: Neutrik or Switchcraft.
      c. 3.5mm TRS: Switchcraft 35HDBAU.
      d. Screw-type (Phoenix): typically supplied by equipment manufacturer.
      e. Screw-type (open): typically supplied by equipment manufacturer.
      f. Drain wire sleeved with Teflon or PVC sleeving as appropriate.

C. Standard Video Cabling:
   1. Non-plenum rated cabling shall be RG-59/U, 20 AWG, black colored, unless otherwise indicated:
      a. Belden 1505A
      b. or commercial grade equal from Gepco.
   2. Plenum-rated cabling shall be RG-59/U, 20 AWG, black colored, unless otherwise indicated:
      a. Belden 1506A
      b. or commercial grade equal from Gepco.
   3. Permitted terminations shall be:
      a. BNC, 75-ohm, compression: Belden DB1BNC
      b. BNC, 75-ohm with a crimp plug: MilesTek 10-03001-240, AMP, or Canare.
      c. BNC-to-RCA Adapter: MilesTek, Switchcraft. or Canare.

D. Standard RGBHV Cabling:
   1. Plenum rated cabling shall be 25 AWG, five copper conductors, solid, tinned, black colored, unless otherwise indicated:
      a. Belden 1279P
      b. or commercial grade equal from Gepco.
   2. Permitted terminations shall be:
      a. BNC, 75-ohm, compression: Belden DB1BNC

b. BNC, 75-ohm with a crimp plug: MilesTek 10-03001-240, Canare BCP-C55A, or AMP.

E. Standard Television Cabling:
1. Non-plenum rated cabling shall be RG-6, 18 AWG, HD-SDI rated, white colored, unless otherwise indicated:
   a. Belden 1694A
   b. or commercial grade equal from Gepco.
2. Plenum-rated cabling shall be RG-6, 18 AWG, HD-SDI rated, white colored, unless otherwise indicated:
   a. Belden 1695A
   b. or commercial grade equal from Gepco.
3. Permitted terminations shall be:
   a. BNC, 75-ohm with a crimp plug: MilesTek 10-03001-240, AMP, or Canare.
   b. BNC-to-RCA Adapter: MilesTek, Switchcraft, or Canare.

F. Standard HDMI Cabling:
1. Pre-manufactured HDMI cables shall be commercial grade and less than 30 feet long, from:
   a. Kramer K-Lock Series
   b. Comprehensive Cable Pro AV/IT series with ProGrip
   c. or pre-approved equal.
2. Where HDMI applications would require lengths exceeding 50 feet, provide active baluns with Category 6 Cabling per Section 27 15 00 – "Communications Horizontal Cabling," installed and terminated by the certified telecommunications contractor.
   a. Active baluns shall be:
      1) Atlona AT-HDTX and AT-HDRX
      2) AMX DX-TX (FG1010-310) and DX-RX (FG1010-500)
      3) or pre-approved equal.

G. Standard HDBaseT Cabling:
1. Cabling shall be Shielded Category 6A Cabling per Section 27 15 00 – "Communications Horizontal Cabling," installed and terminated by the certified telecommunications contractor.
2. Permitted terminations shall be as shown in the Contract Documents, including:
   a. Outlets, jacks and faceplates for Category Cabling per Section 27 15 00 – "Communications Horizontal Cabling."
   b. 12-port wall-mounted TE/AMP patch panel, matching the cable type specified in Section 27 15 00 – "Communications Horizontal Cabling."
      1) or pre-approved equal.

H. Standard DVI-A Cabling:
1. Pre-manufactured DVI-A cables shall be commercial grade cables and shall be Class 2 where required for higher bandwidth signals, from:
   a. Kramer
   b. Gepco
   c. Comprehensive Cable
   d. Cables 2 Go (C2G)
   e. or pre-approved equal.

I. Standard DVI-D Cabling:
1. Pre-manufactured DVI-D cables shall be commercial grade cables and shall be Class 2 where required for higher bandwidth signals, from:
   a. Kramer

b. Gepco
c. Comprehensive Cable
d. Cables 2 Go (C2G)
e. or pre-approved equal.

J. Standard USB Cabling:
1. Pre-manufactured USB cables shall be commercial grade, from:
a. Gepco
b. Comprehensive Cable
c. Cables 2 Go (C2G)
d. or pre-approved equal.

K. Standard Contact Closure Cabling:
1. Plenum-rated cabling shall be 18 AWG, stranded, three conductor, natural colored, shielded with drain wire, unless otherwise indicated:
a. Belden 6300FE
b. or commercial grade equal from Gepco.

