SECTION 11 63 50 – MASTER BROADCAST CONTROL ROOM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Work under this Contract includes all labor, materials, tools, transportation services, supervision, coordination, etc., necessary to complete the integration of the Master Broadcast Control Systems associated with RazorVision, as described in these specifications and illustrated on the associated drawings. The systems shall be called the “Master Control Systems” and the integrator the “Video Systems Integrator”. The systems include the following major items:
   1. Video Control Room
   2. Remote equipment connectivity at fiber-interconnected facilities.
   3. All electrical distribution within each system at each integration point.
   4. Technical Millwork and Furniture Consoles

B. The Contract also includes:
   1. Verification of dimensions and conditions at the job site.
   2. Preparation of submittal information.
   3. Coordination with other trades.
   4. Integration in accordance with the contract documents, manufacturer’s recommendations, and all applicable code requirements.
   5. Manufacturer’s commissioning for all major items of equipment.
   6. Initial tests and adjustments, written report, and documentation.
   7. Instruction to operating personnel
   8. Provision of manuals.
   9. Maintenance services; warranty.

C. The nature of this Contract is “design-build”. That is the Integrator is responsible for all subsequent design and engineering not included within the RFP documents. The Integrator is responsible for providing all components necessary for complete and operational system. Any system changes or revisions necessary to make the system conform to the building, walls, steel, electrical services etc, shall be included at time of proposal and integrated without claims for additional compensation.

D. The Contract Documents are complementary and are intended to include or imply all items required for the proper execution and completion of the work. Any item of work required by the Specifications or other portion of the Contract Documents, but not shown on the drawings, or shown on the drawings but not required in the Specification, shall be provided by the Contractor without extra charge as if shown or mentioned in both.

1.2 SYSTEM DESCRIPTION

A. RazorVision Master Broadcast Control is the central video production and control room located on the West Mezzanine level of Bud Walton Arena. It is connected to multiple ancillary athletic venues. It consists of the following systems and components:
   1. Two identically configured Video Control Rooms to be used to originate programming for the in-house video displays at campus athletic facilities as well as broadcast support functions (ESPN3, SEC Network, etc.) associated with event production at campus athletic facilities, distributed TV network, etc.

2. One lesser configured Video Control Room to be used for smaller functions.
3. One centralized Audio control room associated with the two Video Control Rooms is provided to support broadcast functions.
4. One Studio space
5. Centralized Rack Room
6. Centralized Shading and POV Room
7. Centralized Slow Motion Room
8. Edit Rooms

B. A number of video cameras are dedicated to the Video Control System.
1. Each camera may be connected at a number of locations throughout the facility via triax camera cables to the Camera Control Base Stations.
2. Two wireless cameras are provided for use in the Video Control Room.
3. Additional unit costs are requested for potential purchase of additional CCU and Cameras.
4. POV cameras, joystick controllers and digital servo pan/tilt head allow for live control of each camera and/or rapid selection of presets from controller.
5. The fiber from the POV location to the Video Control room in Bud Walton Arena is provided by the project. For ancillary facilities, the fiber is provided by the project, but connection from camera location to fiber location may be required.
6. Coordinate mounting location with Owner's Representative as well as:
   a. Do not mount cameras until given permissions.
   b. Expect to provide mockups of each location at least 1 time.
   c. Mount camera
   d. Connect to power (within 75')
   e. Interconnect cabling between camera and the fiber location.
7. Locations: as shown on drawings.

C. A remote production kit is specified to permit the base bid cameras and ancillary production equipment (intercom/IFB, bi-directional video and audio, scoring interface, etc.) to be connected via fiber around campus back to the Master Control Room.

D. Video sources (camera "isos") are introduced to the system from the Outside Broadcast Television (OB) Trucks parked in the Video Truck Area, at facilities with such capabilities, via a newly integrated fiber run with fiber optic transmitter, receivers and cross converters supplied and integrated by the Video Control Room Integrator. The fiber optic connection to the truck dock is being supplied and integrated by the project.

E. Antenna mounting locations shall be investigated by the successful integrator in association with the wireless manufacturer: Coverage shall be provided throughout the seating bowl.
1. Video System integrator is responsible for mounting antenna and extending cables (video and RF) from receiver to antennas and connection to equipment specified herein.
2. It is essential that the integrator work with the manufacturer on correctly locating these antennas, as well as selecting appropriate transmit and receive antennae.

F. Audio, Video and intercom lines will be provided to the Live Shot room and the Social Media Lounge.

G. In addition to the cameras the following equipment is provided for video replay use:
1. Multiple Production Switchers used to switch multiple shows.
2. Multiple Character generators
   a. A data feed will be made available from the scoring computer system at each venue; this scoring computer system shall be interfaced to the Character Generators and text/stat capable Clip and Still Store Devices to allow automatic

extraction and CG display of scoring and statistics information from the scoreboard system.

3. Multi-channel file server used for multi-camera slow motion playback.
4. Multi-channel file server used for spot playback.
5. Multi-image viewer for viewing of multiple sources on multiple screens throughout the Master Control Room.
6. A separate audio mix for mixing separate shows.
7. Preview, program and confidence monitoring
8. Video Recorders are provided to:
   a. Make archival video recordings of game and truck program
   b. Playback individual plays in the event of a failure of a file server
   c. Make archival video recordings of the individual camera iso angles.
   d. Create “dubs” and duplications of footage for common distribution.
   e. Certain recorders are provided to provide video tape interchange within existing team tape footage.

H. A routing switcher (video and audio) is used to route sources throughout the Master Control Room to Video Board Processor(s), VCRs, Slow Motion, Character Generators, Clips Players, monitors, fiber optic transmitters and other devices within the space..

I. The entire Video Control Room is fully equipped with intercom (communication) interconnected to the “house” PA/intercom system.
   1. Multi-channel circuits are connected to a “source-assignment” panel for ease of configuration.
   2. Cabling exterior to the Video Control Room is existing. The Master Control Room contractor is responsible for coordinating terminations, supplying equipment, and assisting in balancing and configuring the system.

J. The integration of the Master Control Room should be coordinated with the existing Broadcast Cabling, Structured Cabling and facility Sound Systems.
   1. The Master Control Room Integrator is responsible for terminating existing camera, audio and video cable to the Master Control Room, on patch panels supplied by the Master Control Room Integrator.
   2. Additional cable pulls are noted in the system drawings.
   3. Refer to University Standards regarding the horizontal cable types and terminations.
   4. Coordinate connectivity to existing fiber and fiber switches.

K. Editing System:
   1. Integrate cabling and connections to this Owner Furnished Equipment as well as supporting equipment (e.g. speakers, control surface).

L. Work to be performed outside the immediate area of the control room:
   1. Coordination of connectivity of mobile production fly pack, POV cameras and fiber electronics to existing conditions at each venue. This could include connection to venue’s existing scoring/clock/statistical information system, venue’s video scoreboard, venue’s audio/PA system, fiber, etc.
   2. Extension of cabling, as necessary, from flypack to existing components at each venue. This could involve extension of antennae cabling, audio/PA tielines, POV camera cable extension, etc.
   3. Integration of fiber optic transmitters and interconnecting cables.
   4. Social Media Lounge
      a. Several TV monitors will have the ability to display content from University provided computers and content from RazorVision.
      b. There will be the ability to conduct a “live shot” in the space.
      c. Control will be via touch panel to route sources to TV walls.

d. Audio, video, triax tie lines to the Rack Room
e. PTZ camera to Rack Room

5. Conference Room
   a. A TV and speaker system will allow for playback of content to review.
   b. A small touch panel will allow for control of devices.

M. MIV to Intercom Matrix Station. Interface Intercom Station GPIs to MIV for director to engage up and down clocks for segment timing. GPIs may be wired from any station to the MIV frame.

1.3 RESPONSIBILITY AND RELATED WORK

A. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned herein or on the drawings, without claim for additional payment.

B. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Video Control Integrator to supply systems in full working order. Notify the Owner's Representative of any discrepancies in part numbers or quantities before bid. Failing to provide such notification, supply items and quantities according to the intent of the Specification and Drawings, without claim for additional payment.

C. Obtain all permits necessary for the execution of any work pertaining to the integration.

D. The drawings included with this specification convey general system concepts. The plans do not show complete and accurate building details. The integrator is responsible for making field measurements necessary to establish exact locations, relationships, load capacities necessary for the integration of these systems.

E. If a conflict develops between the contract documents and the appropriate codes and is reported to the Owner's Representative prior to proposal opening, the Architect will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform work.

F. All structural support, design, and engineering for integration of all system components.

G. Power shall be provided within the control room at a breaker panel with whips extending under the accessible floor. The integrator shall be responsible for distributing electrical power from the whips to the equipment as required.

H. The integrator shall be responsible for connecting appropriate grounds to all equipment in accordance with applicable codes and standards.

I. Coordinate work with other trades to avoid causing delays in schedule.

J. Paint all POV camera housings to a color selected by Owner.

1.4 QUALITY ASSURANCE

A. Integrator's Qualifications: Firm experienced in the integration of systems similar in complexity to those required for this project. Specific proposal submission requirements are:
   1. Experience with at least three (3) similar projects within the last three years.
      a. Provide reference information and contact information for each project.
      b. In the event sport specific projects are not available, other projects may be considered.

2. Maintain a fully staffed and equipped service facility. In the event the integrator is outside a one (1) hour support time for the project, identify local resource(s) to be developed and assigned to support the project during the warranty duration.
3. Integrator authorized to sell all equipment specified within this system.
4. The Integrator shall demonstrate that he has:
    a. Adequate plant, equipment bonding and insurance capabilities to complete the work.
    b. Adequate staff with commensurate technical experience. Identify the following roles for the project and provide appropriate resumes:
        1) Senior Project Engineer(s).
        2) IT Project Engineer
        3) Project/Site Supervisor (aka lead integrator).
        4) Project/Off-site project manager.
        5) Purchasing and expediting staff
        6) Vice President/Owner for escalation contact in the event of difficulties
        7) Other staff and their experience that may assist in evaluating the integrator's proposed deployment team
    c. Suitable financial status to meet the obligations of the work.
5. Any integration or electrical subcontractor (this does not include millwork) whose contract value will exceed $10,000.
6. A proposed project schedule with man power loading diagram (based on a system of this complexity).
7. Sample submittals are encouraged as part of the proposal submittal. This is including but not limited to:
    a. One-line diagrams
    b. As-built documentation
    c. Photographs of work (showing the rear of equipment racks, not the fronts).
    d. Commissioning procedure(s)
    e. Training documentation
    f. Other information that may assist in evaluating the vendors' past performance.

1.5 SUBMITTALS

A. Submit all shop drawings and submittals in accordance with Project Requirements.

B. Shop drawings and submittal data shall contain sufficient information to describe the Work to be performed. Drawings shall be executed at an appropriate scale. Submit all Shop Drawing information at one time.

C. The following outlines expected submittal packages:
1. Project and Submittal schedule.
2. Product Data
    a. A material list of all equipment to be furnished, arranged in specification order. This list shall be followed by catalog data sheets, arranged in specification order, of all equipment to be furnished. Where a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbol.
    b. Proposed cable labeling technique.
3. Equipment layout and Millwork details (with console elevations)
    a. Location of all equipment in racks, consoles, or on tables, with dimensions; wire routing and cabling within housings; AC power outlet and terminal strip locations.
4. One Line diagrams for all signals (without cable numbering or patch points)
5. Wiring diagrams. Complete, detailed wiring diagrams for all systems, based on the contract documents but including cable types, identification and color codes, and detailed

wiring of connections, both at equipment and between equipment racks and wiring in conduit.

6. Schematic drawings of any custom circuitry or equipment modifications, including connector pinouts and component lists.
7. Detail Submittal
   a. Patch panel layouts and designation (labeling) strips.
   b. Custom Plates. Provide complete shop drawings on custom fabricated plates or panels. Drawings to include dimensioned locations of components, component types, engraving information and plate material and color.
   c. Representative equipment labeling sizes, styles, and numbering.
   d. Any structural mounting details (including structural engineers seal as appropriate)
   e. Samples as required in various specification paragraphs.
8. User Interface (UI) Submittal. This submittal is to provide sufficient information to indicate that the Integrator has appropriately configured software and user interfaces in accordance with user requests, as well as in common scoreboard/video replay configuration. The submittal can be in PDF, Excel, or as configuration files as appropriate. In some cases this submittal, may need to be incremental, with multiple deliveries. Items covered by this submittal shall include, but not be limited to:
   a. Routing Switcher, inputs, outputs, virtual naming, intercom panel configuration, alphanumerics and the like. A “dummy” version of the configuration file is preferred for review.
   b. Production Switcher
   c. Intercom
   d. Tally
   e. Control System (e.g. Crestron, AMX, etc.)
9. Commissioning Plan and Training Resume Submittal
   a. Provide integrators commissioning plan, if it differs from the plan in Part 3.
   b. Part 3 lists training that is to occur on the system. Provide resumes where required for training on specific device(s).
   c. If integrator desires to utilize own forces for specified manufacturers commissioning, submit resume and relevant references for approval.
10. Commissioning Completion Submittal. At the conclusion of the commissioning process provide a written submittal indicating the completion of each commissioning task.
11. Training and Event Attendance Submittals:
    a. All Operations and Maintenance manuals, as well as as-built drawings must be on site for all sessions of training.
    b. Following discussions with Owner and Tenant, formally submit a Training and Event Attendance submittal 2-4 weeks prior to first training. Submittal shall:
       1) Include a separate page/entry for every training session.
       2) Indicate date, time, and approximate length of training session.
       3) Indicate person(s) conducting training.
       4) Indicate whether training will be video recorded.
       5) Intended curriculum and most appropriate attendees (e.g. engineer, operations, IT, etc.)
       6) Include signature and title lines for:
          a) Owner acknowledgement and acceptance of training schedule. Include both an accepted and rejected box. An alternate schedule time should be suggested by the Owner in the event the schedule is rejected.
          b) Countersigning by trainer indicating that training actually occurred.
          c) All persons attending training. Where attendees do not stay for the entire session, this should be noted on the form and initialed by Owner’s representative attending training.
          d) Owner’s representative attending training at the end of the session shall initial that:

(1) Training Occurred.
(2) Training Materials were provided and left with Owner
(3) Training was not interrupted or shortened by equipment or system troubleshooting. If it is, then there should be a line where Owner and Contractor can indicate when make-up training will be provided and how long it should be.
(4) Training was generally sufficient for the proposed curriculum.

e) Include Notes section for Owner and Contractor to note any issues during training (areas requiring further development, etc.).

c. Following training occurrence, submit completed training records no later than 5 days following end of training. When training is conducted over a period of weeks, completed training submittals shall be consolidated into a single submittal and submitted every 2 weeks.

d. Final Inspection Notification Report. Two copies of a typed, neatly prepared checkout report for each piece of equipment and the entire system shall be prepared and submitted; it shall include:
1) A complete listing of every piece of equipment, the date it was tested and by whom, the results and date re-tested (if failure occurred during any previous tests).
2) The final report shall indicate that every device tested successfully.
3) A performance test report indicating that the system meets all of the Integrator testing requirements of Part III.

12. Contract close-out submittals:
a. Keep a complete set of drawings on the job, note any changes made during integration, and submit 1 corrected set of reproducible drawings showing Work as integrated.
b. Submit the following data for review, prepared as indicated, at least one week prior to acceptance testing (exceptions noted):
1) System Operation and Instructions. Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity. This procedure should describe the operation of all system capabilities. Assume the intended reader of the manual to be technically inexperienced and unfamiliar with this facility.
2) Final Documents:
a) A list of all equipment, indicating manufacturer, model, serial number, power consumption, warranty terms if greater than the specified warranty and equipment rack location. Update following acceptance testing, if changed.
b) Manufacturer’s Instruction Manuals for all items of equipment, incorporating or followed by manufacturer's warranty statements.
c) Where manufacturer registration is required, register warranty in Owner’s name, and at an address determined by Owner. Provide copy of registration.
d) For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item.
e) A list of settings of all semi-fixed controls. Update following acceptance testing. (This shall specifically include all computer based software settings, e.g. IP addresses, gateways, drive mapping, backup procedures etc.)
f) Schematic wiring diagrams of the video replay sub-system, based on the as-built documentation, at a reduced scale easy to handle but fully legible.
g) Maintenance Instructions, including Integrator’s maintenance phone number(s) and hours; maintenance schedule; description of products

recommended or provided for maintenance purposes, and instructions for the proper use of these products.

h) A legend of acronyms and abbreviations must accompany all documentation.

i) Any other pertinent data generated during the Project or required for future service.

j) System Reference Manual: Furnish multiple copies as required by Project Requirements, in 3 ring binders, sized to hold the material plus 50% excess, with clear vinyl pockets on cover and spine for project title.

3) Electronically editable files for all project work:

4) Autocad DWG

a) Excel

b) Word

c) PDF is not considered an editable file.

1.6 PROJECT CONDITIONS

A. Verify all conditions on the job-site applicable to this work. Notify Owner's Representative in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The drawings diagrammatically show cables, conduit, wiring, and arrangements of equipment fitting the space available without interference. If conditions exist at the job site which make it impossible to integrate work as shown, recommend solutions and/or submit drawings to the Owner's Representative for approval, showing how the work may be integrated.

1.7 DELIVERY, STORAGE AND HANDLING

A. Ship product in its original container to prevent damage or entrance of foreign matter.

B. Handling and shipping in accordance with manufacturer's recommendation.

C. Provide protective covering during integration, to prevent damaging or entrance of foreign matter.

D. Replace at no expense to general contractor/Owner, product damaged during storage, handling or the course of integration.

E. Coordinate product and materials delivery, offloading, staging, security and transportation with the /Owner.

1.8 ACCEPTANCE TESTING

A. Upon completion of integration and initial tests and adjustments specified in Part 3, acceptance testing shall be performed by the Technical Consultant.

B. Provide two persons familiar with all aspects of the system to assist the Architect's Consultant during acceptance testing.

C. The process of acceptance testing the System may necessitate moving and adjusting certain component parts; perform such adjustments without claim for additional payment.

D. Final acceptance shall occur after the system has functioned without failure for three games/events (as defined by Owner)

1.9 WARRANTY

A. Warrant labor and materials provided under this agreement for one year following the date of the first regular season game, trouble free operation, or substantial completion, whichever is later.

B. System to be free of defects and deficiencies, and to conform to the drawings and specifications as to kind, quality, function, and characteristics; repair or replace defects occurring in labor or materials within the Warranty period without charge. Warrant all replaced products as new.

C. This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guaranteed to the Owner by law.

D. Within the warranty period, answer service calls within 8 hours, and correct the problem within twenty-four hours.

E. Register all manufacturers' warranties (e.g. software, computers, etc.) in Owner's name.

F. This warranty shall not include owner furnished equipment utilized within this system.

1.10 EVENT ATTENDANCE

A. In addition to training and warranty requirements, this integrator shall provide event support services to facilitate troubleshooting and effect repair of the specified systems during critical events.
   1. Event Attendance within the following requirements:
      a. Be present at all home football games and ~~five~~ **eight** auxiliary events as designated by the Owner.
      b. During these events, attendance shall begin at the first crew call and conclude when the crew is released.
      c. During these events perform such tasks (e.g. assistance with timing, patching, routing, shading, troubleshooting cabling problems, etc.) as requested by user. Tasks shall be strictly assistance, not operation.
      d. In the event that the system is used prior to final acceptance, attendance in support of system usage shall not be construed as acceptance, or as event attendance.
      e. Schedule 2 days with team during mid-season to review systems and equipment operation.

1.11 SPECIFIED PRODUCTS AND MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed as a standard of quality. Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required. Where two or more acceptable products are listed, the Integrator may use either at his option.

B. Other qualified manufacturers will be considered subject to approval of complete technical data, samples, and results of independent testing laboratory tests of proposed equipment, submitted in accordance with project requirements.

C. If proposed system includes equipment other than specified model numbers, submit a list of major items and their quantities, with a one-line schematic diagram for review.

D. Include a list of previously integrated projects using proposed equipment that are similar in nature to specified system.

E. If product is discontinued or made obsolete due to continuing product development, replace it with manufacturers' equivalent at time of integration at no additional cost.

1.12 OWNER FURNISHED EQUIPMENT

A. Certain Equipment is identified as Owner Furnished Equipment (OFE). This Owner Furnished Equipment will be available from the Owner. Coordinate pickup and/or delivery of Owner furnished equipment with the Owner.

B. Inspect the Owner Furnished Equipment, and advise the Owner of damage or defect and the extent of repair and/or adjustment required to bring the Owner Furnished Equipment to operating specifications. Any repair service is beyond the current scope. Service the Owner Furnished Equipment, as directed by the Owner, as change to this contract or under separate agreement.

C. Incorporate into the system as if new, excepting warranty coverage.

D. Owner Furnished Equipment reused or provided by as part of the system:
   1. Ethernet Switches (ETHERNET SWITCH).
      a. Provide final port count and type to Owner 4 months prior to completion.
      b. Coordinate connectivity with Owner.
      c. Refer to University Standards regarding horizontal cable types and connectors.
   2. Five (5) Avid Edit Systems (EDIT) with monitors, keyboards, mouse.
   3. Social Media Lounge Computers (CPU)

1.13 ALLOWANCE. THE FOLLOWING ALLOWANCES SHOULD BE CARRIED WITHIN THE PROJECT; ALL MARKUPS OUTSIDE THIS ALLOWANCE

A. Storage Management Systems--$150,000.

1.14 OPTIONS SHOULD REFLECT THE NET COST (ADD OR DEDUCT) FOR THE OPTION AND ALL IMPACTED ELEMENTS. IN THE EVENT SUPPLIER CANNOT QUOTE A SPECIFIC PRODUCT; LIST NAME ON BID FORM.

A. Option 11 63 50-A. Sole Source Slow Motion Supplier. Provide net cost to replace the base bid Slow Motion Unit with:
   1. Option 11 63 50-A1. Evertz Dreamcatcher in lieu of base (low) bid configuration
   2. Option 11 63 50-A2. Supply acceptable EVS configuration in lieu of base (low) bid configuration.

B. Option 11 63 50-B. Additional Flight Cases. Provide additional Flight Case A, B and C with all electrical components, panels, wiring, etc.

C. Option 11 63 50-C. Remove Social Media Lounge, Conference Room and Lobby Televisions. Provide net cost to remove entire scope.

D. Option 11 63 50-D. Remove entire Social Media Lounge and Conference Room A/V scope.

E. Option 11 63 50-E. Surround sound mix. Provide cost to add surround sound mixing/monitoring capabilities.
   1. Type 2 Amplifier and Speakers (AMP_2 and $SPKR_2$):
      a. Blue Sky System One 5.1
      b. Omni Mount MM-024
   2. Type 3 Audio Monitor ($AUD\ MON_3$)
      a. Studio Tech 76 and 77 with 71

F. Option 11 63 50-F – Value Engineering and Voluntary Alternates
   1. F1 – Cost to delete a requirement of the specification that can save the Owner significant cost. Describe alternate and consequences, if any, for functionality, reliability and/or performance.

1.15 UNIT COSTS; SUPPLY AND INTEGRATE

A. Unit Costs 11 63 50-A. CG/GRAPHICS OPTIONS:
   1. Unit Costs 11 63 50-A1. Costs to add/delete one (1) Type 1 Character generator (CG_1) with all of its associated hardware.
   2. Unit Costs 11 63 50-A2. Costs to add/delete one (1) Clips Server (CLIPS) with all of its associated hardware.

B. Unit Cost 11 63 50-B: POV Camera Options:
   1. Unit Cost 11 63 50-B1. Unit Cost to add/delete one (1) Type 1 POV (POV_1) camera configuration.
   2. Unit Cost 11 63 50-B2. Unit Cost to add/delete one (1) Type 2 POV (POV_2) camera configuration.
   3. Unit Cost 11 63 50-B3. Unit Cost to add/delete one (1) Type 3 POV (POV_3) camera configuration.
   4. Unit Cost 11 63 50-B4. Unit Cost to add/delete one (1) Type 4 POV (POV_4) camera configuration.
   5. Unit Cost 11 63 50-B5. Unit Cost to add/delete one (1) Type 5 POV (POV_5) camera configuration.
   6. Unit Cost 11 63 50-B6. Unit Cost to add/delete one (1) **Type 1** POV Control Station (POV $CNTRL_1$).

C. Unit Cost 11 63 50-C: Camera Lens and Support Options:
   1. Unit Cost 11 63 50-C1. Unit Cost to add/deduct one (1) Type 1 Camera Lens and Support Configuration. Shall include, Lens, Tripod Package, Rain Slicker, Custom Case and Overnight Rain Cover.
   2. Unit Cost 11 63 50-C2. Unit Cost to add/deduct one (1) Type 2 Camera Lens and Support Configuration. Shall include, Lens, Tripod Package, Rain Slicker, Custom Case and Overnight Rain Cover.
   3. Unit Cost 11 63 50-C3. Unit Cost to add/deduct one (1) Type 3 Camera Lens and Support Configuration. Shall include, Lens, Tripod Package, Rain Slicker, Custom Case and Overnight Rain Cover.
   4. Unit Cost 11 63 50-C4. Unit Cost to add/deduct one (1) Type 4 Wireless Camera Lens and Support Configuration. Shall include, Lens, Tripod Package, Rain Slicker, Custom Case and wireless.

D. Unit Cost 11 63 50-D: Camera Configuration Options:
   1. Unit Cost 11 63 50-D1. Unit cost to add one (1) GV Type One Camera.
   2. Unit Cost 11 63 50-D2. Unit cost to add one (1) Sony Type One Camera.
   3. Unit Cost 11 63 50-D3. Unit Cost to add/deduct one (1) Type 2 Camera.

E. Unit Cost 11 63 50-E. Camera Configuration Leasing Options:
   1. Unit Cost 11 63 50-E1: Unit cost to lease one Type 1 Sony or GV Camera Lens and Support Configuration for one year. Shall include lens, tripod package, Rain Slicker, Case and Overnight Rain Cover. Cost shall include integrator's labor during the year to handle maintenance and warranty issues.
   2. Unit Cost 11 63 50-E2: Unit cost to lease one Type 2 Sony Camera Lens and Support Configuration (or equivalent product) for one year. Shall include lens, tripod package, Rain Slicker, Case and Overnight Rain Cover. Cost shall include integrator's labor during the year to handle maintenance and warranty issues.
   3. Unit Cost 11 63 50-E3: Provide total cost if University chooses to lease all cameras at one time for one year. Cost shall include integrator's labor during the year to handle maintenance and warranty issues.

F. Unit Costs 11 63 50-F. Extended support options. Annual support costs shall be following the warranty period. They shall be exercised 30 days before the expiration of the warranty or preceding annual support period whichever is later.
   1. Unit Costs 11 63 50-F1. Provide sum of annual costs for all software and hardware support for full Routing Switcher and Multi-image viewing Systems provided as base bid. Annual costs shall be for ten years following expiration of the project warranty period.
   2. Unit Costs 11 63 50-F2. Provide sum of annual costs for all software and hardware support for full Production Switcher Systems specified as Base Bid. Annual costs shall be for ten years following expiration of the project warranty period.
   3. Unit Costs 11 63 50-F3. Provide sum of annual costs for all software and hardware support for all Type 1 CGs (CG_1). Annual costs shall be for seven years following expiration of the project warranty period.

G. Unit Costs 11 63 50--G. Slow Motion Replay System.
   1. Unit Cost 11 63 50-G1. Unit cost to add One (1) Type 1 Evertz slow motion unit.
   2. Unit Cost 11 63 50-G2. Unit cost to add one (1) Type 1 EVS XT3 Slow Motion Unit.

H. Unit Costs 11 63 50-H. Dedicated Fiber Optic Scoreboard/PA Connection to remote facility.
   1. Unit Cost 11 63 50 – H1. Unit cost add two (2) Type 1 Fiber Transceiver (FTR_1) and one (1) Type 9 Intercom Interface ($ICOM_9$)
      a. with appropriate Frame.
   2. Unit Cost 11 63 50 – H2. Unit cost add two (2) Type 3 CWDM ($CWDM_3$) and two (2) Type 1 Fiber Transceiver (FTR_1)

PART 2 - PRODUCTS

2.1 GENERAL

A. All equipment and materials shall carry original manufacturer's warranty. B-stock or floor demonstration equipment is allowed and encouraged for all equipment, other than video and audio monitors and patch panels. Given the integration cycle NAB or IBC or intervening trade shows may be accounted for. Take care during integration to prevent scratches, dents, chips, etc.

B. Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required. Where two or more acceptable products are listed, the Integrator may use either at his option.

C. Provide engraved lamicoid labels at the front and rear of all signal processing equipment mounted in racks. Mount labels on the equipment and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Provide engraved labels at the rear only of equipment mounted in furniture consoles.

D. Note: Provide IP address labels on all equipment connected to network. Coordinate with Owner.

E. Custom rack panels shall be 1/8" thick aluminum, standard rack sizes, brushed black anodized finish unless otherwise noted. (Brush in direction of aluminum grain only.) Custom connector plate (speaker, microphone, etc.) finishes shall be selected from manufacturer's full range of standard finishes. Plastic plates will not be accepted, even if they are building standard in other areas.

F. All engraving shall be 1/8" high block sans serif characters unless noted otherwise. On dark panels or push buttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored push buttons, letters shall be black.

G. In accordance with IEC-268 standard, all XLR connectors shall be wired pin 2 hot (high), pin 3 low, and pin 1 screen (shield).

H. All patch panels shall be wired so signal "sources" (outputs from devices) appear on the upper row of a row pair; all "loads" (inputs to devices) appear on the lower row of a row pair. All patch panel designation strips shall utilize alphanumeric and descriptive labels. The jack positions in each horizontal row shall be numbered sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the functional block drawings.

2.2 VIDEO CONTROL ROOM CAMERA AND SUPPORT EQUIPMENT

A. Type 1 Camera (CAM_1)
   1. Sony Configuration:
      a. Camera Configuration 1:
         1) Portable 2/3", 3 Chip Camera
         2) Acceptable Product:
            a) Sony HDC 2570
      b. Viewfinder and hood
         1) Sony HDVFEL75 WITH VFH790
      c. Tripod Adapter plate
         1) Quick release plate
         2) Sony VCT-14
            a) Quantity: 8
      d. Type 1 CCU (CCU_1):
         1) Sony HDC-2500L with HDFX-200 with appropriate mounting shelves (2 HDCU's per shelf and three HDFX per shelf).
            a) Quantity: 8
      e. Type 1 Remote Control Panel (RCP_1)
         1) Individual camera control
            a) Sony RCP-1500. (Quantity: 8)
      f. Type 2 Remote Control Panel (RCP_2)
         1) Master camera control

a) Sony MSU-1500. (Quantity: 1)

2. Grass Valley Configuration:
   a. Camera Configuration 1:
      1) Portable 2/3", 3 Chip Camera
      2) Acceptable Product:
         a) Grass Valley LDX 80 Camera 8926 310 00001
   b. Camera Adapter (3G Triax)
      1) Grass Valley LDK 8926 541 95001
   c. Tripod Adapter plate
      1) Quick release plate
      2) Grass Valley LDK 8926 503 11001
   d. 7" EFP Configuration Viewfinder with bracket and hood
      1) Grass Valley LDK 8926 530 70001 Viewfinder
      2) Grass Valley LDK 8926 699 21201 field hood
         a) Quantity: 8
   e. Type 1 CCU (CCU_1):
      1) Grass Valley XCU LDK 8926 427 15201. (Quantity: 8)
   f. Type 1 Remote Control Panel (RCP_1)
      1) Grass Valley OCP 400, 8926 464 01001 with 8926 590 30001 power supply. (Quantity: 8)
   g. Type 2 Remote Control Panel (RCP_2)
      1) Grass Valley MCP 400 with 8926 590 30001 power supply. (Quantity: 1)
   h. Power Cord
      1) Grass Valley 56-025560-001. (Quantity: 10)

B. Type 2 Camera (CAM_2):
   1. Camera Configuration 2
      a. Portable 2/3", 3 Chip Camera
      b. Acceptable Product:
         1) Sony PMW 350L
      c. Camera Battery Adapter
         1) Anton Bauer QRC-SDR
      d. 3.5” Viewfinder
         1) Sony
      e. Tripod Adapter plate
         1) Quick release plate
         2) Sony VCTU14
      f. Type 1 Remote Control Panel (RCP1)
         1) Sony RCP-1500
      g. Camera Recordable media
         1) Sony 64GB SXS; (Quantity: 4 per camera)
      h. Media Drive
         1) Sony SBACUS10; (Quantity: 1 per camera)
      i. Camera Recorder
         1) HVRMRC1K; (Quantity: 1 per camera)
      j. QuickDraw Case sized to accommodate Camera and lens while connected as well as ancillary viewfinders, tripod adaptor plates, microphone holders, intercom headsets, 5 meter cable, wireless adapter, etc.
         1) PortaBrace
         2) As Approved
      k. Hard Case
         1) Sony to accommodate lens
      l. Quantity: 2 as configured above

C. Camera Lens and Support Configuration 1:

1. Lens Type 1 Lens Controller
    a. Canon Solution:
        1) Canon XJ80X9.3BIED/P01-DSS with Canon PFJ-701 protection filter
        2) Canon semi servo lens controls
        3) Canon large lens adapter for portable camera
    b. Fujinon Solution:
        1) Fujinon XA88x8.8BESM-T Digi with Stabilizer
        2) Fujinon MS-21 D Digi Semi Servo
        3) Fujinon ELH-112A-xxx ENG Camera Support
        4) Fujinon EPF236A Protection Filter for XA 88
2. Tripod package
    a. Vinten Vector 75 head, includes two pan bars, male wedge plate and Mitchell base
    b. Vinten 3901-3 HDT-1 Single Stage heavy duty tripod with mid-level spreader
    c. Vinten 3355-3 Transit Case
3. Camera Rain Slicker
    a. M.T.O Unlimited Shooterslicker® S5 Rain/Shoot
4. Overnight Camera Cover
    a. M.T.O Unlimited B7 Elephant/Overnight Cover
5. Custom Castered Case sized to accommodate Camera and lens while connected as well as ancillary viewfinders, tripod adaptor plates, microphone holders, intercom headsets, 5 meter cable, etc.
    a. Viking
    b. As Approved
6. Quantity: 2 as configured above

D. Camera Lens and Support Configuration 2:
1. Lens Type 2; Lens Controller
    a. Canon Solution
        1) Canon HJ40X14B IASD-V/SS
        2) Canon UV/127 P0.75 UV/protection filter
        3) Canon semi servo lens controls
    b. Fujinon Solution:
        1) Fujinon HA 42X13.5BERD-U48 with Stabilizer
        2) Fujinon ALH-117C-01A ENG Camera Support
        3) Fujinon MS-11D Digi Semi Servo Kit
        4) Fujinon 127MM MC Protector (K-127PTMC)
2. Tripod package
    a. Vinten VB250-CP2M
3. Custom Castered Case sized to accommodate Camera and lens while connected as well as ancillary viewfinders, tripod adaptor plates, microphone holders, intercom headsets, 5 meter cable, etc.
    a. Viking
    b. As Approved
4. Shotgun Microphone
    a. Sony ECM 678/9X
5. Camera Rain Slicker.
    a. M.T.O. Unlimited Shooterslicker® S10 Rain/Shoot
6. Overnight Camera Cover
    a. M.T.O. Unlimited B7 Elephant/Overnight Cover
7. Quantity: 4 as configured above