L. Standard Screen Control System Cabling:
1. Projection screen control cables shall be 18 AWG, plenum rated, stranded, three conductor, shielded with drain wire, white colored:
a. Belden 6301FE
b. or commercial grade equal from Gepco.
2. 3-wire RS232 cables shall be 22 AWG, plenum rated, stranded, twisted pair, shielded with 22 AWG drain wire, white colored.
a. Belden 82761
b. or commercial grade equal from Gepco.
3. 4-wire RS422 and RS485 control cables shall be 22 AWG, plenum rated, stranded, two twisted pairs, natural colored, with termination hardware as required by the equipment.
a. Belden 82723
b. or commercial grade equal from Gepco.
4. AMX AXLink cable shall be plenum-rated, 22 AWG, stranded, one twisted pair shielded (data), and 18 AWG two conductor (power) with 24 AWG drain wire, black colored, with termination as specified by AMX:
a. Liberty AXLink-P wire
b. or commercial grade equal from Gepco.
5. AMX Network shall be Category Cabling per Section 27 15 00 – “Communications Horizontal Cabling” with RJ45 connectors, installed and terminated by the certified telecommunications contractor.
6. IR control cables shall be 22 AWG, stranded, twisted pair, shielded with 22 AWG drain wire, gray-colored and terminated with a Screw-type (Phoenix) termination. Cables shall include IR Emitter provided by Room Control System manufacturer.
a. Belden 9451
b. or commercial grade equal from Gepco.
7. RS232 control cabling and AMX RS232 control cabling shall be Category Cabling per Section 27 15 00 – “Communications Horizontal Cabling” with RJ45 connectors, installed and terminated by the certified telecommunications contractor.

M. Standard Speaker Wiring:
1. Speaker wiring shall be 14 AWG, stranded, two conductor, unshielded, white or gray-colored, and plenum-rated (regardless of the plenum rating of the space):
a. Belden 6100UE
b. or pre-approved commercial grade equal from Gepco.
2. Permitted terminations shall be as required by the attached device:
a. Spring clip

b. Screw-type (banana plug)
c. Speakon
d. XLR

N. Standard Cable Management:
1. Hook-and-loop straps (Velcro style).

2.4 EQUIPMENT RACKS/ENCLOSURES

A. A/V Equipment Rack (Full-Height):
1. A/V Equipment Rack shall have a capacity of 40U, shall be 32” deep, black powder coated with a vented rear door. The rack shall include all necessary mounting hardware and grounding/bonding hardware.
2. Equipment Rack: Lowell LSER-4032.
3. Power Strip: Tripplite PDU 1215. The power strip shall not have a user-facing on/off switch.
4. Cable Management: Lowell CMV Series (vertical).
5. Drawer: Lowell UDE Series.
6. Solid Blank Panels: Lowell SEP or SP Series.
7. Vented Blank Panels: Lowell SVSP Series.
8. Security Covers: Lowell SSC Series.
9. Shelf: Lowell US Series, 14” deep.

B. A/V Equipment Rack (In-Casework applications):
1. A/V Equipment Rack shall have a capacity of 10U (minimum), shall be 18” deep, black powder coated with removable side panels. The rack shall include all necessary mounting hardware and grounding/bonding hardware.
2. Equipment Rack:
a. Lowell LDTR-1018
3. Swivel Casters:
a. Lowell C2S
4. Power Strip: Tripplite IBAR-12 with surge suppression.
5. Cable Management: Lowell CMV Series (vertical).
6. Drawer: Lowell UDE Series.
7. Solid Blank Panels: Lowell SEP or SP Series.
8. Vented Blank Panels: Lowell SVSP Series.
9. Security Covers: Lowell SSC Series.
10. Shelf: Lowell US Series, 14” deep.

C. A/V Equipment Rack (In-Podium applications):
1. A/V Equipment Rack shall have a capacity of 14U, shall be 21” deep, black powder coated without sides, back or top panels. The rack shall include all necessary mounting hardware and grounding/bonding hardware.
2. Equipment Rack: Lowell LXR-1421.
3. Power Strip: Tripplite PDU 1215. The power strip shall not have a user-facing on/off switch.
4. Exhaust Fans:
a. Lowell FW2-3T
b. Middle Atlantic UQFP-4
5. Cable Interface Panel:
a. 19-Inch Rack Adapter shall be Kramer RK-6T:

Discuss with the AVPM which of the following inputs are required:

1) HDMI
2) DisplayPort

3) 3.5mm audio input
4) DB15 VGA video input
5) RJ45 Ethernet
6) RCA auxiliary video and audio inputs (Yellow/Red/White)
7) USB (quantity three)
8) XLR female microphone

6. Solid Blank Panels: Lowell SEP or SP Series.
7. Vented Blank Panels: Lowell SVSP Series.
8. Security Covers: Lowell SSC Series.
9. Shelf: Lowell US Series, 14" deep.

D. Exhaust Fans for A/V Equipment Racks:
1. Lowell
2. Middle Atlantic

E. Mesh Sleeve for routing exposed cables:
1. Braided, expandable plastic mesh sleeve, black colored, sized appropriately for the application (typically 1" and 1-1/2" diameter):
a. TechFlex, Panduit or equal.

2.5 FURNITURE

A. Cable Access Cubby for Conference Room Tables:

The Designer shall discuss with the AVPM whether Conference Room Tables shall be specified here or whether another procurement vehicle will be used. If the AVPM directs that tables shall be included in this specification, the Designer shall work with the AVPM to determine the parameters.

- Materials and Color shall match building décor.

Regardless of whether the tables are specified here, the Cable Access Cubby is required in this specification.

1. Table-top cable access cubby shall be:
2. Connectors for cable access cubby shall be:

Discuss with the AVPM which of the following inputs are required:

a. HDMI
b. 3.5mm audio input
c. HD15 XGA video input
d. Electrical Power

B. Instructor Podiums:

Verify that detailed drawings have been provided depicting how the podiums shall be constructed.

1. Podiums shall be as shown in the Contract Documents:

The Designer shall discuss with the AVPM whether Instructor Podiums shall be specified here or whether another procurement vehicle will be used. If the AVPM directs that Podiums shall be included in this specification, the Designer shall work with the AVPM to determine the parameters.