E. Camera Lens and Support Configuration 3:
1. Lens Type 3; controller:
    a. Canon Solution:
        1) Canon HJ22ex7.6IRSE

2) Canon MS-210D semi servo lens control
3) Tiffen 105CCLRP lens protection filter

b. Fujinon Solution:
1) Fujinon HA 23x7.6 BERM
2) Fujinon MS 11D Digi Semi Servo Kit
3) Fujinon 107 MM Protection Filter K-107PTMC

2. Shotgun Microphone
a. Sony ECM 680S
3. Tripod package
a. Sachtler System 20 SB SL HD MCF
b. Sachtler Second Pan Arm
4. Camera Rain Slicker.
a. M.T.O. Unlimited Shooterslicker® S10 Rain/Shoot
5. Custom Castered Case sized to accommodate Camera and lens while connected as well as ancillary viewfinders, tripod adaptor plates, microphone holders, intercom headsets, 5 meter cable, etc.
6. Quantity: 4

F. Wireless and Camera Lens Type 4:
1. Canon Solution
a. Canon HJ22ex7.6IRSE
b. Canon MS-210D semi servo lens control
c. Tiffen 105CCLRP lens protection filter
2. Fujinon Solution
a. Fujinon HA 23x7.6BERM
b. Fujinon MS 11D Digi Servo Kit
c. Fujinon 107MM Protection Filter K-107PTMC
3. Lens adapter
a. Abel Cine HDx35 B4/PL
4. Camera Rain Slicker.
a. Porta brace (K & H Products) Rain Slicker (Sized for camera, wireless adapter, lens and viewfinder). (Quantity: 1 per camera)
5. Custom Castered Case sized to accommodate Camera and lens while connected as well as ancillary viewfinders, tripod adaptor plates, microphone holders, intercom headsets, 5 meter cable, etc.
6. Shotgun Microphone
a. Sony ECM 680S
7. Wireless Microphone:
a. Receiver
1) Sony DWRS01D/XXX. (Coordinate frequency of receivers/transmitters with local sources).
b. Transmitter
1) Sony DWT-P01 and Sony DWT-B01
c. Transmitter/Receiver NiMH rechargeable Batteries
1) www.Greenbatteries.com 2400maH AA batteries. (Quantity: 6)
d. Transmitter/Receiver battery charger. 8-Cell AA/AAA NiMH Smart Battery Charger with discharge and conditioning function and a universal voltage AC adapter and a DC car adapter
1) www.Greenbatteries.com V-6280
e. Lavalier Wireless Microphone
1) Sony ECM 88PT
8. Type 1 Wireless transmitter (WT_1) and Type 1 Wireless Receiver (WR_1)
a. Wireless Transmitter with Zero Latency, HD/SDI (WT)
b. Wireless Receiver Diversity Receiver with paint/shade control and audio (WR)
c. Antennae

1) 10 of various types
d. Contact Anthony Sangviovanni (973-222-5270)
e. Quantity: 2

G. Type 1 POV (POV_1) camera configuration
1. Remote operated Indoor 16x9 POV.
2. Acceptable Product:
a. Sony BRCH900 with Sony HFBK-HD1 with ceiling/wall mount.

H. Type 2 POV (POV_2) camera configuration
1. Remote operated Indoor 16x9 POV.
2. Acceptable Product:
a. Sony BRCH900 with Sony HFBK-HD1 with ceiling/wall mount.
3. Camera Interface (CIF)
a. POV Transceiver - stand alone at camera end
b. HD/SDI video, RS232 over fiber
c. Acceptable Product:
1) Harris OP+VTX+D with OP+SFP1+TR13
4. POV Transceiver, rack mount, base station (FTR_1)
a. HD/SDI, RS232 over fiber
b. Acceptable Product:
1) Harris OP+VTX+D with OP+SFP1+TR13
c. Rack Mount Chassis
d. Acceptable Product:
1) Harris FR6822+QXFE+S

I. Type 3 POV (POV_3) camera.
1. Remote operated Outdoor 16x9 POV.
2. Acceptable Product:
a. Canon BU-47H with ceiling or wall mount
3. Pan and Tilt cable termination end:
a. 2-gang enclosure. NEMA 6 and 6P rated; Indoor/outdoor use; Gasket sealed cover. Accepts (4) cable glands and (1) 1” conduit gland.
1) AMP P/N 1479655-1
b. Cable Gland
1) AMP P/N 1479657-1
c. Conduit Gland
1) AMP P/N 1479659-1
d. Duplex LC fiber optic receptacle
1) AMP P/N 182861 9-2
e. Duplex LC receptacle dust cap
1) AMP P/N 191 8177-1
f. Duplex LC plug; Equipped with epoxy/polish connector
1) AMP P/N 18 28618-2 (single-mode)
g. Duplex LC plug dust cap
1) AMP P/N 182 8740-1

J. Type 4 POV (POV_4) camera.
1. Remote operated Outdoor 16x9 POV.
2. Acceptable Product:
a. Canon BU-47H with ceiling or wall mount
3. Camera Interface (CIF)
a. POV Transceiver - stand alone at camera end
b. HD/SDI video, 2 fibers
c. Acceptable Product:

1) Harris OP+VTX+D with OP+SFP1+TR13 with FR6800+MB

4. POV Transceiver, rack mount, base station (FTR)
   a. HD/SDI, two strands of fiber
   b. Acceptable Product:
      1) Harris OP+VTX+D with OP+SFP1+TR13
   c. Rack Mount Chassis
   d. Acceptable Product:
      1) Harris FR6822+QXFE+S
5. Pan and Tilt cable termination end:
   a. 2-gang enclosure. NEMA 6 and 6P rated; Indoor/outdoor use; Gasket sealed cover. Accepts (4) cable glands and (1) 1" conduit gland.
      1) AMP P/N 1479655-1
   b. Cable Gland
      1) AMP P/N 1479657-1
   c. Conduit Gland
      1) AMP P/N 1479659-1
   d. Duplex LC fiber optic receptacle
      1) AMP P/N 182861 9-2
   e. Duplex LC receptacle dust cap
      1) AMP P/N 191 8177-1
   f. Duplex LC plug; Equipped with epoxy/polish connector
      1) AMP P/N 18 28618-2 (single-mode)
   g. Duplex LC plug dust cap
      1) AMP P/N 182 8740-1

K. Type 5 POV (POV_5) camera (Talent/Confidence)
   1. Camera
      a. Sony BRC-H900 with mount to tripod assembly
   2. Tripod/Assembly
      a. Telemetrics ETPO-S2
      b. Telemetrics ETP-TRI
      c. Telemetrics ETP-LCS
      d. Telemetrics PS-RM-XX
      e. Telemetrics CLIU
      f. Telemetrics CA-S2-Aux-020
      g. Telemetrics CA-ITV-DIN-025
      h. Telemetrics CA-RS-025
      i. Telemetrics DS-4

L. POV Control Hub (HUB).
   1. Connection of four POV cameras
   2. Acceptable Product:
      a. Telemetrics DS-4
      b. Telemetrics DSO-4BRC

M. Type 1 POV Controller (POV $CNTL_1$)
   1. Multiple camera control
   2. Acceptable Product:
      a. Telemetrics RCCPO-1-STS-PRO.

N. Type 2 POV Controller (POV $CNTL_2$)
   1. Camera shader panel
   2. Acceptable Product:
      a. Telemetrics CSPO-PRO
      b. Telemetrics RCCPO-1-STS-PRO

O. Camera Accessories:
1. Battery Type 1
a. Anton Bauer Dionic 160. (Quantity: 8)
2. Battery Charger
a. Anton Bauer Quad 2702 each with an Anton Bauer XLR-4. (Quantity: 2); mount on shelf shown.
3. Shading Ethernet Switch (SHADE)
a. Sony and Grass Valley Solution
b. Netgear GS724TP. (Quantity: 1)

2.3 PRODUCTION CAMERA KITS

A. Camera
1. Camera Performance Configuration
a. Portable 2/3", 3 Chip Camera
b. Acceptable Product:
1) Sony PDWF800
c. Camera Battery Adapter
1) Anton Bauer
d. Viewfinder
1) Sony HDVF200
e. Tripod Adapter plate (Quick release plate)
1) Sony
f. Recordable media
1) Sony PFD50DLA/2; (Quantity: 10 per camera)
g. Media Drive
1) Sony PDW-U2; (Quantity: 1 per camera)
h. QuickDraw Case sized to accommodate Camera and lens while connected as well as ancillary viewfinders, tripod adaptor plates, microphone holders, intercom headsets, 5 meter cable, wireless adapter, etc.
1) PortaBrace
2) As Approved
i. Hard Case
1) Sony
j. Tripod, Fluid Head, and Camera Bag
1) Sachtler SOOM FSB 6 System
k. Camera fill light
1) Sony HVL-LBPB with 2NPF970/B. (Quantity: 2)
l. Shotgun Microphone
1) Sony ECM 680/S. (Quantity: 1)
m. Rainslicker
1) MTO. (Quantity: 1)
2. Wireless Microphone:
a. Receiver
1) Lectrosonics UCR-401. (Quantity: 1 per kit)
b. Transmitter
1) Lectrosonics SMDa with SMDBC mounting clip. (Quantity: 1 per kit)
c. Lavalier Wireless Microphone
1) Sony ECM 88BPT with appropriate connector. (Quantity: 1 per kit)
d. Transmitter/Receiver NiMH rechargeable Batteries
1) www.Greenbatteries.com 2400maH AA batteries. (Quantity: 4 per kit)
e. Transmitter/Receiver battery charger. 8-Cell AA/AAA NiMH Smart Battery Charger with discharge and conditioning function and a universal voltage AC adapter and a DC car adapter

1) www.Greenbatteries.com V-6280. (Quantity: 1 per kit)

3. Quantity: 6 systems

B. Field mixer
1. Portable four channel audio mixer
2. Acceptable product:
a. Azden FMX-42. (Quantity: 2)

C. Field Monitors
1. Lightweight and portable 7" LCD monitor
2. Acceptable product:
a. TV Logic LVM-074W with hood and Anton Bauer adapter. (Quantity: 1)
b. TV Logic LVM-~~174~~**172**W with hood. (Quantity: 1)

D. Camera Accessories:
1. Battery Type 1
a. Anton Bauer Dionic 160. (Quantity: 12)
2. Battery Charger
a. Anton Bauer Quad 2702 each with an Anton Bauer XLR-4. (Quantity: 3).

E. Camera Teleprompter:
1. At least 15" SVGA monitor
2. At least 16 ½" x15" trapezoid glass mirror
3. Adjustable
4. Indoor/Outdoor
a. Mirror Image LC-150MP
b. With EZ Prompt software and extension cable
c. Quantity: 1

2.4 VIDEO CONTROL ROOM VIDEO COMPONENTS

A. Production Switcher (PS)--Quantity: 3; and Production Switcher Control Panel (PS CP)--Quantity 3 identical control panels.
1. Ross Carbonite C2-224-001
a. Standard Panel Includes:
1) 24 Crosspoint Buttons on Panel
2) 2 Multi-Level Effects Systems (MLE) Control Areas
3) Source Mnemonics and Custom Control Mnemonics
4) USB Ports for Keyboard, Mouse, and Media Drives
5) 96 Custom Control Macro Buttons
6) On-Panel Aux Bus Control
7) Source Awareness™ Automatic Features
8) Two MIV with Tally Outputs
9) Panel Glow User Definable Button Color Themes
10) Full 1 Year Transferable Warranty, Lifetime Fader Handle Warranty
b. Rack Frame Processing Engine including all Standard System boards. Standard System Includes:
1) Multi-Definition support for any of the following formats:
2) 525, 625, 1080i 50, 1080i 59.94, 720P 50, 720P 59.94, 1080P 24, 1080PSF 24, 1080PSF 23.98
3) 24 Multi-Definition Serial Digital Inputs
4) 2 Multi-Level Effects Systems (MLE) with 4 Keyers in Full MLEs expandable to 8 MLEs

5) 2 UltraChrome™ Chroma Keyers with Super Fine Keying Quality in every MLE
6) 4 Channel Global-Store with 8 GB of Memory
7) Preprocessor effects and DVE timelines per MLE. 4 Pattern Generators
8) 10 Outputs Hard Disk Drive for Storing Configurations, Stills, Animations and Clips
9) 100 Event Memory System
10) 34 GPI/O
11) VTR Control Protocol (BVW-75)
12) Video Server Protocols (VDCP/AMP) see supported list of servers
13) Serial Tally Interface (34)
14) Color Correction and Proc Amps
15) Two (2) 32 input Multi-viewer
16) Control Panel Cable
17) Comprehensive System Operation and Engineering Manuals Disc
18) Full 1 Year Transferable Warranty
19) Lifetime Software Updated via Ross Website, Lifetime Telephone Support

c. Additional Devices/Requirements
1) Routing switcher and tally interface
a) Image Video as required. (Quantity: as required)
b) Production Switcher Game Training/Operations see Part 3.

2.5 VIDEO MONITORS

A. Type 1 Color Video Monitor—($CPXM_1$)
1. 17” multi-format video and audio inputs
2. 1920x1080
3. Acceptable product:
a. Ikegami HLM-1750WR
b. Sony PVM1741A
c. As Approved
d. with rack mount

B. Type 2 Color Video monitor ($CPXM_2$):
1. 42” diagonal
2. 1920x1080
3. DVI/HDMI
4. Acceptable product”
a. Sony FWD42B2 with Aja HDP2
b. NEC

C. Type 3 Color Video Monitor—($CPXM_3$):
1. Dual 7” LCD Monitor
2. Acceptable product:
a. Marshall Electronics VMD-72-MD-HDSDIx2
b. TV Logic
c. As Approved

D. Type 4 Color Video Monitor— ($CPXM_4$):
1. 17"
2. In monitor display for tally and source
3. 1920x1200 display
4. Acceptable product:
a. Marshall V-R171X-IMD-HDSDI

b. As Approved

E. Type 5 Color Video monitor— ($CPXM_5$):
1. 10” HD/SDI input
2. Acceptable product:
   a. Marshall Electronics V-R104DP-SDI
   b. As Approved, in monitor display for tally and source required

F. Type 6 Color Video Monitor ($CPXM_6$):
1. 22” LED
2. DVI/HDMI
3. 1920x1080
4. Acceptable product:
   a. Samsung LS22B300
   b. As Approved

G. Type 7 Color Video Monitor ($CPXM_7$):
1. 47 Inch diagonal
2. 1920x1080 minimum resolution
3. Acceptable Suppliers
   a. NEC X461S-AVT with Aja HDP2
   b. Sony FWD46B2 with Aja HDP2
   c. As Approved
4. With Chief LTMU wall mount

H. Type 8 Color Video Monitor— ($CPXM_8$)
1. 22” LED
2. Multi-format inputs
3. 1920x1080 @60Hz
4. Acceptable product:
   a. Ikegami ULE-217
   b. As Approved

I. Type 10 Color Video/Data Monitor ($CPXM_{10}$)
1. 22" flat screen, mounted to a rack panel with separate retractable keyboard and touchpad.
2. Acceptable Suppliers:
   a. Ikegami ULE-217
   b. Chief Mfg. Fusion FTR series wall mount mounted to a blank panel and Middle Atlantic RM-KB

2.6 TEST AND MEASUREMENT

A. Waveform Monitor/Vectorscope (WVS):
1. Type 1 Waveform Monitor/Vectorscope (WVS_1)
   a. Harris CVM-306
   b. Tektronik WFM 500 with rack mount and audio monitor.

B. Test, Sync Generator, and Sync Changeover switch:
1. Type 1 Sync Generator ($SYNC_1$)
   a. Integral test generator; digital black, and two independently adjustable black burst outputs:
   b. Acceptable Suppliers:
      1) Evertz 5601MSC+GP+T+STG+HTG+WC

2) Tektronik; Harris

2. Type 2 Sync Generator ($SYNC_2$)
   a. Integral test generator; digital black, and two independently adjustable black burst outputs:
   b. Acceptable Suppliers:
      1) Evertz 5601MSC+GP+T+STG+HTG+WC
      2) Tektronik; Harris
3. Sync Changeover ($SYNC_3$):
   a. Acceptable Suppliers:
      1) Evertz 5601ACO2
      2) Tektronik; Harris

2.7 ROUTING SWITCHER AND MULTIVIEWER

A. Serial digital level (RSD; RS):
   1. Sized as shown on drawings with ability to expand to 256 x 256 as well as additional monitoring outputs required to serve the (MIV) shown. Please note that the physical frame and size is the ultimate requirement, expansion is expected to be accommodated with the addition of additional input, output and cross point cards.
      a. SMPTE 424M IO and Crosspoint
   2. Provide base bid configuration without any options. If options require additional expansion, indicate this on option pricing not within base bid.
   3. Note, in the Evertz Dreamcatcher Slow Motion Option, separate character outputs into router are not required and Inputs may be reduced; however growth beyond 256 inputs is still required
      a. Multiplex 16 channels of audio on each video input/output (note: approximately 20 outputs do not require integral mux/demux).
      b. Full mono breakaway audio routing support.
      c. Seamless integration between demultiplexed and discrete audio.
   4. Acceptable Product:
      a. Evertz
      b. Harris
      c. Alternate suppliers available for consideration: Grass Valley, Miranda/Nvision/Belden/Telecast, Snell/Probel, Sony

B. Stereo Analog Audio Router (AUDIO RS/ROUTER):
   1. Sized as shown on drawings with ability to expand in same frame to a minimum of 144 x 196 stereo with the addition of additional input, output and cross point cards.
   2. Provide two (2) MADI inputs and two (2) MADI outputs to provide audio transport interface to the Fiber Optic System components that send audio to/from ancillary facilities.
   3. Provide base bid configuration without any options. If options require additional expansion, indicate this on option pricing not within base bid.
   4. Base bid unit must be able to shuffle, sum, split input and output channels to build virtual routes for recording. If this adds significant cost to proposal, provide VE option to deduct. For instance stereo pairs shall be created from mono channels and stereo channels shall be summed to mono, such as:
      a. Pair 1
         1) PA (non fire alarm mix)
         2) Direct Announcer feed
      b. Pair 2
         1) Radio
         2) Sum of separate Press Box and Interview Room Audio
      c. Pair 3

1) Effects Left and Right Sum (derived from TV broadcast or other L/R effects)
2) TBD

5. Acceptable Product:
   a. Evertz EMR with breakout cables from high density router connections to rackmount breakout cables or direct to patch panel.
   b. Alternate suppliers available for consideration: Grass Valley, Harris, Miranda/Nvision, Snell/Probel, Sony

C. Routing Switcher Configuration
1. Provide Redundant Crosspoints
2. Provide Redundant Controllers
3. Provide fully redundant Power Supplies
4. Provide spare fan modules

D. RS422/232 matrix/port router (CNTL MATRIX)
1. RS422 and RS232 port router with 422/232 conversion between ports.
2. Provide ability to bridge inputs to multiple outputs
3. Acceptable product:
   a. Evertz EMR with breakout cables from high density router connections to rackmount breakout cables or direct to patch panel
   b. Alternate suppliers available for consideration: Grass Valley, Harris, Miranda/Nvision, Snell/Probel, Sony

E. Routing Switcher Control Panels (RS CP)
1. Button per source control panel (RS BPS1)
   a. Programmable, Button Per Source; breakaway audio
   b. Quantity: 14 (Possible positions: CGA, CGB, CG Assist A, CG Assist B, EDIT, Clips A, Clips B, Control C, SHADE A, SHADE B, TBD)
   c. Shading Configuration Interface joystick control panels to Shading RS BPS for input switching. Specified panel has built-in GPI interface in BPS—if using an alternative router this feature must be supported.
   d. Acceptable Product:
      1) Evertz CP-3201E
      2) Harris RCP-48PB with GPI interface
      3) Alternate suppliers available for consideration: Harris, Pesa, Grass Valley, Sony
2. Multi-buss, relegendable source control panel (RS MB):
   a. Programmable, Button Per Source
   b. Quantity: 4 (ENG, TBD, TBD, TBD)
   c. Acceptable
      1) Evertz CP-2272E
      2) Harris RCP 64LCD
      3) Alternate suppliers available for consideration: Harris, Pesa, Grass Valley, Sony
3. Master X-Y Routing Switcher Control Panel (RS XY):
   a. Possible Locations:
   b. Quantity: 5 (PROD A, PROD B, PROD C, TBD, TBD)
   c. Acceptable Product
      1) Evertz CP-2232E
      2) Harris RCP Color Video/Data Monitor (GPXM2)
      3) Alternate suppliers available for consideration: Harris, Pesa, Grass Valley, Sony
4. Simple X-Y Routing Switcher Control Panel (RS XY):
   a. Possible Locations:

b. Quantity: 11(SLO MO A, SLO MO B, SLO MO C, SLOW MO D, TD A, TD B, TD C, AUDIO A, AUDIO B, TBD, TBD)
c. Acceptable Product
1) Evertz CP-1040E
2) Harris RCP-32PB-OLED
3) Alternate suppliers available for consideration: Harris, Pesa, Grass Valley, Sony

F. Video Display Processors:
1. Multi-image Viewer (MIV). This is a performance specification to provide a virtual display wall for the project.
a. Frame
1) Evertz 7800FR-QT with power supply
b. Type 1 Multi-Image Viewer (MIV_1):
1) 16 sources with two (2) distinct; separately programmable 1920x1080 HD-SDI outputs
2) Basis of Design
a) Evertz 7867VIPX-16x2 with appropriate rear plate and XLINK cable
2. Configuration Software:
a. Basis of Design
1) Evertz Magnum-Multiviewer.
3. Routing Switcher Type 1 Protocol Converter (PTX_1)
a. For Video Display Programming
b. Basis of Design
1) Evertz 7700-PTX (Quartz)
4. Production Switcher Type 2 Protocol Converter (PTX_2)
a. For Video Display Programming:
b. Capable of passing alphanumeric information between production switcher and Multi-Image Viewers.
c. Four inputs
d. Basis of Design
1) Evertz 7700-PTX (Production Switcher)
5. Scoreboard Information Inserter; Type 3 Protocol Converter (PTX_3):
a. Capable of decoding scoring RTD data feed and displaying Game in Progress Information as well as clock.
b. Four inputs
c. Basis of Design
1) Evertz 7700-PTX (SCOREBOARD). (Quantity: as required to handle venues)
6. Producer Timing Interface
a. Interface designated intercom station GPI to MIV to allow countdown timing on designated/interfaced MIV.
1) Custom

G. Provide all appropriate Routing Switcher Control Hardware Software required for proper operation. System shall:
1. Interface to Fiber Optic/MADI routing system that utilizes Probel protocol to control audio routing I/O
2. Be interfaced to a tally interface system to allow transfer of alphanumeric switcher information to/from:
a. Production Switcher
b. Multi-image Display System
3. Be interfaced to the production switcher to allow transfer of alphanumeric information as well as remote switching.

4. Allow control panels to intercommunicate. In the event that Ethernet protocol is used for the communication and it requires a separate physical network, then this supplier shall provide the network hardware required.
5. Computer Type 1 ($COMPUTER_1$):
   a. Ethernet: 10/100/1000
   b. USB 2.0 minimum of 2 ports
   c. RS232 Serial Ports: minimum of two (2)
   d. 3 year warranty; 24 hour replacement with on site replacement
   e. Provide 1 spare hard drive of each type.
   f. Provide Hard Drive Image Ghost software and configuration for each type.
   g. Software As required to operate routing switcher and multi-viewer
   h. Basis of Design Hardware Configuration is currently
      1) Evertz
      2) Quantity: 2 (primary and backup)
6. Software
   a. Basis of Design
      1) Evertz Magnum-Router-MVP--Redundant
7. Quantity: Lot

H. Tally Interface (TALLY IF/TALLY)
1. Video Tally connections are to be provided to indicate when a particular source is "on-air". Connections shall be provided between the video switchers and:
   a. All control console monitors
   b. All shading and tape machine monitors
   c. Producer's monitors multi-viewer
   d. Camera control units
   e. As required
2. Acceptable product:
   a. Image Video TSI3000.
   b. Evertz Magnum Tally
   c. As Approved

2.8 CHARACTER GENERATORS, IMAGE SERVERS SLOW MO AND EDITING

A. Type 1 Character Generator (CG_1):
1. Base Configuration
   a. Dual Channel
   b. Acceptable Product:
      1) Ross Video XAE2-0101-**M3** XPression Studio AE Dual Channel 3D CG.
   c. Keyboard Type 1:
      1) Dedicated keys for XPression functionality
      2) User defined custom keys
      3) Acceptable Product
         a) Ross Video XPN-KBD. (Quantity: 1 per unit)
2. Offline CG creation software for PC:
   a. Ross Video XDS0-0001-BDL XPression Designer Edition, 3D CG (Software Only Bundle (Quantity: 2)

B. Media Server (MEDIA)
1. Ross Video INC-SYS-001. (Quantity: 1)
2. Ross Video INC-CPP-003-913. (Quantity: 1)
3. Ross Video INC-~~090~~**OTR-1DAY**. (Quantity: 1)
4. ~~Ross Video INC-091. (Quantity: 1)~~
5. Ross Video INC-~~094~~**COM-1DAY**. (Quantity: 1)

C. Type 1 Clip Server (CLIP $SERVER_1$):
1. Evertz Option
   a. Evertz DC-104 with DC RCP-10
2. EVS Option
   a. EVS XSDPH-6u-444-SAS with MIX1 with XSDP+XSDP-MVW.
3. Ross Video
   a. Ross Video Blackstorm Video Server model BVS-104P-10 4channel Video Server
   b. Ross Video BVS-100AP-BP, Breakout Panel

D. Slow Motion
1. Evertz Solution
   a. Type 1 SLOW MO (SLOW MO_1).
   b. Base Configuration
      1) Evertz DC-MRP-31R8
      2) Requires Evertz Routing Switcher and Multiviewer.
   c. Slow Motion Control Panel (CLIPS RCP)
      1) Evertz DC-RCP-10.
   d. Type 2 SLOW MO (SLOW MO_2)
      1) Evertz Workstation
      2) Hardware Consisting of:
         a) 2RU Frame
         b) Controller/keyboard interface
   e. Software to provide file configuration conversion between native codecs and DNX/ DVC Pro, AVC Intra, ProRes, MPEG2, H.264
   f. Contact for Evertz quote; Joe Cirincione; joe@evertz.com.
2. EVS Configuration
   a. Type 1 SLOW MO (SLOW MO_1).
      1) Base Configuration
         a) EVS XT3HS-6U-866; XT [3]
         b) HD server with six (6) 600 GB gig drives in a RAID 3 configuration.
      2) Multiviewer
         a) EVS Multiviewer Option MVW8
      3) Slow Motion Audio Interface
         a) EVS Internal Audio Module.
      4) Software
         a) EVS MLT-O; I/O configuration: Open Configuration (TBD)
      5) Slow Motion Control Panel (CLIPS RCP)
         a) EVS RCU.
   b. Type 2 SLOW MO (SLOW MO_2)
      1) EVS IP Director 2RU Workstation
      2) Hardware Consisting of:
         a) 2RU Frame;
            (a) EVS IPDWS2HP
         b) RS422 Digital Video Capture Board for IP Director Workstation
            (b) EVS IPDAVH
         c) Removable Storage Option for two (2) 1TB SATA drives.
            (c) EVS IPD3U7-SATA. (Quantity: 2)
         d) Shuttle Pro remote control panel with jog and shuttle
            (d) EVS SPR-USB
      3) Software
         a) IP Engine
         b) Database with on-line, near-line and proxy media management Including keyword grids and log sheets functions Synchronization with XT[3] Broadcast Servers' and XL[2] Proxy Servers' content Users rights management & administrative tools XML Engine for automated

tasks management BVW75 protocol for VTR connections Database can be integrated on a standard IP Director workstation

(e) EVS IPDENG; IP Engine. (Quantity: 1)

c) IP Access

d) IP Director Database Explorer; Channel Explorer; Recorder Panel (manual ingest control). Control Panel with Clip List; VTR control Window. Runs on a standard Windows XP Pro Workstation. Requires 1 IP Engine license to be connected to (locally or on the LAN).

(f) EVS IPDACC IP Access . (Quantity: 1)

e) Ingest Scheduling Module

f) Scheduling and management of records on any XT Series servers' input channels Runs on a standard Windows XP Pro Workstation with IP Access license.

(g) EVS IPDING; IP Ingest Scheduling Module. (Quantity:

g) Logger

h) Intuitive user interface to log live events as they occur Possibility to control an XT playback channel for comfort logging. Runs on a standard Windows XP Pro Workstation with IP Access license

(h) EVS IPDLOG; IP Logger. (Quantity: 1)

i) Media Viewer

j) Software Preview of on-line and near-line media files (proxy, SD, HD).

(i) EVS IPDMVM; IP Media Viewer. (Quantity: 1)

k) IP Director Production Playlist

l) Create, edit & control playlists with transitions, loop functions, start modes, etc

(j) EVS IPDPL; IP Production Playlist. (Quantity: 1)

m) Full Transcode Software Module

(a) EVS MXC-Full. (Quantity: 1)

c. Philip Stein; p.stein@evs.com

E. Keyboard, Video, Mouse Matrix Switcher

1. Unit to provide up to 16 Users to access each of the systems computer(s) without the need for re-booting or re-configuration of cabling.
2. Frame (KVM MATRIX)
   a. Matrix
      1) Cisco WS-C3750X-48T-L
      2) Cisco CON-SNT-3750X4TL
      3) Cisco C3KX-NM-10G
      4) Cisco SFP-10G-LR=.
   b. Controller (KVM)
      1) Avocent HMXMGR.
      2) Note: this unit shall be interconnected to other computers and workstations provided by Video Replay and existing Video Display/Scoring workstations.
   c. Type 1 User Stations (EXR_1):
      1) Single Video, 1920x1200
      2) Acceptable Product:
         a) Avocent HMX1070. (Quantity: As required plus 1)
         b) With rack mounts
   d. Type 2 User Stations (EXR_2):
      1) Dual Video, 1920x1080
      2) Acceptable Product:
         a) Avocent HMX2050. (Quantity: As required).
         b) With rack mounts
   e. Type 1 Computer Interface (EXT_1):
      1) Single Video, 1920x1200

2) Acceptable Product:
a) Avocent HMIQSHDI.(Quantity: As Required plus 3)

f. Type 2 Computer Interface (EXT_2):
1) Dual Video, 1920x1200
2) Acceptable Product:
a) Avocent HMIQHDD.(Quantity: As Required plus 1)

F. Computer Type 2 and 3 ($COMPUTER_{2 \text{ and } 3}$)
1. Stealth Computer SR-2501 – with the following configuration:
a. Processor: Intel Core i7-3770 (4C/8T), 3.4GHz, 32/64-Bit
b. Memory: 8GB DDR3 Upgrade
c. Hard Drive - 1: 2TB SATA Included
d. Removable Hard Drive Kit (Available for Hard Drive 1 only): No Removable Kit included (standard)
e. Raid Adapter onboard; Raid 1 (mirroring) configured.
f. Hard Drive - 2: 2TB SATA included
g. Optical Drive: DVD+-RW/Blu-ray Burner, SATA - Upgrade
h. Operating System: Microsoft Windows 7 Ultimate, 64-Bit
i. Power Supply: 90-264VAC, 400 Watt ATX (standard)
j. Side Rails: 30" chassis slide rails
k. Extended Warranty: 1 Year Warranty Extension - 3 Years Total

2.9 VIDEO RECORDING EQUIPMENT

A. Type 1 VCR (VCR_1):
1. HDCAM
2. Acceptable product:
a. Sony HDW-2000/20 with rack mount adapter

B. Type 2 VCR (VCR_2):
1. Disc Recorder
2. Acceptable product:
a. Sony PDWF-1600 with rack mount

C. Type 3 VCR (VCR_3):
1. Hard disc play/recorder
2. Acceptable product:
a. AJA Ki Pro w/o hard drive
b. AJA SSD300GB. (Quantity: 2 per VCR type 3)
c. Provide one (1) Middle Atlantic Sliding Shelf for every VCR type 3.

D. Type 4 VCR (VCR_4)
1. Digital Betacam VTR
2. To playback existing Beta, BetaSP and BetaSX tapes
3. Acceptable product:
a. Sony DVWM2000

E. Type 1 DVD Blu-Ray Disc Device (DVD_1)
1. Blue Ray recorder
2. Acceptable product:
a. JVC SR-HD2500US with a Roland VC-50HD with Middle Atlantic RSH4S2R JVCXXX –C rack mount shelf with shelf clamp
b. As Approved

F. Type 2 DVD (DVD_2)
1. DVD Recorder
2. Acceptable product:
   a. Toshiba DR430 with Middle Atlantic RSH-XXX –C rack mount shelf with shelf clamp
   b. As Approved

G. Type 3 Blu-Ray Disc Device (DVD_3)Duplicator.
1. DVD Duplicator. NOTE: This unit is not shown on functionals
2. Basis of Design Product:
   a. 2 Bay BD Duplicator:
      1) R-Quest Tech NS2100BDi with Middle Atlantic Sliding Shelf. (Quantity: 1)
   b. Color Media:
      1) R-Quest FJ2100-19-B - FlashJet 2100 19ml Black Inkjet Cartridge. (Quantity: 2)
      2) R-Quest FJ2100-17-C - FlashJet 2100 17.1ml CMY Color Inkjet Cartridge. (Quantity: 2)
   c. BD-R:
      1) Microboards BD-WIJ-400 - 4x BD-R 25GB Blu-ray White Inkjet Non-Hub Print Cakebox; 25-Disc Pack. (Quantity: 10)
   d. DVD-R:
      1) Taiyo Yuden DVD-R4 7VAL600SK - VL 8x DVD-R Silver Lacquer; 100pk. (Quantity: 2)
   e. Control Components:
      1) R-Quest TrueNet LX WITH FX Software upgrade. (Quantity: 1)
   f. Packaging:
      1) Digital Image PSD34 - 2-Disc Black SuperSlim Amaray Style CD/DVD Case 9mm 100pk. (Quantity: 2)
      2) Digital Image DC71-STBK - 1-Disc Black Amaray Style DVD Cases 100pk. (Quantity: 2)
   g. Sliding Shelf
      1) Middle Atlantic SSHD-28. (Quantity: 1)
3. As Approved

2.10 DISTRIBUTION GEAR AND SIGNAL PROCESSING

A. Distribution Gear Card frame (FR):
1. Frame with cooling fan, network card with 1 power supply
   a. Ross FBK-OG3-CN
   b. Evertz 500FR with single power supply and 500FC frame controller
   c. Harris FR6822+QXFE with single power supply and Ethernet resource card,
   d. Harris Selenio: SEL-FR3-AC-RR with SELOPT-LCP , (14 slot, 3 RU frame with single controller, single power supply and local control panel)
   e. Grass Valley 8900FFN: GeckoFlex 2RU Frame w/single power supply, 10 8900B-G, fans Ethernet network interface.
   f. Snell, PESA meeting these performance requirements
2. Spare Power Supply:
   a. Mounts in selected Distribution Gear Card Frame
   b. Acceptable product:
      1) Ross PS OG3. (Quantity: 1 for every 4 trays, round fractional numbers up)
      2) Evertz backup/redundant power supply. (Quantity: 1 for every 4 trays, round fractional numbers up)
      3) Harris 6822+AC power supply,
      4) Harris Selenio Family: SELOPT-PSU-AC (Quantity: One per frame)

5) Grass Valley 8900U-PSX: Redundant 125W Power Supply for GeckoFlex frames (90-240VAC)
6) Snell, Pesa, meeting these performance requirements

B. Type 1 Serial Equalizing Amplifier (SDA_1):
1. General distribution amplifier.
2. 1x4 or 1x8 HD/SDI with reclock and EQ
3. Mounts in selected Distribution Gear Card Frame.
4. Acceptable product:
a. Ross SRA-86~~01~~**02A**-R2S. (NOTE THIS MODEL NUMBER IS A SINGLE PATH DISTRUBTION AMPLIFIER)
b. Evertz 500DA2Q-3G (NOTE THIS MODEL NUMBER IS A DUAL PATH DISTRIBUTION AMPLIFIER)
c. Harris DA-DHR6804+D (NOTE THIS MODEL NUMBER IS A DUAL PATH DISTRIBUTION AMPLIFIER)
d. GV, Snell, Pesa, meeting these performance requirements.