- Materials and Color shall match building décor. Desktop Surface materials and colors shall be selected by Facilities Services Interior Designers.

a. Size: XXXXXX
b. Material: XXXXXX

c. Color: XXXXXX
d. Manufacturer and model: XXXXXX

2. Computer security cable and lock:
   a. Kensington
   b. or pre-approved equal.

2.6 AUDIO SYSTEMS

A. Mono system amplifiers shall provide 75 watts per channel output, be Class A/B rated, with appropriate inputs, and rack-mount brackets. The amplifier shall support 4, 8 and 16 ohm speakers and shall also have intrinsic 70V speaker outputs.
   1. Mono system amplifiers shall be Peavey Crest PA 150.
   2. Cables shall be Standard Audio Cabling with XLR plugs, RCA plugs, spring clip, or Screw-type (open) terminals.

B. Stereo system amplifiers shall provide 75 watts per channel output, be Class A/B rated, with appropriate inputs and rack-mount brackets. The amplifier shall support 4, 8 and 16-ohm speakers. Amplifiers shall be:
   1. Crest Peavey or Biamp MT series.
   2. Cables shall be Standard Audio Cabling with Phoenix terminals or Screw-type (open) terminals.

C. Digital Signal Processing (DSP) systems shall be:
   1. Biamp Nexia/Audia.
   2. Cables shall be Standard Audio Cabling with XLR plugs, RCA plugs, spring clip, or Screw-type (open) terminals.

D. Speakers:
   1. For Speech: 70 Volt, monaural audio speakers, suitable for ceiling mounting. Speakers shall be:
      a. Pure Resonance Audio VCA series 2'x2' ceiling tile speakers.
      b. Pure Resonance Audio PRA series in-ceiling speakers.
      c. QSC AD-C series.
   2. For Content: 4 ohm or 8 ohm stereo audio speakers, suitable for ceiling mounting or hanging. Speakers shall be:
      a. QSC AD-S series for surface mounting.
      b. QSC AD-C series for ceiling-tile mounting.
      c. Pure Resonance Audio VCA series 2'x2' ceiling tile speakers.
      d. Pure Resonance Audio PRA series in-ceiling speakers.
   3. Mounting hardware shall be either included with speakers or inherently mountable.
   4. Wiring shall be Standard Speaker Wiring with standard terminations.

E. Assistive Listening Devices:
   1. Transmitter:
      a. Williams Sound WIR TX90 with:
         1) Power supply
         2) Power cable
         3) Wall/ceiling mounting kit
         4) ADA wall plaque
   2. Receivers:
      a. Mono Headset Receiver: Williams RX18, with rechargeable batteries.
      b. Ear Tips: EAR 240
   3. 5-bay Receiver Charging Station:
      a. Williams CHG 518

F. Microphones:
   1. Ceiling-hung microphones shall be:
      a. Polycom Ceiling Array
      b. Crown PZM-11
      c. or pre-approved equal.
   2. Desk-mounted microphones shall be push-to-talk with built-in logic:
      a. Shure MX-392C
      b. or pre-approved equal.
   3. Wireless Microphones shall be UHF, tunable and able to automatically identify available radio frequencies:
      a. Shure BLX4R rack-mount receiver with external antennas.
      b. Shure WL 185 lapel microphone
      c. Shure BLX1 bodypack transmitter
      d. RF Cables shall be:
         1) Antenna extension cable: RG-58 with BNC connectors on both ends.
         2) Antenna mount: BNC barrel connector.
   4. Cables shall be Standard Audio Cabling with Phoenix terminals, XLR, or ¼" balanced phono.

2.7 VIDEO SYSTEMS

A. Blu-ray Player Devices:
   1. Blu-ray players shall be region-free:
      a. Panasonic, Sony, LG
      b. or pre-approved equal.
   2. 1U Rack-mounted Shelf.
   3. Cables shall be Standard HDMI Cables.

B. Video Cameras:
   1. Table-top Document Camera: White, HD, 1080p/60fps, HDMI output.
      a. Cameras shall be Epson DC-20 or pre-approved equal.
      b. Cables shall be Standard HDMI cables.
   2. Classroom Camera: HD, 1080p/30fps, HDMI output, with wall mount bracket. PTZ is required.
      a. Polycom Eagle Eye, or pre-approved equal.
      b. Cables shall be Polycom Eagle Eye Cables, or Polycom adapters.
   3. Lecture Capture: SD/HD, 1080p/60fps, with wall mount bracket. PTZ is not required.
      a. Vaddio WallView SD70 Series, or pre-approved equal.
      b. Cables shall be two Standard Category 6, per Section 27 15 00.
   4. Camera Tracking System: HD, 1080p/60fps, with wall mount bracket. PTZ is required.
      a. Polycom Director Series
      b. Cables shall be Polycom Eagle Eye Cables, Polycom adapters, Belden 1277P, or Category 6 per Section 27 15 00.

C. Video Conferencing Endpoints:
   1. Shall be High Definition Video Conferencing Endpoint (VCE):
      a. Polycom Real Presence Group Series
      b. or pre-approved equal.