C. Type 1 Analog Video Distribution Amplifier (VDA_1):
1. Mounts in selected Distribution Gear Card Frame.
2. Acceptable product:
a. Ross UDA-8705A-R2
b. Evertz 501ADA-EQ
c. Harris VDA6800+S/D
d. Grass Valley 8902-EQ-1694A
e. Snell, Pesa, meeting these performance requirements.

D. Type 1 Digital to Analog Composite (DAC_1). Note that single and multi-path units are specified herein. Verify exact quantity against the functional drawings and adjust rack elevations accordingly.
1. Dual Input/Dual Output
2. Up/Down/Cross Convert/ARC
3. Audio embed/de-embed
4. Acceptable product:
a. Single Path
1) Harris X50-AV-2PS with X50OPTCAB-AES where needed
2) OR
3) Harris Selenio SEL-1XD1-EES with SELOPT-VEX1-EES Video Expansion module with SELOPT-AAEX1.
4) **Ross,** GV, Snell, Pesa, meeting these performance requirements.
b. Dual Path
1) Evertz 7812DCDAQ-3G-AA+3RU
2) Harris Selenio SEL-2XD1-EES with SELOPT VEX1-EES video Expansion module and SELOPT-AAEX1 analog audio expansion module.
3) ~~Ross,~~ Grass Valley, Snell, PESA meeting these performance requirements.
c. As Approved

E. Type 2 Digital to Analog Component (HD) converter (DAC_2)
1. Component, Composite, RGB outputs
2. SD/SDI and HD/SDI inputs with loop through
3. Acceptable Product
a. AJA HD10C2 with power supply.
b. Evertz, Grass Valley, Harris, or Ross equivalent with mounting tray and power supplies

F. Component to Serial Digital Converter Type 1 (ADC_1): Note that single and multi-path units are specified herein. Verify exact quantity against the functional drawings and adjust rack elevations accordingly.
   1. Acceptable product:
      a. Single Path Products
         1) AJA FS2.
         2) Black Magic Design Teranex 2D Processor.
         3) Harris X50-AV-2PS.
      b. Dual Path Products
         1) Evertz Solution (NOTE THIS IS A DUAL PATH UNIT)
         2) Evertz HD2012+FR-HIO+FL-ADC-HD+AA
      c. As Approved

G. Type 1 Frame Synchronizers (FS_1). Note that single and multi-path units are specified herein. Verify exact quantity against the functional drawings and adjust rack elevations accordingly.
   1. Acceptable product:
      a. Evertz solution:
         1) Evertz 2012+2PS+CF2G+2RX+AA+WPAES8-BNCM-6F. NOTE THIS IS A DUAL PATH UNIT.
         2) Evertz BHP-BNCIU-48. (Quantity: 1 for EVERY 4 Type 1 ADC or Type 2 FS)
      b. Harris X50-AV-2PS with OP+SFP+TR13P. NOTE THIS IS A SINGLE PATH UNIT.

H. Type 2 Frame Synchronizers (FS_2). Note that single and multi-path units are specified herein. Verify exact quantity against the functional drawings and adjust rack elevations accordingly.
   1. Acceptable product:
      a. Evertz Solution (NOTE THIS IS A DUAL PATH UNIT)
         1) Evertz HD2012+2PS+CF2G+AA+WPAES8-BNCM-6F+2RX.
         2) Evertz BHP-BNCIU-48. (Quantity: 1 for EVERY 4 Type 1 ADC or Type 2 FS)
      b. Harris X50-AV-2PS with X50OPTCAB-AES. NOTE THIS IS A SINGLE PATH UNIT
      c. As Approved

I. Closed Caption Decoder (CCD)
   1. EEG DE280 WITH SOFTWARE DECODE TO SCORING SYSTEM

J. Closed Caption Encoder (CCE)
   1. Evertz 7825CCE
   2. EEG HD490

K. Type 1 Converter ($CONV_1$)
   1. SDI to Fiber
   2. Ensemble Designs Brighteye 46 and 48

L. SDI TO DVI converter (DVI)
   1. AJA HDP2 with appropriate power supply

M. SDI TO HDMI converter (HDMI)
   1. AJA Hi5 with appropriate power supply

N. Type 1 Tuner ($TUNER_1$)
   1. Extron AVT 200HD
   2. Aurora Multi-Media V-Tune Pro
   3. Contemporary Research 232-ATSC+1 with rack shelf

O. Type 1 DVI/VGA input Scaler ($SCALER_1$):
1. Ensemble Designs BEM1
2. with power supply, rackmount, DVI-I to DVI-D and VGA breakout to rack interface plate.

2.11 FIBER OPTIC TRANSPORT

A. Type 1 Fiber Transmitter (FOT_1):
1. HD/SDI
2. Acceptable product:
   a. Dual Path Transmitter(s)
      1) Evertz 3405T13-2
      2) Harris OP+XOS+2SFP+D
   b. Quad Path Transmitter(s)
      1) Harris OP+XOS+4SFP+D
   c. 6 Channel/Path Transmitter(s)
      1) Harris OP+XOS+6SFP+D

B. Type 1 Fiber Receiver (FOR_1):
1. HD/SDI
2. Acceptable product:
   a. Dual Path Receiver
      1) Evertz 3405R-2
      2) Harris OP+OXS+2SFP+D
   b. Quad Path/Channel Receiver(s)
      1) Harris OP+OXS+4SFP+D
   c. 6 Path/Channel Receiver(s)
      1) Harris OP+OXS+6SFP+D

C. Type 1 Fiber Transmitter (FO TX_1):
1. HD/SDI and Four Channel Audio
2. Acceptable product:
   a. Evertz 7707-ADVT-HD
   b. Harris OP+HMX+AI+13T.

D. Type 1 Fiber Receiver (FO RX_1):
1. HD/SDI and Four Channel Audio
2. Acceptable product:
   a. Evertz 7707-ADVR-HD
   b. Harris OP+HDX+AO+R+T

E. Type 1 Fiber Transceiver (FTR_1)
1. Bi-directional HD/SDI, four channel analog audio, RS232/485, Ethernet
2. Acceptable Product
   a. Harris OP+VTX+D+SFP1+TR13 with appropriate Frame.
   b. As Approved

F. Type 3 Fiber Transceiver (FTR_3)
1. Dense Fiber transport
2. Acceptable Product
   a. Riedel 1930002; MN-LNK2
   b. Riedel 1930003; MN-LNK4
   c. Riedel 1910004; MN-2RU
   d. Riedel 1910002; MN-PSUR
   e. Riedel 1910003; MN-FAN

f. Riedel 1920001; MN-XSS
g. Riedel 1930025; MN-HDP-6

G. ~~Type 1~~ CWDM
1. Type 1 CWDM ($CWDM_1$)
a. Twelve HD/SDI or Fiber multiplexed onto one fiber
b. Acceptable Product
1) Multidyne Configuration:
a) Multidyne FS-12000-TX-ST-RG
b) Multidyne FS-12000-RX-ST-RG
2. Type 3 CWDM ($CWDM_3$)
a. Six HD/SDI or Fiber multiplexed onto one fiber
b. Acceptable Product
1) Multidyne Configuration:
a) Multidyne FS-6000-TX-ST-RG
b) Multidyne FS-6000-RX-ST-RG

H. Flight Case A
1. Type 2 CWDM ($CWDM_2$)
~~2. Six HD/SDI or Fiber multiplexed onto one fiber~~
3. Acceptable Product
a. Multidyne Configuration:
1) Multidyne FS-~~6~~**18**000-TX-ST-RG
2) Multidyne FS-~~6~~**12**000-RX-ST-RG
4. Wireless Camera Station (WR)
a. Acceptable Product
5. Case:
a. Rugged, light, compact case
b. Acceptable product:
1) Pelican MR1910-05/29/05 case

I. Flight Case B
1. Type 2 Fiber Transceiver(s) (FTR_2)
a. Audio Intercom Interface
b. Acceptable product:
1) Riedel 2010017 RN 301 MI RP **(2 per system)**
2) Riedel 2010018 RN 302 LO RP **(2 per system)**
c. Dense Fiber Transport
d. Acceptable product:
1) Riedel 1910023; MN-CompactPlus (1 per system)
2. Wireless Receiver and base station:
a. Type 1 Wireless Receiver Base station ($WLRX_1$)
1) Clearcom Four Channel System Base Station CM-944 and CCT-9RT
b. Type 2 Wireless Transceivers (WT_2).
1) Clearcom CP942 beltpacks.
c. Spare Battery Pack:
1) Clearcom Spare Battery (Quantity: 2)
d. 5-bay Battery Charger:
1) Clearcom CT-BC5A Charger (Quantity: 1) mounted to Middle Atlantic sliding shelves
2) Clearcom T-LP1Spare Battery (Quantity: 4)
e. Remote Wireless antennae; connects to base station via CAT-5 cable.
1) Clearcom CCT-9RT. (Quantity: 1)
3. Type 1 Intercom Interface (ICOM IF_1):
a. Studio Technologies Model 45

4. Type 3 Intercom Interface (ICOM IF_3)
    a. Studio Technologies Model 42
5. Ethernet Switch (SWITCH)
    a. Cisco Small Business 100 Series SG100D-08P-NA
6. Case:
    a. Rugged, light, compact case
    b. Acceptable product:
        1) Pelican MR~~1910~~**1921**-05/29/05 case

J. Flight Case C
1. Triax to Single Mode Fiber Converter (TIF)
    a. Sony Solution
        1) Sony HDFX-200
    b. Grass Valley Solution
        1) Grass Valley LDX 4426
2. Case:
    a. Rugged, light, compact case
    b. Acceptable product:
        1) Pelican MR1910-05/29/05 case
3. Type 9 Fiber Transmitter (FOT_9)
    a. Two (2) HD/SDI I/O
    b. Dual Path Transmitter(s)
    c. Acceptable product:
        1) Evertz 3405T13-2 with mounting tray
        2) Harris XOS+2+OP+13+13S with mounting tray
        3) MultiDyne HD-3000-2TX with mounting tray

K. Portable Fiber Optic Transmitter ($FOTR_P$)
1. Bi-directional HDTV Electrical to Optical Converter, 19.4Mb/s to 1.5Gb/s.
2. Acceptable Product
    a. Black Magic Design Mini Converter Optical Fiber (Heavy Duty version if available).
    b. Quantity: 4; not shown on drawings.

2.12 AUDIO, TIME CODE, CONTROL

A. Type 1 Audio Mixer ($MIXER_1$)
1. Yamaha DM1000VCM
2. Yamaha MB1000
3. Yamaha SP1000
4. Yamaha DM1000V2K
5. Apple iPad Air
6. Riedel 201 10005 RN 341 MY I-face

B. MADI interface to routing switcher (MADI)
1. Riedel RN334 MD

C. Audio Amplifier (AMP):
1. Two Channels, 75W
2. Ashly SRA-2075

D. Speakers and Monitors
1. Type 1 Speakers ($SPKR_1$):
    a. Tannoy i7 (BLACK) with i7 MAB mounting bracket i7 yoke; orient as shown on drawing(s).

b. JBL CBT50 LA-1

2. Type 3 Speakers ($SPKR_3$)

a. JBL Control 5 with wall mount

3. Type 1 Audio Monitor ($AUD\ MON_1$)
   a. Blackmagic Design Audio Monitor
4. Type 2 Audio Monitor ($AUD\ MON_2$)
   a. Two channel analog monitor
   b. 10 source
   c. Acceptable product:
      1) Wohler Amp 2A-10S

E. Volume Controller (VC)

1. Wall mounted

2. Atlas AT-100

F. Time Code Distribution Amplifier:
1. Time Code Distribution Amplifier (TDA)
   a. Ross Video TDA-7891
2. Distribution amplifier Frame and Power supply (DO NOT MIX WITH AUDIO DA's).
   a. Ross Video AFR-7814C

G. Word Clock Synthesizer and Distribution Amplifier (ADA_1):
1. Drawmer D-Clock

H. Audio Interfacing, Matching, and Line Driving Devices:
1. Analog Audio to AES (AADC)
   a. Evertz 7720ADC-A4+3RU—note this is a multi-channel unit (two pair channels 1 way).
   b. Ross ADC-84**34-A-R2A – note this is a dual channel unit** ~~32 – note this is a SINGLE channel unit.~~
   c. Harris ADC6800+A4BCD—note this is a multi-channel unit (two pair channels 1 way).
2. AES to Analog Audio (ADAC)
   a. Evertz 7720DAC-A4+3RU—note this is a multi-channel unit (two pair channels 1 way).
   b. Ross DAC-8416**8-A-R2A – note this is a dual channel unit**
   c. Harris DAC6800+BCA4D—note this is a multi-channel unit (two pair channels 1 way).
3. Balancing Amplifier (BA; UBA)
   a. RDL STA-1
4. Type 2 Audio Distribution Amplifier (ADA_2)
   a. Ross Video ADA-8405-C. (Quantity: As required)
   b. Evertz 7700ADA-AUD. (Quantity: As required)
5. Microphone to Line Level interface (MIC). NOTE DEPENDING ON MANUFACTURER OF CCU, MAY NOT BE REQUIRED.
   a. RDL STM-2. (Quantity: 2 per stereo connection)
6. Support
   a. RDL-STR-19. (Quantity: As required)
   b. RDL Power supply. (Quantity: As required)
7. Rackmount Balun; 20 channels (BALUN)
   a. Acceptable Product
      1) Ward Beck IMP20A
8. Type 1 Balun; Individual Devices (BL_1)
   a. Acceptable Product
      1) Ward Beck IMP1

2) Canare BJC-XS-TRB

9. Type 2 Balun Rack mount (BL_2). Pair of Baluns
   a. Acceptable Product: For each device provide two (2) of the following:
      1) Ward Beck IMP1
      2) Canare BJC-XS-TRB
10. Note: it is acceptable to use the Rackmount Balun system (BALUN) for all AES impedance conversions.
    a. RDL RU-BLA2 Adjustable Stereo Line Amplifier

I. 232 Transceiver
   1. Units used to connect 232 connections over Cat 5/6 connections.
   2. Acceptable product:
      a. Minicom Cat 5 232 Extender
      b. Local and Remote Unit with local power supplies.
      c. Provide as required.

2.13 INTERCOM

A. Matrix Station (MATRIX):
   1. Riedel Solution; Riedel Artist 128. Include:
      a. Riedel Artist 128 Frame MFR-128 G2. (Quantity: As requried)
      b. Riedel Artist 128 Power Supply PSU-128 G2. (Quantity: 4)
      c. Riedel Artist Node Controller, Standalone; quantity two for redundant CPU-128S G2. (Quantity: 4)
      d. Riedel Transformer balanced analog 4W interface AIO-108 G2. (Quantity: As required)
      e. Riedel Matrix client card CAT5-108 G2. (Quantity: As required)
      f. Riedel Director Artist/Performer Configuration Software. (Quantity: 1)
      g. Riedel Artist Sync Card. (Quantity: 2)
      h. Riedel VOIP-108. (Quantity: 1)

   2. RTS/Telex/Bosch Solution
      a. RTS-Telex/Bosch Adam-M-US. (Quantity: 1)
      b. RTS-Telex/Bosch Dual, Redundant Power Supply. (Quantity: 1 redundant).
      c. RTS-Telex/Bosch MCIIE-S. (Quantity: As required).
      d. RTS-Telex/Bosch AIO-FC-16 with AIO-16 MDR Back Card (Quantity: As required).
      e. RTS-Telex/Bosch XCP-48-RJ45. (Quantity: As required)
      f. RTS-Telex/Bosch MDR Cable. (Quantity: As required)
      g. RTS-Telex/Bosch RVON I/O. (Quantity: 1)
      h. RTS-Telex/Bosch AZ edit Software. (Quantity: 1)

B. Intercom Stations (ICOM). Use same manufacturer as selected for MATRIX. Note: coordinate sex of headset connector to correlate with headsets and camera connections:
   1. Matrix Intercom Station Type 1 ($ICOM_1$)
      a. Riedel RCP-1112
      b. RTS-Telex/Bosch KP12CLD
   2. Matrix Intercom Station Type 2 ($ICOM_2$)
      a. Riedel RCP-1128 with MIC-30 microphone
      b. RTS-Telex/Bosch KP32CLD
   3. Intercom Station Type 3 ($ICOM_3$).
      a. Riedel DCP-1116
      b. RTS-Telex/Bosch DKP-16CLD
   4. Intercom Station Type 4 ($ICOM_4$).

a. Riedel DCP-1116 with connect IPX8
b. RTS-Telex/Bosch DKP-16CLD with RVON-2 DKP 16 CLD.