D. Video Distribution Amplifiers:
   1. HDMI Amplifier:
      a. Kramer VM-4HC
      b. Kramer VM-4HXL
      c. pre-approved equal

2. Mounting shelves shall be:
   a. Lowell US Series, 14" deep
   b. Kramer rack adapters
   c. or pre-approved equal.

E. HDMI/HDBaseT Extenders:
1. Transmitter / Receiver Pair shall be:
   a. Atlona AT-HDTX / AT-HDRX
   b. AMX DX-TX / DX-RX
   c. or pre-approved equal.
2. Mounting shelves shall be:
   a. Lowell US Series, 14" deep
   b. Kramer rack adapters
   c. or pre-approved equal.

2.8 VIDEO DISPLAYS

A. Projection Screens:
1. All projection screens shall be manufactured by Da-Lite (specified below), or their pre-approved equivalent from Draper.

Discuss with the AVPM whether a projection surface is desired in lieu of projection screens. Some options include IdeaPaint, Wall Talkers and matte finished paint.

If screens are desired, specify the sizes and model numbers. Consider the following when sizing the screens:

- **The height of the projected image shall be not less than 1/6 the distance to the farthest viewing position in the room.**

2. Motorized Screens:
   a. Motorized projection screens shall be Electric Tensioned Advantage or Tensioned Contour product line.

Screen Surfaces typically used at WSU Pullman include:

- **Standard Surface: Da-Mat Gain 1.0, Viewing Angle 60 degree.**
- **HD Progressive: Gain 1.1, viewing angle 85 degree. HD progressive is ideal for applications that require a small increase in gain due to screen size and projector brightness. HD Progressive 1.1 is an ideal choice for large audiences and is formulated for High Resolution Projectors.**

   b. Motorized projection screens shall have a 16:10 aspect ratio and a Standard Da-Mat or HD Progressive Screen Surface.
   c. Other required options include:
      1) Screens shall be electrically operated and support low-voltage control via the built-in SCB-100 screen controller.
      2) Motor shall be 120VAC and silent. 220VAC motors are not acceptable.
      3) Cases and trim kits shall be white.
      4) Internal junction box.
      5) Without video projector interface.

Typical screen sizes used at WSU Pullman include:

- **57.5' x 92" VA (109" diag.)**
- **60" x 96" VA (113" diag.)**
- **65" x 104" VA (123' diag.)**

- **69” x 110” VA (130” diag.)**
- **72.5” x 116” VA (137” diag.)**

- **87” x 139” VA (164” diag.)**
- **100” x 160” VA (189” diag**
- **Where larger screens are required, discuss with the AVPM**

d. **XXX”** Screen: Da-Lite **XXXXXXXX**.
e. **XXX”** Screen: Da-Lite **XXXXXXXX**.
f. **XXX”** Screen: Da-Lite **XXXXXXXX**.
g. or pre-approved equal models from Draper.

3. Manual Screens:
   a. Projection screens shall be Advantage Manual with CSR, Model C with CSR, or Model C product line.
   b. Manual projection screens shall have a 16:10 aspect ratio and a Standard Da-Mat Screen Surface.
   c. Cases and trim kits shall be white.

Typical screen sizes used at WSU Pullman include:

- **50” x80” VA (94” diag.)**
- **57.5’ x 92” VA (109” diag.)**
- **60” x 96” VA (113” diag.)**
- **Where larger screens are required, discuss with the AVPM**

   d. **XXX”** Screen: Da-Lite **XXXXXXXX**.
   e. **XXX”** Screen: Da-Lite **XXXXXXXX**.
   f. **XXX”** Screen: Da-Lite **XXXXXXXX**.
   g. or pre-approved equal models from Draper.
4. Projection screen mounts shall be manufactured by the screen manufacturer, and shall be wall-mounted or ceiling-mounted as shown on the Contract Documents. A ceiling trim kit shall be provided where shown on the Contract Documents.
   a. 10in/14in Wall Brackets, Wall Brackets (White) (1 pair): Da-Lite 40957.
   b. 10in/24in Wall Brackets, Wall Brackets (White) (1 pair): Da-Lite 40933.
   c. Unistrut/all-thread ceiling mount.
   d. Ceiling Opening Trim Kit: Da-Lite 9638x.
   e. or pre-approved equal.

B. Video Projectors:
1. Ultra Short-throw Video projector shall be 3LCD-type, WXGA+ or better, with a minimum of 2500 ANSI lumen output, and shall have IP connectivity, RS232 control, and HDMI video input:
   a. Panasonic PT-CW230E (or latest equal model meeting these specifications)
   b. or pre-approved equal.
2. Standard-throw Classroom Video projectors shall be 3LCD-type, WXGA+ or better, with a minimum of 4500 ANSI lumen output, and shall have IP connectivity, RS232 control, and HDMI video input:
   a. Panasonic PT-DX500U (or latest equal model meeting these specifications)
   b. or pre-approved equal.
3. Standard-throw Auditorium Video projectors shall be 3LCD-type, WXGA+ or better, with a minimum of 6000 ANSI lumen output, and shall have IP connectivity, RS232 control, and HDMI video input:
   a. Panasonic PT-DW640 (or latest equal model meeting these specifications)
   b. or pre-approved equal.
4. Video projector cables:
   a. Data: One Category 6 cable (per Section 27 15 00, by Telecommunications Contractor) running between an outlet near the projector and the telecommunications room.

b. Control: One Category 6 cable (per Section 27 15 00, by Telecommunications Contractor) running between an outlet near the projector and an outlet near the A/V Equipment Rack.
c. Video: One Category 6A cable (per Section 27 15 00, by Telecommunications Contractor) running between an outlet near the projector and an outlet near the A/V Equipment Rack, with any necessary baluns or extenders required to support HDMI/DisplayPort via Category 6A cabling.
d. Video: One Belden 1279p running between an outlet near the projector and an outlet near the A/V Equipment Rack.