C. IFB Interface (IFB)
1. Riedel AIO-108
2. RTS IFB 828.

D. Intercom Telephone Interface (ICOMT)
1. RTS TIF-2000. (Quantity: 2)

E. Intercom Interface Equipment
1. Intercom Source Assignment Panel (SAP):
a. Acceptable Product:
1) RTS/Telex/Bosch SAP 612
2. Type 1 Intercom Interface (ICOM IF_1):
3. Type 2 Intercom Interface (ICOM IF_2):
a. 2-4 wire interface
b. Acceptable Product:
1) Studio Technologies Model 47
4. Type 3 Intercom Interface (ICOM IF_3)
a. Digital Matrix intercom to analog IFB
b. Acceptable product:
1) Studio Technologies Model 42
5. Type 4 Intercom Station ($ICOM_4$)
a. Announcer console
b. Acceptable Product:
1) Studio Tech Model 233 with direct out microphone. (Quantity: 2)
6. Intercom Station Type 5 ($ICOM_5$)
a. Dual channel beltpack
b. Acceptable Product:
1) RTS/Telex BP325

F. Wireless intercom system.
1. Wireless Receiver and base station:
a. Type 1 Wireless Receiver Base station ($WLRX_1$)
1) Clearcom Four Channel System Base Station CM-944 and CCT-9RT
b. Type 2 Wireless Transceivers (WT_2).
1) Clearcom CP942 beltpacks.
2. Spare Battery Pack:
a. Clearcom Spare Battery (Quantity: 2)
3. 5-bay Battery Charger:
a. Clearcom CT-BC5A Charger (Quantity: 1) mounted to Middle Atlantic sliding shelves
b. Clearcom T-LP1Spare Battery (Quantity: 4)
4. Remote Wireless antennae; connects to base station via CAT-5 cable.
a. Clearcom CCT-9RT. (Quantity: 1)

G. Intercom Interface (TALENT IF_1):
1. Acceptable Product:
a. Studio Technologies Model 210 with microphone line level output
b. Custom XLR breakout to mic and line connection

H. Intercom Interface (TALENT IF_2):
1. Acceptable Product:
a. Studio Technologies M36

I. Intercom to Radio Interface (RADIO IF)
1. Clear Com TW-60

J. Footswitch:
1. Linemaster 632-S. (Quantity: 5 connected to intercom stations TBD)

K. Headsets: PROVIDE APPROPRIATE XLR CONNECTOR AT THE END OF EACH UNIT.
1. Lightweight
   a. Clearcom CC-26K-XX. (Quantity: 40)
2. Single Muff
   a. David Clark 8592 (Quantity: 6)
3. Dual Muff
   a. David Clark 8392 (Quantity: 8)
4. Single Muff
   a. Beyer Dynamic DT280 (Quantity: 12)
5. Note: coordinate sex of headset connector to correlate with headsets and camera connections.
6. Headphone.
   a. SONY MDR-NC500D. (Quantity: 2)
   b. @Provide adapter to go from Intercom station to headset. (Quantity: 2)

L. Telephone Hybrid (HYBRID):
1. For transmission of game program audio to a remote captioner.
   a. Comrex DH20.

2.14 SOCIAL MEDIA LOUNGE AND CONFERENCE ROOM

A. LCD or LED Displays and Mounts:
1. Provide new displays and mounts specified within. Refer to the television schedule for locations of displays and type of mounts to be provided.
2. Coordination of delivery of the displays is part of this contract.
3. Moving the displays from a staging area to the physical location is the responsibility of this Integrator.
4. Configuration and set-up of the display and remote control is the responsibility of this Integrator.
5. Integration and delivery of all accessories (remote control, power cords).
6. All Display cables shall be concealed from view.
7. Cabling and dressing from the outlet to display to be provided under this scope. This includes any A/V cables (coaxial, HDMI, etc.) and control cabling (IR, RS232, USB).
8. It is the intent that the cables, including power, be completely concealed from view. Notify Owner's representative of any situation where cable concealment is questionable such that a solution can be developed.
9. Provide covering for mounts to conceal cable where possible.
10. Refer to drawings for quantities.

B. Mounting:
1. TV Monitors shall be mounted plumb and level at the operating position in a safe, secure and permanent manner.
   a. In areas where mounting brackets span blocks of varying depths, provide a "sleeve" to conceal exposed mounting bolt threads.
2. Hardware required to locate the mount and TV monitor at the required position shall be provided.
3. TV Monitors shall be mounted using tamper proof secure hardware.
4. In areas where TVs are located in signage, coordinate mounting with Owner.

5. In areas where modification of mounting location is required, method must be approved by Owner's representative.
6. Ceiling tile must be replaced with "like and kind" material. Field-verify the type for material to be replaced.
7. Extension columns/poles/masts color must match that of bracket.
8. Extension columns/poles/masts must include escutcheon.
9. Locations to be verified prior to mounting.
10. TVs to conceal outlet locations.

C. Specifications common to each display:
1. 1080 resolution
2. Consumer grade LCD or LED display
3. Screen image size variance from specified: +/- 5%
4. Inputs:
   a. HDMI
   b. ATSC/QAM integrated tuner
   c. IR and/or RS232 (RS232 is preferred)
5. Speakers integrated into unit (Type A and B only)
6. Black, rectangular bezel (identify look in proposal)
7. Standard VESA mounting

D. Type 1 Flat Panel Display (TV_1)
1. EIA/TIA: 60-inch diagonal
2. Acceptable products
   a. LG 60LN5400
   b. NEC E654
   c. Panasonic TC-L58E60
   d. Samsung UN60ES6100F
   e. Sony KDL-60R550A
   f. Sharp LC60LE65000U

E. Type 2 Flat Panel Display (TV_2)
1. EIA/TIA: 37/42-inch diagonal
2. Acceptable product:
   a. LG 42LS5700
   b. NEC E423
   c. Panasonic TC-L42E60
   d. Samsung UN40ES6100F
   e. Sony KDL-47W802A
   f. Sharp LC42SV50U

F. Type 3 Flat Panel Display (TV_3)
1. EIA/TIA: 46/48-inch diagonal
2. Acceptable product:
   a. LG 47LS5700
   b. NEC E464
   c. Panasonic TC-L50E60
   d. Samsung UN46FH6030
   e. Sony KDL-47W802A
   f. Sharp LC50LE650U

G. Flat Panel Monitor Mounts:
1. Wall mount assembly from 37"-63"
2. Up to 15-degrees tilt
3. Leveling and lateral shift

4. Weight load up to 200 lbs
5. Acceptable Product:
    a. Chief
    b. Peerless
    c. Or equivalent
    d. Provide with any steel stud mounting accessories

H. Flat Panel Monitor Mounts:
1. Wall mount assembly from 60”-80”
2. Fixed wall mounts
3. Weight load up to 250 lbs
4. Acceptable Product:
    a. Chief
    b. Peerless
    c. Or equivalent
    d. Provide with any steel stud mounting accessories

I. Audio Video Processor/Switcher (RCS):
1. Input signal types: HDMI, RGB, DM+
2. Output signal types: HDMI, DM+
3. Supports resolutions up to and including 1080p
4. EDID format management
5. HDCP management to allow fast switching between sources
6. Control communication via Ethernet
7. IR ports.
8. Relay ports.
9. Two RS 232/422/485 ports.
10. Cresnet ports.
11. 40W RMS mono @ 70v
12. 3RU height
13. Acceptable Product:
    a. Crestron DMPS-100-C

J. Routing Switcher Type 3 (RS_3)
1. Modular and expandable 32x32
2. HDMI and SDI inputs
3. Digital Media, analog audio and HDMI outputs
4. Acceptable Product:
    a. Crestron DM-MD32x32-RPS
    b. DMC-HD HDMI input cards (Qty: 8)
    c. DMC-HD-DSP HDMI input cards with downmix (Qty:3)
    d. DMC-VID-BNC input card (Qty:1)
    e. DMC-SDI input cards (Qty:3)
    f. DMCO-22 category cable output cards (Qty:20)
    g. DMCO-30 HDMI and stereo audio output card (Qty: 2)

K. Room Control System (CS):
1. Central controller shall be a self contained unit containing the following:
    a. Eight IR ports
    b. Three 232/422/485 ports
    c. Eight relays
    d. Eight I/O channels
    e. Ethernet Port
2. Acceptable Product:
    a. Crestron CP3

L. Touchscreen Control Panel (TP):
1. Provide flush mounted touch panel in wall.
2. 7” color touch panel
3. Resolution: 800 x 480
4. Contrast: 350:1
5. Edgelite LED
6. Core 3 UI
7. PoE: IEEE 802.3af (802.3at Type 1) class 3 PoE powered device
8. Acceptable Product:
    a. Crestron TSW-750-B-S
    b. Coordinate color with Architect

M. Digital Media Receiver (DMTX):
1. Converts HDMI to STP CAT5e/6 to with serial and relay control
2. Use shielded twisted pair cable as required by manufacturer for optimal performance
3. Acceptable Product:
    a. Crestron DM-RMC-SCALER-C
    b. NOTE: Device and cable to TV to be neatly concealed behind display

N. Digital Media Receiver (DMRX):
1. Converts STP CAT5e/6 to HDMI with serial and relay control
2. Use shielded twisted pair cable as required by manufacturer for optimal performance
3. Acceptable Product:
    a. Crestron DM-RMC-SCALER-C
    b. NOTE: Device and cable to TV to be neatly concealed behind display

O. Digital Media Receiver Wall Plate (WP):
1. Converts STP CAT5e/6 to HDMI
2. Use shielded twisted pair cable as required by manufacturer for optimal performance
3. Acceptable Product:
    a. Crestron DM-RX1-1G (Qty: 20)
    b. Provide any box reduction rings as needed

P. AM/FM TUNER (AM/FM TUNER)
1. IR Control
2. Provide with AM/FM outdoor antenna and necessary mounting hardware.
3. Acceptable product:
    a. Tascam TU-690
    b. Pixel PIX-AFXSM-6 or equivalent

Q. AM/FM Antenna:
1. Provide active, high impedance unit with single amplifier and high pass filter.
2. Aluminum tube construction with end-seal elements.
3. Wind loading requirement: withstand 100 mph.
4. Acceptable product:
    a. Pixel Technologies
    b. Blonder Tongue
        1) Antenna: Pixel Technologies AFHD-4
        2) Splitter (SPL9): MBS-4
        3) Twin Lead Adapter
        4) Extender Amplifier (AMP1): Blonder Tongue DA-33
        5) Fixed Attenuators: Pixel Technologies (as required)
    c. Surge Protector: Pixel Technologies

R. Type 1 Ceiling Speaker:

1. 80Hz-25kHz frequency range
2. 85 dB SPL, one watt-one meter
3. 30W continuous
4. Acceptable product:
   a. JBL Control 24CT

S. Amplifier **Type 3** (AMP_3):
1. Crown 180A

T. Type 2 Converter ($CONV_2$)
1. SDI to HDMI with analog audio
2. Ensemble Designs Brighteye 72

U. KVM System
1. Type 2 Controller/Manager (KVM_2)
2. Four users access to 16 computers
   a. Avocent AMX5030
   b. Note: this unit shall be interconnected to other computers and workstations provided by Owner.
3. Type 3 Extenders (EXT_3):
   a. Acceptable Product:
      1) Avocent AMIQ series. Coordinate final connectivity with Owner (PS2/USB)
      2) With rack mounts
4. Type 3 User Stations (EXR_3):
   a. Acceptable Product:
      1) Avocent AMX5130. (Quantity: As required).
      2) With rack mounts

V. Owner shall retain all rights and non-exclusive ownership to custom software, including original source code. Supply printouts of all source codes as well as back-up copies of uncompiled code on suitable electronic storage medium.

W. All commercial software used, shall be registered to Owner, in Owner's name. Owner to be supplied with all software documentation including copies of software registration.

X. All software shall be written with remark statements which document function of subroutines and program requirements.

Y. Deliver final disk copies of the configured software within 30 days after notice to proceed.

Z. Provide one-year of on-site software upgrades from date of substantial completion.

AA. Submit complete software “code” on disk format for approval.

BB. Initial and final software configuration to be included. The cost to configure the software is a part of this contract. Software configuration involves extensive interviews with the Owner. Update software to latest version 60 days prior to system substantial completion. Provide on-site software upgrade service within 30 days of release by manufacturer during the first year following substantial completion.

CC. Provide site licensed commercially available software for control system and control panel both operational and configuration.

DD. The cost to configure the software is a part of this contract.

EE. The cost to interface and control components provided by distributed television system is part of this contract.

FF. Graphical User Interface ("GUI") and Machine Control
1. The Contractor is to develop the GUI and machine software control. The development is to be done in four phases.
2. During the first phase, development of the GUI panel layouts and machine functions are to be established. Participants of the development are the Contractor and the Owner. This requires multiple meetings with these principles and is an interactive and iterative process.
3. During the second phase, the Contractor produces the initial GUI and machine software control filling the requirements developed during the first phase. This also requires multiple meetings with the Contractor and the Owner and is an interactive and iterative process.
4. Upon completion of the second phase, integrate the control software within the AV Control Systems and inspect the systems for performance compliance. During this process the Contractor debugs the AV Control Systems software code as required to ensure a properly functioning system. At the end of this phase the Manufacturer is to provide written notification that their product is operating properly and that the functions and configurations established in Phase One and Two are working and have been properly implemented

2.15 EQUIPMENT REQUIREMENTS

A. Equipment Rack to be frame and panel type constructed of 16-gauge cold-rolled steel. Racks to have locking rear door mounted on the frame (not the rails). Empty mounting panel spaces to be filled with blank or vent panels, in a finish to match rack. Provide end panels and top panels as required. Provide shelving as required for equipment mounting within racks. Provide rack supports as required. Provide seven rack keys of each type. Rack color to be gloss or flat black. Provide a 60-watt "rough service" lamp in a locally switchable fixture mounted in the top rear of each rack. Include extra set of mounting rails in each rack for rear support of panels or equipment. Verify exact rack space required.
1. Rack Room Racks to be:
    a. Racks
        1) Middle Atlantic GRK 4836HLRD
    b. Top
        1) Middle Atlantic MW-4QFT-FC
    c. Side Panels at ends of racks (Only need where exposed; at walls; leave exposed)
        1) Middle Atlantic
    d. Riser Base with Option Feet
        1) Middle Atlantic RIB-#-GRK-36B with Middle Atlantic VFEET-#-XX (where # is equal to the number of bays and XX is depth of rack). Note reduced height of feet.
2. Support Equipment
    a. Rear Doors:
        1) Middle Atlantic Solid
    b. Blank Panels
        1) Middle Atlantic EB Series Flanged Blanks
    c. Vent Panels
        1) Rack screws—Middle Atlantic HS
    d. Power distribution
        1) Middle Atlantic PDT series on both sides of rack; Separate circuit breaker feeds to each side for redundancy.
    e. Rack light

f. Rack Shelves:
   1) Heavy Duty pull out shelf.
      a) Middle Atlantic SS
      b) General shelf standard
      c) Middle Atlantic RSH with escutcheon.
g. Hinged Access Panels as noted on the rack elevations
   1) Middle Atlantic AP-X (where is X is 2, 4 or 6)
h. Horizontal Cable Management (for CAT5/6 cable management) as noted on the rack elevations
   1) Middle Atlantic HHCM-1
   2) Middle Atlantic HHCM-2
i. Additional cable management:
   1) Middle Atlantic BR-1/BR-2 Cable Brush Grommet Panels
   2) Middle Atlantic LPB

B. UPS (UPS):
1. Capacity
   a. 60kVA/60kW
   b. 480 VAC system input voltage
   c. 208/120 VAC 3-phase, 3 or 4 wire plus ground
   d. Scalable frame
   e. On-Line double conversion
   f. Pulse width modulated rectifier (PWM)
   g. Auto continuous duty static switch transfer
   h. DSP monitoring and control system
   i. LCD graphic display
   j. Alarm history database
   k. IntelliSlot comm. Ports
   l. Top fan kit
2. Design Requirements - Battery
   a. Battery Cells: Valve-regulated, lead acid batteries.
   b. Reserve Time: 12 minutes at 60 kVA with ambient temperature of 77°F (25°C). Unit shall provide terminal for connection of external batteries.
   c. Recharge Time: to 95% capacity within ten (10) times discharge time.
   d. Enersys HX-400 back-up for a 60kVA load
   e. 3-breaker wrap-around maintenance bypass with interlock by solenoid key
   f. Include interconnecting cables for bolting cabinet to UPS
3. Accessories:
   a. IntelliSlot Web Modbus IP Card #IS-IPBML
   b. External AccuVAR TVSS #ACV48-D11OR
4. Modes of Operation
   a. The UPS shall be designed to operate as an on-line, double-conversion, reverse-transfer system in the following modes:
      1) Normal - The critical AC load is continuously supplied by the UPS inverter. The rectifier/charger derives power from a utility AC source and supplies DC power to the inverter while simultaneously float-charging the reserve battery.
      2) Emergency - Upon failure of utility AC power, the critical AC load is supplied by the inverter, which, without any switching, obtains power from the battery. There shall be no interruption in power to the critical load upon failure or restoration of the utility AC source.
      3) Recharge - Upon restoration of utility AC power after a utility AC power outage, the rectifier/charger shall automatically restart, walk-in and gradually assume the inverter and battery recharge loads.
      4) Bypass - If the UPS must be taken out of service for maintenance or repair, or should the inverter overload capacity be exceeded, the static transfer

switch shall perform a reverse transfer of the load from the inverter to the bypass source with no interruption in power to the critical AC load.