5. Video projector mounts shall be:
   a. Chief Manufacturing RPAU universal mount
   b. or pre-approved equal.

C. Video Panels:
1. Video Wall:
   a. Panels shall be commercial grade, with LED backlighting, LCD, damage-resistant glass, and sized 46" (diagonally measured) with DVI inputs. Panels shall accept RS232 control and IP connectivity, with direct input selection ability.
      1) Video Panels shall be Planar LX46HD or current equal 46" model, with:
         a) Mounting brackets included by the manufacturer.
         b) Planar Quad Controller Module.
         c) Planar Power Supply Module.
         d) Planar Video Extender.
         e) Planar cabling
      2) or pre-approved equal from Sharp or NEC.
2. Digital Signage:
   a. Panels shall be commercial grade, LCD, sized not less than 55" (diagonally measured) with HDMI inputs.

      Plasma video panels are only acceptable where glare will not be problematic.

      1) Video Panels shall be NEC Series
      2) or pre-approved equal.
   b. Mount for Owner-provided digital media player.
3. Classrooms and Conference Rooms:
   a. Panels shall be commercial grade, LCD, sized not less than 55" (diagonally measured) with HDMI inputs.

      Plasma video panels are only acceptable where glare will not be problematic.

      1) Video Panels shall be NEC Series
      2) or pre-approved equal.
4. Wall-mounting bracket shall be full-articulating with locking security features:

   For panels 52" or larger, the wall shall be reinforced for mounting purposes, typically requiring a 4x8 sheet of fire-treated 5/8" plywood attached to the wall studs beneath a layer of gypsum board.

   a. For panel sizes 24" to 65":
      1) Chief LTMU or NEC Flush
      2) or pre-approved equal.
5. Ceiling-mounting bracket:
   a. For panel sizes 42" to 71":
      1) Chief XCM1U
      2) or pre-approved equal.
6. Video Panel Cables:
   a. Cables shall be HDMI except where distances exceed HDMI's limitations, in which case cables shall be HDBaseT.
7. Video Panel Interface Box:

a. FSR, Inc. PWB-100
8. Video Panel Remote Interface:
a. AMX Novara MCP-106
b. Required Features:
1) HDMI Interface
2) Video Panel On/Off
3) Volume Up/Down
4) HDMI Input Select

2.9 AUDIO-VIDEO CONTROLS AND SWITCHING

A. Audio/Video Scaling Switcher:
1. Switching matrix shall be the Kramer, Sierra Video, or AMX Enova DGX family of products.
2. Switch cables:
a. Audio/video cables shall be RGBHV, HDMI, and HDBaseT.
b. Audio cables shall be Standard Audio Cable terminated with Screw-type (Phoenix) or 3.5mm TRS connectors.
c. Control wiring shall be Ethernet, RS232 and IR.

B. Touch Panel Interface:
1. Touch panel shall be 10.1” size, be powered via Power-Over-Ethernet (POE), operate via Ethernet, and shall have a desktop mount.
a. Touch panel shall be: AMX MXT-1000 Modero X
b. or pre-approved equal.
2. Control wiring shall be Ethernet via Category 6 cabling per Section 27 15 00 or Polycom POL-300-70-002 or AMX AXLink.

2.10 PRESENTATION WIRELESS REMOTE CONTROL

A. Presentation wireless remote control devices with batteries shall provide page-up/page-down functions, have a red laser pointer, and connect to the Owner-provided computer via a USB port in a Plug-and-Play fashion.
1. Logitech R400
2. or pre-approved equal.

2.11 LABELING AND ADMINISTRATION

A. Equipment Labels:
1. As recommended in ANSI/TIA/EIA 606. Permanent polyester, not subject to fading or erasure, permanently affixed, and created by a hand-carried label maker or a computer/software-based label making system. Handwritten labels are not acceptable.
2. Printable on a Laser Printer:
a. 2.00 x 0.5 inches: LSL-84-602
b. or approved equal.
3. Printable on a Hand-carried Label Maker:
a. 0.5 inches high: Brady M71C-500-595-WT
b. or approved equal.
4. Hand-carried label maker:
a. Brady BMP71
b. or approved equal.

B. Cable Labels:

1. As recommended in ANSI/TIA/EIA 606. Permanent (i.e. not subject to fading or erasure), permanently affixed, self-laminating vinyl, and created by a hand-carried label maker or a computer/software-based label making system. Handwritten labels are not acceptable.
   a. Brady: Bradymaker Wire Marking Labels WML-511-292 (or approved equal).
2. Hand-carried label maker:
   a. Brady: ID Pro Plus (or approved equal).

PART 3 - EXECUTION

Ensure that products incorporated into the project under PART 3 paragraphs have corresponding Product information in PART 2 – Products, or in another specification Section if installed but not supplied under this Section.

The following paragraphs include installation requirements written specifically for the Products listed in Part 2 above. If other products are approved, the Designer shall ensure that appropriate Part 3 installation requirements are added/removed or modified as applicable and described in equal or greater detail to the following paragraphs.

All installation requirements shall be consistent with the manufacturer's requirements.

3.1 GENERAL

A. All audio/visual systems and applications shall be arranged, assembled, wired and configured identically to other applications in similar rooms within this project. Component arrangement, wire numbering, wire routing, etc. shall all be consistent throughout the project.

B. All cables shall be unspliced and not coupled.

C. The rooms listed below are designated with the application functions indicated. For each room listed, provide the equipment, cabling and functionality defined for each application.

	General University Classrooms (GUC)				Active Lecture Halls (ALH)							Conference Rooms							Digital Signage				
A/V Equipment	223	333	337	436	110A	110B	110C	110D	101	301	304	202	403	120J	125	441	303	302	10	41	100N	330	0W
A/V Equipment Rack (Full-Height)									1														
A/V Equipment Rack (In-Casework applications)														1	1	1	1	1					
A/V Equipment Rack (In-Podium applications)	1	1	1	1	1	1	1	1	1	1	1												
Cable Access Cubby for Conference Room Tables														1	1	1	1						
Instructor Podiums	1	1	1	1	1	1	1	1	1	1	1												
Mono system amplifiers	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1					
Stereo system amplifiers	1	1	1	1	1	1	1	1	2	1	1			1	1	1	1	1					1
Digital Signal Processing (DSP)										1	1						1						
Speakers (Speech)	4	4	4	4	4	4	4	4	12	4	4			4	4	4	4	2					
Speakers (Content)	2	2	2	2	2	2	2	2	5	2	2			2	2	2	2	2					4
Assistive Listening Devices	2	2	2	2	2	2	2	2	6	2	2			2	2	2	2						
Microphones (Ceiling-hung)										12	12					1	1						
Microphones (Desktop)												1	1	1	1	1		1					
Microphones (Wireless)	1	1	1	1	1	1	1	1	1	1	1					1	1	1					
Video Cameras (Document)	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1					
Video Cameras (Classroom)	1	1	1	1	1	1	1	1	2	2	2					1	1	1					
Video Cameras (Lecture Capture)										1	1						1	1					
Video Camera Tracking System										1	1					1	1						
Video Conferencing Endpoints										1	1					1	1						
Projection Screens	1	1	1	1	1	1	1	1	3					1	1	1	2						
Video Projectors (Ultra Short-throw)																1							
Video Projectors (Standard-throw Classroom)	1	1	1	1	1	1	1	1		1	1			1	1		2						
Video Projectors (Standard-throw Auditorium)									3														
Video Panels	1	1	1	1	1	1	1	1	4	2	2	1	1	1	1	2	1	4	1	1		1	
Video Panel Remote Interface												1	1										
Video Wall																					1		
Audio/Video Scaling Switcher	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1					
Touch Panel Interface	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1					

D. In addition to the major equipment listed above, provide all equipment shown on the Drawings or listed in the specification, as required for a complete, operational system.

E. Configure, program, adjust and tune all equipment according to manufacturer requirements such that it will perform as required. From the perspective of users of the audio/visual systems, all systems shall be installed to look, feel and operate similarly to all of the existing facilities throughout the Owner's campus.

F. Any accessory hardware (including adapters, batteries, brackets, cables, connectors, covers, dongles, remote controls, and tools) that is provided by the manufacturer with equipment, but which does not become permanently installed, shall be furnished to the Owner.

G. Furnish to the Owner one set of original packaging material for each piece of audio/visual equipment.

3.2 GROUNDING AND BONDING

A. Grounding conductor shall be installed to bond all non-current-carrying metal equipment and materials to the nearest telecommunications grounding system (as provided under Section 27 05 26 – "Grounding and Bonding for Communications Systems"). Ground conductor shall be run directly to the cable tray grounding conductor, and shall not rely upon metallic conduit for a grounding path.
   1. Ensure that active electronic equipment is properly grounded per manufacturer's requirements.

3.3 STANDARD CABLE ASSEMBLIES/PATCH CORDS

Verify that all cables required for the project are defined in under "Standard Cable Assemblies/Patch Cords. For special case cables (only used for a single piece of equipment) specify the cable with the equipment it serves.

A. Provide all patch cables, cords and connectors required for a completely functional system. Cable lengths shall be kept to practical minimum lengths (not more than 25 ft.), while providing slack for three connector reterminations of the cable on each end of the cable. Avoid long cables that require slack coils. Where slack coils are required, store slack coil under the base of A/V Equipment Rack.

B. All wiring and cables shall be free of grounds and shorts.

C. All wiring and cables shall be properly supported with strain relief measures.

D. The use of nylon tie wraps ("zip-ties") is prohibited everywhere, with the following exceptions:
   1. In above-ceiling wire basket cable trays, tie wraps shall be used in the corners (where the cable tray turns) to maintain orderly cable grooming.
   2. Permanently affixed power wiring.

E. A/V Equipment Racks:
   1. After the system has been completely tested, neatly bundle and dress cables using Velcro-style straps to secure cables against lacing bars in a neat and workmanlike manner. Provide sufficient cable slack such that equipment can be serviced without binding or kinking the cables.

F. Instructor Consoles:
   1. After the system has been completely tested, neatly bundle and dress cables using Velcro-style straps with screw-attached bases to secure cables against the underside of the console in a neat and workmanlike manner.