5. Fabrication
   a. Materials
      1) All materials of the UPS shall be new, of current manufacture and high grade and shall not have been in prior service except as required during factory testing. All active electronic devices shall be solid-state. All power semi-conductors shall be sealed. Control logic and fuses shall be physically isolated from power train components to ensure Owner safety and protection from heat. All electronic components shall be accessible from the front without removing sub-assemblies for service access.
   b. Wiring
      1) Wiring practices, materials and coding shall be in accordance with the requirements of the National Electrical Code, OSHA and applicable local codes and standards. All bolted connections of busbars, lugs and cables shall be in accordance with requirements of the National Electrical Code and other applicable standards. All electrical power connections shall be torqued to the required value and marked with a visual indicator.
      2) Provisions shall be made in the cabinets to permit integration of input, output and external control cabling, using raceway or conduit. Provision shall be made for top and bottom access to input, output, bypass and DC connections. In conformance with NEC, connection cabinets shall provide for adequate wire bend radius. All copper busbars for customer power connections shall be tin plated for connection integrity.
   c. Construction and Mounting
      1) The UPS shall be in NEMA Type 1 enclosures, designed for floor mounting. The UPS shall be structurally adequate and have provisions for hoisting, jacking and forklift handling.
   d. Cooling
      1) Cooling of the UPS shall be by forced air using a redundant fan configuration. Fan power shall be provided by the UPS.
      2) The thermal design, along with all thermal and ambient sensors, shall be coordinated with the protective devices before excessive component or internal cabinet temperatures are exceeded. Air filters shall be located at the point of air inlet and be changeable.
   e. Grounding
      1) The AC output neutral shall be electrically isolated from the UPS chassis. The UPS chassis shall have an equipment ground terminal. Provisions for local bonding shall be provided.
   f. Audible Noise--Noise generated by the UPS under any condition of normal operation shall not exceed 54 dBA measured 1 meter from the surface of the UPS.
   g. Power Distribution Unit (PDU)
      1) As required
   h. Main Breaker as required to feed UPS.
6. Basis of Design:
   a. Emerson Liebert APM 3-phase. #NRD90CCSA0A)197 (Quantity: 1)
   b. Emerson Liebert APM Bypass Distribution Cabinet NRMB1A9C1RA0G03
   c. Functional Equivalent from APC

C. Furniture Console:
   1. Console shall be constructed to house audio, video, control and other equipment as shown on drawings. Console shall be constructed by expert craftsman in a fully qualified cabinet shop regularly in business for technical millwork furniture.

2. The term “console” includes actual consoles housing equipment for work while seated; console desks housing little or no equipment; and other millwork or furniture housing monitors, timing or cueing devices, etc.
3. All shelves, counters and edges to be designed to support 250 pound point load at edge of counter in addition to equipment mounted in or on shelf.
4. Equipment rack frames with drilled and tapped mounting holes shall be included as shown on drawings (reference EIA standards). Unused rack space shall be filled with black blank panels, brushed anodized aluminum.
5. AC power distribution and other requirements shall be as in Section 3.01; for routing between sections of cabinet, metal conduit and/or wireway shall be used for shielding and protection of circuits or as required by applicable codes.
6. Cabling access is required at each and every counter location. Preferred cabling system is a slot or reveal in the millwork that allows user a great deal of flexibility in locating cabling. Where slot exists in a flat millwork piece, then slot should be equipped with a brush cover or other suitable filler material that allows cables to be easily connected and dressed through openings (e.g. www.mockett.com; brush wire manager series).
    a. Circular grommets are not allowed.
    b. A slot or cable reveal at the intersection of counter with vertical "rack" elements is preferred wherever possible.
7. Certain equipment shall be mounted into the millwork (e.g. console mount intercom stations, camera control shading joysticks, etc.); do not cut into millwork, until on site and user can evaluate operating configuration.
8. Seismic bracing and bases for millwork as required.
9. Field verify all site conditions prior to final shop drawing submittal to Owner’s Representative.
10. Steel Components
    a. Steel components shall be 11g. or 3/16” cold rolled (type B), laser cut, de-burred and press break formed for strength and accuracy. Powder coating finish is polyester/epoxy oven baked with Airstatic process.
11. Aluminum Extrusion
    a. Aluminum extrusion to be 6061 with clear anodizing. Slot for attachment of standard, custom and client supplied components. Steel components to be factory placed for speed of on-site assemble and accuracy.
12. Wood Components
    a. Wood components to meet AWI Premium Grade Standards, construction to include solid woods, multiply plywood sheet, medium density fiber board and high density/high quality particle board. All components to be permanently plant assembled with screws, glue and staples. Black Melamine surfaces to cover equipment bay interiors and there are no exposed raw wood surfaces.
13. Vinyl Bumper
    a. Counters to be edged with a 1¼” bullnosed and splined PVC Bumper pressure applied to a machined slot in the counter perimeter.
14. Millwork Locations:
    a. As shown on floor plans
15. Acceptable Suppliers:
    a. TBC Consoles
    b. As approved

D. Hardware/furniture issues:
1. Data and power cable terminations
    a. TBC Consoles T-PD. (Quantity: 4)

E. Patch Panels:

1. Identification strips to be printed labels of different color for each major connector grouping. Use a combination of colored fonts on white background and black fonts on colored backgrounds.
2. Video and AES (unbalanced) patch panel with normal through patch jacks.
    a. Acceptable Products
        1) ADC PPI4632RS-MVJ-BK. (Quantity: As required with 10% excess capacity)
        2) Equivalent products from AVP and ADC are also acceptable
3. Audio and Intercom Patch Panels—Note these panel(s) shall be located in the PA equipment racks adjacent to the PA analog patches.
    a. Non-terminated inputs to be shorted through normalling contacts on rear panel.
    b. Provide one punch down tool and one replacement tip.
    c. Acceptable product:
        1) Bittree B96DC-HNSSH/E3 M2OU7B
        2) Equivalent products from AVP and ADC are also acceptable
        3) Provide additional panels for termination of existing, external cabling; terminations at patch panels by video replay contractor.
4. RS422/232 matrix/port patch panel
    a. Two rows of 24 inputs and outputs; supply multiple units if required.
    b. 6 wire Normalling panel.
    c. Acceptable Product:
        1) Bittree B422-FI6T/24
    d. Machine Control Patch Cables:
        1) Bittree GPI-24-00
5. Fiber Optic Facility Feed.
    a. Neutrik NZPF3RU. (Quantity: 3)
    b. Neutrik NZPFD-2. (Quantity: 27)
    c. Neutrik NO4FDW-A with SCDP-0 and LC to LC patch cords to connect to the inter-facility fiber bundle. (Quantity: 42)
    d. Neutrik NKO 4S-A-0-2 TO BREAKOUT LC. (Quantity: 12)
6. General Purpose Interface contact closures available on the DVE, Still Store, Character Generator, Editor, and any other devices shall be brought to a patch panel (normals out) for wiring purposes.
    a. CAT5. (Quantity: As required)

F. Patch Cables:
1. Video Patch Cables. Standard Video Patch Cords; each length in a different color
    a. ADC is basis of Design; Provide compatible products from others:
        1) 2' in length
            a) ADC R2V-STM. (Quantity: 18)
        2) 3' in length.
            a) ADC G3V-STM. (Quantity: 12)
        3) 4' in length.
            a) ADC B4V-STM. (Quantity: 4)
        4) 6' patch to male BNC
            a) ADC 06V-STM-B. (Quantity: 4)
        5) Conversion adapter
            a) ADC MBNC-3. (Quantity: 6)
    a. Equivalent products from AVP and ADC are also acceptable
2. Machine Control Patch Cables:
    a. Bittree is basis of design
    b. Bittree GPI-24-00. (Quantity: 5)
    c. Equivalent products from AVP and ADC are also acceptable
3. Audio Patch cables
    a. Bittree is basis of design

b. Bittree BPC2405-110. (Quantity: 15)
c. Equivalent products from AVP and ADC are also acceptable

4. Patch Cord Holder OPTIONS:
a. Pomona 4408. (Quantity: 1), or
b. Trompeter CH50. (Quantity: 1), or
c. ADC PPH. (Quantity: 1)
e. ADC QB 4 with QB 4T spare tip. (Quantity: 1)

G. Camera, Video and Audio Cables:
1. Camera (Triax)
a. Gepco GTC59A-BLACK-##-Kings:
1) Quantity and Lengths
a) 4 feet (Quantity: As required to be used for CCU patch)
b) 50 feet (Quantity: 8)
c) Gepco GTC11A-BLACK-##-Kings:
2) Quantity and Lengths
a) 100 feet (Quantity: 4)
b) 350 feet (Quantity: 2) with Canare R460S (w/casters)

2. Broadcast truck umbilical:
a. Length: 150 feet
b. Overall Jacket
c. Individually numbered cables
d. Video Umbilical:
1) 10 BNC—provide 2 foot breakout at the rack end and 4 foot breakout at the truck end.
2) Gepco VS102000
3) Integrate on Hannay C3218-25-26-F with slotted divider disc to allow appropriate tail to connect between rack and reel (wall-mount w/crank handle) and mount on wall at broadcast truck parking.
4) Quantity: 1
e. Audio Umbilical:
1) End 1
a) 6 Male XLRs
b) 4 Female XLRs
2) End 2
a) 6 Female XLRs
b) 4 Male XLRs
3) Integrate on Hannay C3218-25-26-F with slotted divider disc to allow appropriate tail to connect between rack and reel (wall-mount w/crank handle) and mount on wall at broadcast truck parking.
4) Quantity: 1

3. Video Cables:
a. Assembly:
1) Gepco GVC11-BLUE-##
b. Quantity and Lengths (note: lengths are in meters):
1) 3 meter (Quantity: 4)
2) 7 meter (Quantity: 4)
3) 15 meter (Quantity: 2)
4) 30 meter (Quantity: 2)
5) 100 meter (Quantity: 3) Integrate on Canare R3805 w/casters
6) 150 meter (Quantity: 1) Integrate on Canare R3805 w/casters

4. Audio Cables:
a. Assembly:
1) Gepco GMC-5-BLUE-xx-MF-NBG
b. Quantity and Lengths (note: lengths are in meters):

1) 3 meter (Quantity: 4)
2) 7 meter (Quantity: 4)
3) 15 meter (Quantity: 2)
4) 30 meter (Quantity: 2)
5) 100 meter (Quantity: 1) Integrate on Canare R3005.

H. For all devices with detachable power cord, provide a "shortened" cable to connect directly to power strip without "bundling"; this power cable is preferred in a color other than black. Provide Owner 15 of the original length power cables.

2.16 RF CABLE, GENERAL PURPOSE CABLE AND CONTROL WIRING

A. All electrical conductors integrated under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper, and meet appropriate ratings (e.g. CMR, CMP, etc.). Cables as follows:

1. Riser rated Triax Cable:
   a. Type: RG-11/U
   b. Sweep tested to 3GHz
   c. Acceptable Product
      1) Gepco VT61811
      2) Belden 8233A
      3) Clark TV7511DR
2. Plenum rated Triax Cable for use only within plenum spaces or as required by Code:
   a. Type: RG-11/U
   b. Sweep tested to 3GHz
   c. Acceptable Product
      1) Belden 1859A
      2) Gepco VT61811TK
      3) West Penn 258311
3. Underground rated Triax Cable:
   a. Type: RG-11/U
   b. Water Blocking: Blocking Tape
   c. Sweep tested to 3GHz
   d. Acceptable Product
      1) Gepco VT61811PEF
      2) Belden 8233AWP
      3) Clark TV7511DB
4. Video (under 100') and AES-U Cable.
   a. Precision video cable, PVC jacketed.
   b. Solid center conductor.
   c. Color: cable to be ordered in 6 colors (other than black) for each separate cabling system:
      1) Gepco VDM-230
      2) CommScope as approved
      3) Belden 1855
5. INTRA RACK ROOM Video.
   a. Precision video cable, PVC jacketed.
   b. Solid center conductor.
   c. Color: cable to be ordered in 6 colors (other than black) for each separate cabling system:
      1) Gepco VSD-2001
      2) CommScope as approved
      3) Belden 1694A
6. CABLE FOR ANY RUNS OUTSIDE OF CONTROL ROOM.

a. Precision video cable, PVC jacketed.
b. Solid center conductor.
c. Color: cable to be ordered in 6 colors (other than black) for each separate cabling system.
4) Gepco VHD7000
5) CommScope as approved
6) Belden 7855A

7. Analog Audio Cable:
a. Color: cable to be ordered in 6 colors (other than black) for each separate cabling system:
1) Gepco 61801EZ
2) CommScope 4201EZ
3) Belden 9451

8. AES-B Audio Cable
a. Gepco DS401

9. Horizontal UTP Cable:
a. Provide compliant with NEC type CMP, CMR and CM rating as applicable:
b. Impedance: 100 ohms, plus or minus 15 ohms.
c. Velocity of propagation: at least 70 per cent nominal.
d. Frequency attenuation at 60° F less than 6.5 dB per 100 ft at 100 MHz.
e. Acceptable product:
1) CommScope 5504M.
2) Belden 1585A
3) Mohawk M54998
4) Refer to University standards

10. Other control cables to be 20 gauge with overall shield and appropriate number of conductors.
a. Riser Rated
1) Acceptable Product:
a) CommScope R-006-LN-8W-FN12BK

B. Connectors: All audio, video, and control equipment not a part of manufactured equipment shall have gold plated contacts excepting phone and patch jacks and plugs.
1. Triax
a. Truck/Control Room Interface Connections (Male Plug):
1) Kings 7702-1 with Gepco modular triax panel kit
b. Field Box Connections (Female Jack):
1) Kings 7702-7.with Gepco modular triax panel kit
c. Cable Connections
1) Male Plug:
a) Kings 7705-1
2) Female Jack:
a) Kings 7703-1

2. XLR type connectors shall incorporate metal shells and bodies and employ a non-hydroscopic dielectric. Panel connectors to be removable from panel front for solder and repair work. Male and Female panel connectors to fit in the same cutout. XLR connectors: Neutrik.
3. F Connector:
a. Provide commercial style gold plated connector with integral sleeve for F6 Series, F11 Series, and F59 Headend cable.
b. Provide seal ring in all moisture intensive environments.
c. Integrate with manufacturer recommended compression tool.
d. Provide weatherized boots and seal covers for all antenna connections.
e. Verify connector cable type, size and construction with manufacturer.
f. Acceptable product:

1) Gilbert Engineering GF-US-6Q series, GF-US-11Q, and GF-US-59Q series respectively.
2) Gilbert Engineering Seal ring: G-SR-1/2.

4. BNC Bulkhead Connections
   a. To utilize gold plated center contacts, insulated from panel feed-through connection:
      1) ADC BHFT-1
5. BNC cable connections
   a. To utilize gold plated center contact, dual crimp connections:
      1) ADC BNC
6. UTP connections
   a. Cat 6, 8-pin wiring
   b. T568A/B
   c. Belden
   d. Refer to University standards

2.17 FIBER OPTIC CABLING, TERMINATIONS

A. Provided by project

2.18 MANUFACTURERS COMMISSIONING

A. Provide manufacturers commissioning and setup for all systems provided as part of the Video Control Room including any selected options. This shall include, but not be limited to:
   1. Production Switcher; including interface to 3rd party devices such as file servers, audio mixers, routing switchers, cameras, etc.
   2. Routing Switcher and multi-image viewers
   3. Clip Server(s); including interface to other devices such as production switcher and data networks
   4. Character Generators
   5. Tally System
   6. Intercom Systems
   7. Slow Motion Systems; including interface to other devices such as production switcher, Edit system and data networks
   8. Shared storage, archive management, and media asset management system if provided herein.

B. If integrator shall be using their own forces for commissioning then they need to submit qualifications of persons performing commissioning and three references for similarly commissioned projects.

C. Unless otherwise noted, integrator is not responsible for providing commissioning of Owner Provided equipment (with the exception of Network switches and computers which the Owner may provide to the project for integration of configuration and operating software).

PART 3 - EXECUTION

3.1 GENERAL

A. All equipment and materials shall be new. Take care during integration to prevent scratches, dents, chips, etc.

B. Mount equipment and enclosures plumb and square. Permanently integrated equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least three. Seismic bracing shall be integrated on appropriate equipment where local codes require such integration.

C. Cover edges of cable pass-through holes in chassis, racks, boxes, etc., with rubber grommets or Brady GRNY nylon grommetting.