G. Mesh Sleeves:
   1. Provide mesh sleeves as listed below, with the ends of the sleeves telescoped/rolled back into the sleeve approximately 4 inches to prevent fraying, and secured with an overwrapping tie-wrap at each end:
      a. Anywhere cables would be exposed to public view.
      b. Between floor boxes and conference tables.
   2. Prevent mesh sleeves from pulling out of their termination point, thus keeping cabling concealed and protected inside the sleeves.

3. Do not use tape, tie wraps, or Velcro-style straps to bundle cables inside mesh sleeves and conduits. Cables shall be loose inside mesh sleeves and conduits, allowing them to be individually pulled out and replaced without disturbing the other cables.

3.4 EQUIPMENT RACKS/ENCLOSURES

A. Provide junction panels, racks, cabinets, and enclosures with all associated hardware according to locations, elevations, and plan views as shown in the Contract Documents.

B. A/V Equipment Racks, Cabinets and Enclosures:
1. Provide racks, cabinets and enclosures as shown on the Contract Documents.
2. Assemble racks and install components as shown and ensure that all moving parts (doors, drawers, latches, etc.) function as intended.
3. Provide exhaust fans as shown on the Contract Documents and as required for reliable operation of the equipment.
4. Coordinate the installation of power outlets and data boxes that will serve the A/V equipment.

3.5 FURNITURE

A. Provide cable access cubbies with the specified connectors in each designated conference table location, cut-in and mounted as shown on the Contract Documents.

B. Provide Instructor Podiums as shown on the Contract Documents.
1. Provide computer security cable, attached securely to the A/V Equipment Rack.
2. Protect furniture from damage prior to Owner Acceptance. Repair or replace any damaged furniture.
3. Provide documentation, maintenance, and warranty information associated with furniture to the Owner.

3.6 AUDIO SYSTEMS

A. Maintain the following minimum separation distances:
1. 24” between all ceiling-hung speakers and pendant microphones.
2. 24” between all pendant microphones and air ducts (return or discharge).
3. 12” between all pendant microphones and video projection paths.
4. 12” between all pendant speakers and video projection paths.
5. 12” between all pendant lighting and video projection paths.

B. Amplifiers and Digital Signal Processors:
1. Provide amplifiers and digital signal processors with any required input modules, fully configured as required, and installed in equipment rack as shown on the Contract Documents.
2. Provide cabling and wires.

C. Speakers:
1. Provide speakers and mounting hardware, installed as shown on the Contract Documents.
2. Provide cabling and wires.

D. Assistive Listening Systems:
1. Provide a transmitter in each designated space.
2. Provide mounts, cabling and wires.

3. Table 219.3 in the 2010 ADA Standards for Accessible Design provides the following information about the number of receivers and the number of hearing-aid compatible receivers required depending on the number of seats in a given room:

Seating Capacity of Assembly Area	Minimum Number of Required Receivers	Minimum Number of Receivers Required to be Hearing-aid Compatible
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats*	2
201 to 500	2, plus 1 per 25 seats over 50 seats*	1 per 4 receivers or fraction thereof
501 to 1000	20, plus 1 per 33 seats over 500 seats*	
1001 to 2000	35, plus 1 per 50 seats over 1000 seats*	
2001 and over	55, plus 1 per 100 seats over 2000 seats*	

* or fraction thereof.

Provide the number of receiver sets required by ADA (above) for each space, with batteries, delivered to the Owner during system demonstration.

The Designer shall inquire with the WSUP AVPM about the quantity of Charger Stations that are required for a given project.

4. Provide **X** charger stations (total for project), delivered to the Owner during system demonstration.

E. Microphones:
1. Provide all microphones shown on the Contract Documents. Provide mounts, cabling and wires.
2. For wireless microphones:
   a. Provide receivers, installed in A/V Equipment Rack as shown on the Contract Documents.

The Designer shall work with the WSUP AVPM to determine the desired frequency range for each wireless microphone application, and shall specify this here:

   1) Configure the wireless microphone receivers to operate in the following frequency ranges:

Room Name	Room #	Frequency Range
room name	###	MHz
room name	###	MHz
room name	###	MHz
room name	###	MHz
room name	###	MHz
room name	###	MHz
room name	###	MHz

   b. Install the antennas in top rear of the A/V Equipment Rack, using manufacturer-provided external antenna mounting bracket.
   c. Connect the antenna extension cables between the barrel connectors and the antenna connections on the receiver. Attach the antennas to the exterior ends of the barrel connectors.
   d. Furnish body pack transmitters, wireless microphones and associated cables, stored in the drawer in each A/V Equipment Rack.
3. For ceiling-hung microphones:
   a. Provide grommet through the ceiling tile that matches the color of the tile.

3.7 VIDEO SYSTEMS

A. Blu-ray Player Devices:
   1. Provide shelves, installed in equipment rack as shown on the Contract Documents.
   2. Provide Blu-ray player, attached to shelf.
   3. Provide cables and wires.

B. All Cameras:
   1. Provide cameras, mounted as shown on the Contract Documents.
   2. Provide mounts, cables and wires.

C. Video Conferencing Endpoints:
   1. Provide video conferencing endpoints, installed in conference rooms as shown on the Contract Documents.
   2. Provide mounts, cabling and wires.
   3. Configure system to integrate with the equipment in the conference room.

D. Video Distribution Amplifiers:
   1. Provide Video Distribution Amplifiers as shown on the Contract Documents.
   2. Provide rack-mounted shelving and attach devices to shelf.
   3. Provide cables and wires.

E. HDMI/HDBaseT Extenders:
   1. Provide HDMI/HDBaseT Extenders as shown on the Contract Documents.
   2. Provide rack-mounted shelving and attach devices to shelf.
   3. Attach remote end devices using sticky-back hook-and-loop strips.
   4. Provide cables and wires.

3.8 VIDEO DISPLAYS

A. Projection Screens:
   1. Provide projection screens installed as shown on the Contract Documents.

      Add room numbers and screen sizes, coordinated with Part 2 content above.

      a. For Rooms **XXX, XXX, XXX and XXX** **Screen size**
      b. For Rooms **XXX, XXX, XXX and XXX** **Screen size**
      c. All other rooms requiring screens **Screen size**
   2. Screens shall be mounted as close as possible to the wall (preferably not more than 4" away from the wall) while also permitting the projection surface to clear any obstructions on the wall (such as whiteboard and pen tray).
   3. Do not provide manual control switches.
   4. Provide mounts, power, control raceways and wiring as shown on the Contract Documents.

B. Video Projectors:
   1. Provide video projector mounts, attached to structure as shown on the Contract Documents. Position mounts such that:
      a. The projector is located the proper distance from the projection surface or screen.
      b. The projector achieves peak performance without the use of specialty lenses.
      c. The projector achieves peak performance without the use of keystoning and with only minor use of image adjustment features (contrast, etc.).
   2. Provide video projectors, attached to the projector mounts. Adjust and focus projector to properly display on projection screen.
   3. Provide cables and wires.

4. Verify that lighting and other ceiling-hung objects do not obstruct the image on the screen. Under the direction of the Owner and A/V Engineer, resolve any physical obstructions (such as lighting or other obstructing objects) prior to making any adjustments to the projector, projector mount location or projection screen.

C. Video Panels:
1. Provide video panel mounting brackets, attached to wall as shown on the Contract Documents.
2. Provide video panels, attached to the mounting brackets. Adjust angle and tilt of panel for optimal viewing angle.
3. Provide cables and wires.
4. For video panels designated for use as digital signage, provide two baluns (one for the video panel and one for the telecommunications room).
5. For video wall panels, provide all associated equipment that is required for a functioning Planar Clarity Matrix video wall system, including the Quad Controller Module, Power Supply Module, Video Extenders, and all required cabling.

3.9 AUDIO-VIDEO CONTROLS AND SWITCHING

A. Audio/Video Scaling Switchers:
1. Provide switchers, installed in equipment rack as shown on the Contract Documents.
2. Provide cabling and wires.
3. Provide all required configuration and programming.

B. Touch Panel Interface:
1. Provide Touch Panel Interface devices in locations and quantities shown on the Contract Documents.
2. The Owner will furnish to the Contractor sample software used to configure its existing touch panel interfaces.
3. The A/V Contractor shall edit and adapt that code for use in the Touch Panel Interfaces being provided. The A/V Contractor shall maintain the look-and-feel, the programming structure and existing style, to be consistent with the Owner's standard practices.

C. Computer Software Interface:
1. The Owner will furnish to the Contractor a sample layout of the operator/user control interface that is currently in use at the Owner's facilities.
2. The A/V Contractor shall edit and adapt that code for use in the desktop interfaces required in the Contract Documents. The A/V Contractor shall maintain the look-and-feel, the programming structure and existing style, to be consistent with the Owner's standard practices.

D. Provide fully documented, uncompiled copies of all control programming (AMX or Visual Studio) to the Owner in native electronic format on CDROM during Demonstration and Training.

3.10 PRESENTATION WIRELESS REMOTE CONTROL

A. Provide one presentation wireless remote control with batteries, stored in the drawer in each A/V Equipment Rack.

3.11 LABELING AND ADMINISTRATION

A. Cables:
1. Label Location: Affix at each end of the cable, not less than 1 inch or more than 3 inches from the connector, aligned such that the label is readable without adjusting the cable.

2. Include a clear vinyl adhesive wrapping applied over the label, in order to permanently affix the label to the cable and prevent smudges to label text. Using transparent tape to affix labels to cables is not acceptable.
3. Label Content: Labels shall be formatted all uppercase, with a dash between the item type and two-digit sequential number, and spaces between each segment, as follows:

CABLETYPE - ## EQUIPTYPE - ## PORTTYPE - ##

For example, the first RS232 control cable, connected to RS232 port #1 on AMX Controller number 1 would be given the following label:

RS232-01 IC-01 OUT-01

B. Cabling Color Scheme:
1. Use a consistent color scheme throughout the project, matching the existing scheme in the building.

C. Grounding/Bonding Conductors:
1. Label bonding conductors: “WARNING! BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!”

3.12 TESTING

A. All functions and features shall be verified operational. Demonstrate operation of each space to the A/V Engineer and the Owner’s Representatives.

B. Configure, program, adjust, and tune equipment such that it will perform as required.

C. Replace underperforming or non-performing equipment and cables.

3.13 WARRANTY REGISTRATION

A. Submit equipment warranty registration forms to the equipment manufacturers on behalf of the Owner. Coordinate with the Owner to obtain appropriate contact information for the forms and documentation.

3.14 DEMONSTRATION AND TRAINING

A. Provide 4 hours of demonstration and training to Owner’s Representatives.

Verify that WSU Pullman does indeed wish to have 4 hours of demonstration provided. Will there be multiple demonstration sessions?

END OF SECTION