3.2 AC POWER AND GROUNDING

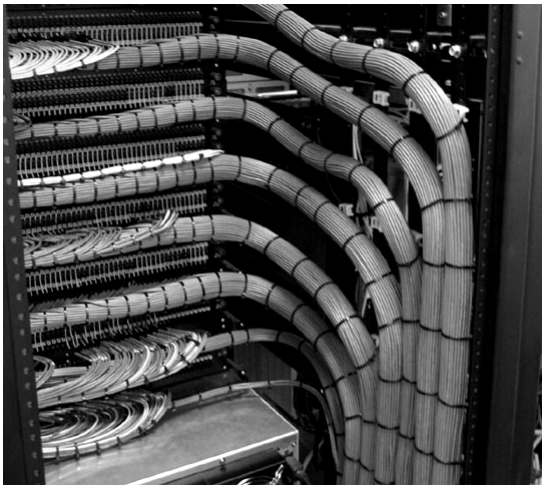
A. Coordinate and make final connection of power and ground wiring to racks. Hard wire power wiring directly to internal AC receptacles to ensure uninterrupted operation.

B. Use 3-conductor, isolated ground outlets in each rack. Provide a minimum of two spare outlets in each rack. Label each outlet as to which AC circuit is feeding it and provide the same information in the circuit breaker panel.

C. Use a copper ground buss bar top to bottom in each rack, insulated from the rack. Ground equipment chassis not having a three wire power cord to these busses using nuts, bolts and lock washers with No. 12 wire. Connect ground wire from each AC outlet in rack to this buss bar. Connect each rack buss bar to main ground wire in local power panel with properly sized insulated cable.

D. For all devices with detachable power cord, provide a “shortened” cable to connect directly to power strip without “bundling”; this power cable is preferred in a color other than black. Provide Owner 15 of the original length power cables.

3.3 EQUIPMENT RACKS AND CONSOLES



A. Mount equipment in racks and consoles and fully wire and test before delivery to job site. If field conditions prevent prior assembly of racks, notify Owner’s Representative in writing that racks will be fabricated on site and the reasons for the change.

B. Provide adequate whisper type ventilation.

C. Looking at the rack from the rear, locate AC power wiring on the left; line level audio, video, and RF wiring on the right. Panels or equipment mounted on the rear rack rails shall not block access to any front mounted components.

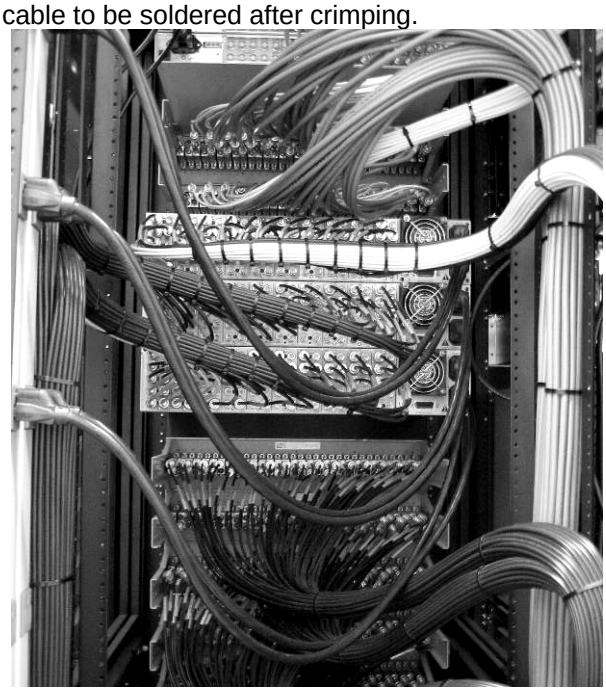
D. Where power supplies exist on both sides of the rack provide second power strip on the left (excepting patch panel racks).

3.4 SYSTEM WIRING

A. Take precautions to prevent and guard against electromagnetic and electrostatic hum. For line level audio signals, float cable shields at the output of source device. Shields not connected to be folded back over cable jacket and covered with heat-shrink tubing. Do not cut off unused shields.

B. Exercise care in wiring; damaged cables or equipment will not be accepted. Isolate cables of different signals or different levels; and separate, organize, and route to restrict channel crosstalk or feedback oscillation in any amplifier section. Keep wiring separated into groups for microphone level circuits, line level circuits, loudspeaker circuits, and power circuits.

C. Make joints and connections with rosin-core solder or with mechanical connectors approved by the Architect's Consultant; where spade lugs are used, crimp properly with ratchet type tool. Spade lugs mounted on 22 gauge or smaller cable to be soldered after crimping.



D. Execute wiring in strict adherence to:
   1. Phillip Giddings. Audio System Design and Installation. Indianapolis: Howard W. Sams & Co., 1990.
   2. Don Davis and Carolyn Davis. Appendix II, Recommended Wiring Practices. In Sound System Engineering, 2nd Edition. Indianapolis: Howard W. Sams & Co., 1989.
   3. Kenneth T. Deschler. Cable Television Technology. New York: McGraw-Hill, Inc., 1987.
   4. In accordance with standard professional practice.

E. Neatly lace vertical and horizontal wiring inside rack with lacing bars. Horizontal wiring in rack to be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Neatly bundle excess AC power cable from rack mounted equipment with velcro cable ties; where short power cables are not available. Rack wiring to be bundled with velcro cable ties. Electrical tape and adhesive backed cable tie anchors are not acceptable.

F. Provide adequate service loops so that equipment mounted on rack slides may be pulled fully out, to their locked position without straining cable.

G. All mini-BNC, mini-DIN and RCA/phono connections shall be made directly to the cable in question; whips and adapters are not acceptable.

H. Wiring and connections shall be completely visible and labeled in rack. Termination resistors shall be 1% tolerance; fully visible and not concealed within equipment or connectors.

I. Custom rack panels shall be 1/8" thick aluminum, standard rack sizes, brushed black anodized finish unless otherwise noted. (Brush in direction of aluminum grain only.) Custom connector plate (speaker, microphone, etc.) finishes shall be selected from manufacturer's full range of standard finishes. Plastic plates will not be accepted, even if building standard in other areas.
   1. All engraving shall be 1/8" block sans serif characters unless noted otherwise. On dark panels or push buttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored push buttons, letters shall be black.

J. All patch panels shall be wired so signal "sources" (outputs from devices) appear on the upper row of a row pair; all "loads" (inputs to devices) appear on the lower row of a row pair. All patch panel designation strips shall utilize alphanumeric and descriptive labels. The jack positions in

each horizontal row shall be numbered sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the functional block drawings.

K. General Equipment and Cable Labeling:
   1. Provide engraved lamicoid labels on the front and rear of active equipment mounted in racks. Mount labels in a neat, plumb and permanent manner. Embossed labels are not acceptable. Equipment labels to have at least three lines of engraving with the first line listing the general name of the device, i.e., COMB GENERATOR, or RF SWITCHER. The second line to include the schematic reference of the device, i.e., COMB GEN, or RF SWITCH. The bottom line to indicate what other devices or areas this equipment controls, i.e., FEEDS SPLITTER or MONITOR/RECEIVER.
   2. Provide an engraved label over each user-operated control that describes the function or purpose of the control. Label size to be adjusted to fit available space.
   3. Engraved labels to have 1/8" high characters minimum. Labels to be black with white characters except where indicated.
   4. Cables, and wiring to be logically, legibly and permanently labeled for easy identification. Labels on cables to be adhesive strip type covered with clear heat-shrink tubing. Factory stamped heat shrink tubing may be used in lieu of the adhesive strip style label. Hand-written or self-laminating type labels are not acceptable.
   5. Wiring designations to be an alpha-numeric code that is unique for each cable. Locate the cable designation at the start and end of each cable run and within 3" of the point of termination or connection. For cable runs that have intermediate splice points, the cable shall have the same designation throughout with an additional suffix to indicate each segment of the run. Actual cable designation assignments to be determined by integrator. Add cable designation codes to system schematic drawings included with Project Record Drawings.
   6. Label each terminal strip with a unique identification code in addition to a numerical label for each terminal. Show terminal strip codes on system schematic drawings included with Project Record Drawings.
   7. Provide adhesive labels on the rear of equipment where cables attach to indicate the designation of the cable connected at that point.

L. Device labeling shall consist of two types: functional drawing reference and operational naming convention. Device physical labeling shall apply to functional drawings and physical labels on devices, operational naming convention shall allow user to provide flexible labeling between devices and their function (e.g. camera naming/numbering, file server labels).

3.5 ANTENNA MOUNTING

A. Unistrut, Kindorf or anything of that appearance is not allowed in any conditions visible to the public.

B. Suggested mounting is McMaster-Carr Type 316 Stainless Steel Slip-ion Round Base Flange, tubing, elbows and related hardware.

3.6 INTEGRATOR TESTS AND ADJUSTMENTS

A. Verify the following before beginning actual tests and adjustments on the system:
   1. All products are integrated in proper and safe manner according to manufacturer's instructions.
   2. Insulation and shrink tubing are present where required.
   3. All Dust, debris, solder splatter, etc. is removed.

4. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
5. All labeling has been provided.
6. Temporary facilities and utilities have been properly disconnected, removed and disposed of off-site.
7. All products are neat, clean and unmarred and parts securely attached.
8. All broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. have been replaced or properly repaired, and debris cleaned up and discarded.
9. All extra materials, portable equipment and spares shall be delivered and stored at the premises as directed.

B. Prior to energizing the System verify and perform the following tests and adjustments in compliance with applicable EIA standards. Record the results of each test in the Project Record Manual.
1. Electronic devices are properly grounded.
2. Test each AC power receptacle with a circuit checker for proper hot, neutral and ground connections.
3. Powered devices have AC power from the proper circuit.
4. Measure and record the DC resistance between the technical ground in any equipment rack or console and the main building ground. Resistance should be 0.15 ohms or less.

C. Preparation for Acceptance, prior to final inspection:
1. Verify each individual component is operating properly
2. Verify each individual component's performance meets the manufacturer's published performance for this unit.
3. Verify proper operation from controlling devices to controlled devices.
4. Verify proper adjustment, balance and alignment of equipment for optimum quality and to meet the manufacturer's published specifications.
5. Establish and mark normal settings for each level control, and appropriately record these settings within the "System Operation and Maintenance Manual."
6. Verify that all communications and networking services are integrated and in proper working condition (Ethernet, IP addressing)
7. Other tests on equipment or systems as deemed appropriate, such as, but not limited to:
    a. Cameras:
        1) Verify Camera power on
        2) Verify all indicators on Camera reflect no short circuit or open circuit conditions
        3) Verify Pan-Tilt arms function smoothly
        4) Verify Focus control is connected and working
        5) Verify Zoom control is connected and working
        6) Verify Camera Head is balanced in front, back and center
        7) Verify Intercom headset is working
        8) Verify Return Video is functional
        9) Verify the Video mode is set proper mode (HD/SD)
        10) Verify Aspect Ratio is set to proper mode (16:9/4:3)
    b. Camera Base Stations:
        1) Verify all triax connectors from base stations to cameras fit snugly into each other and are secure.
        2) Verify that there is no interruption in triax cable by checking communication link indicator between camera and base station is OK.
        3) Verify On-Air/Tally and ISO indicators function as per manufacturer's specifications.
        4) Verify cable lengths do not exceed standard maximum recommended lengths for respective cable.
    c. CCUs/OCPs:

1) Verify relevant cameras are assigned and connected to respective CCU/OCP.
2) Verify assigned IP addresses and subnet mask are configured correctly
3) Verify iris control sensitivity, mode, range and center is setup and joystick is calibrated
4) Verify shading control is turned on
5) Verify White Balance is set and parameters stored.
6) Verify control of camera iris

d. Video Production Switcher
1) Verify assigned IP address and subnet mask is configured correctly
2) Verify all sources are defined, labeled and routed accurately
3) Verify all output assignments are accurate and labeled (program vs. preview)
4) Verify all external devices (DDRs, VTRs, etc) are routed accurately
5) Verify source to button mapping and labeling is to end user preferences

e. Monitors
1) Verify all camera preview cameras have picture from assigned cameras and are labeled as such
2) Verify program and preview monitors have the correct picture routed to them from production switcher
3) Verify DDRs, VTRs monitors have picture
4) Verify aspect ratio is set to 16:9 for native HD signal
5) Verify monitors are calibrated and color matched

D. Commissioning. Commissioning shall be performed by a combination of the integrator, the manufacturer or a separate commissioning agent retained by the integrator. The following identifies some, but not all, of the commissioning tasks expected of the commissioning team. This list is not intended to be comprehensive, and should be considered a general guideline for the integrator without a defined commissioning process statement.

1. Cameras and tripods.
a. Setup camera in accordance with Manufacturer's procedure
b. Balance camera and lens on tripod
c. Confirm presence and proper operation of:
1) Lens controllers
2) Tripod feet, spreaders
3) All cases and carts
4) Rain slicker(s), if any
5) Viewfinders and attachments
6) Batteries and battery chargers
7) Specified microphones
8) Specified wireless hardware
9) Specified camera lighting
d. Set lens back-focus
e. Exercise full zoom/focus control on lens
f. Confirm Remote control panel properly interacts with camera
g. Confirm tallies function as expected at each CCU and Camera. Provide/plan on green and red tally.
h. Confirm Intercom connections are balanced and functional; including CCU front panel connections
i. Confirm program audio connections are properly functioning
j. Confirm return video functions as appropriate.

2. Time Code
a. Confirm time code is set to appropriate clock and offset for team/league requirements

b. Confirm time code is distributed to all devices with time code inputs (including file servers, tape machines, multi-viewers, etc.)
c. Confirm time code records properly at all devices
d. Confirm time code does not cross talk into audio or video circuits

3. Computers, Networking, IP and Data
   a. Coordinate IP address for any equipment supplied herein.
   b. Program Gateways
   c. Program subnets
   d. Coordinate subnets and V-lans with other systems including, but not limited to AV, scoring and video displays, and league statistics.
   e. Coordinate firewall and routing configuration if needed between Video Replay and house system
   f. Set all clocks, software and hardware, to listen to local or network NTP server.
   g. If appropriate create auto-logon scripts
   h. Establish logical share names, including, but not limited to, AV, scoring and video displays, and league statistics.
   i. Set startup process to include logging into appropriate services and servers (e.g. establish SQL connection between Character Generator and data service)
   j. Establish a defined back up process and train user
   k. Integrate all relevant software including, but not limited to:
      1) Clients preference for browser(s)
      2) Word processing, spreadsheet, presentation and general office software
      3) Adobe Acrobat
      4) Software used to control, monitor and troubleshoot any hardware provided herein
      5) Creative/Graphic suites as appropriate
   l. Ghost all boot and configuration hard drives after setup and acceptance, but before the users begin training.
   m. Ghost all boot and configuration hard drives 1 month after acceptance.
   n. KVM Systems
      1) Label all source and destinations with meaningful labels (e.g. COMP 15-01 is not acceptable; C15-01; Riedel Director is).
      2) As all sources appear on two separately provided KVMs (one by Video Replay and one by Video Scoring Displays) be sure to:
         a) Coordinate labeling
         b) Determine the extent that certain users should be locked out (e.g. not all users should have access to CG keyboard).
         c) Setup a default user environment as to which users can share or just monitor
         d) Setup KVM in a training mode, to allow a single user to operate the software, while multiple users can Monitor only the trainer.
   o. Connect all data interlinked devices (e.g. CGs, protocol translators, robotic cameras, etc) with their sources using appropriate control routing switcher, patches, distribution devices and the like, Confirm
   p. Baud rate, programming speed
   q. Desired operations are functional and reliable
   r. Interconnection with other systems including, but not limited to, AV, scoring and video displays, and league statistics.

4. Rack and UPS sensors (SENSOR).
   a. Setup all rack and room temperature, humidity and moisture sensors with appropriate alarming, notification, and SNMP alarms. .
   b. Setup all UPS alarms with appropriate alarming, notification, and SNMP alarms

5. Intercom
   a. Setup each matrix station with labels as coordinated with the Owner.
   b. Setup each party line circuit with labels as coordinate with Owner

c. Program each matrix user station in accordance with Owner direction for sources and destinations. Unless otherwise noted, user stations of same type and functional use shall be initially programmed identically.
d. Test each user station to every other station.
e. Stress test the system under event standards so that users are located at each station and attempt to communicate as they would for the event.
f. Setup all wireless communication so that talk/listen is available throughout the covered area. Test with high ambient noise conditions.
g. Balance all users, user station, and intercom sources.
h. Null all party line circuits
i. Test Audio Monitoring Paths using the intercom system; verify appropriate gain structure, adjust as required.

6. Audio Phase and Stereo imaging.
   a. Check audio phase from each device to each destination, through routing switcher and direct patch. Correct any anomalies.
   b. Check Left/Right pairing from each device to each destination, through routing switcher and direct patch. Correct any anomalies.
   c. Set audio levels through each device to each destination, through routing switcher and direct patch for unity gain. Adjust interfacing devices to accommodate level differences that occur. Correct any anomalies.
   d. Use appropriate test tapes and signals and tones to verify playback level of file servers, tape machines and any device with audio playback capability.
   e. 5.1@
7. SMATV, IPTV, Broadcast cabling and Sound System interconnections.
   a. Check audio phase from each device to each destination, through routing switcher and direct patch. Correct any anomalies.
   b. Check Left/Right pairing from each device to each destination, through routing switcher and direct patch. Correct any anomalies.
   c. Set audio levels through each device to each destination, through routing switcher and direct patch for unity gain. Adjust interfacing devices to accommodate level differences that occur. Correct any anomalies.
   d. Coordinate proper naming and labeling between video and audio sources and destinations that originate elsewhere including, but not limited to Sound, Broadcast, MATV, IPTV, Video Display and LED Scoring devices which may be related work. This shall include but not be limited to: common device labels and nomenclature at each end, rack numbering, all routing interfaces.
   e. After cables are landed and coordinate verify proper connection with each supplier.
   f. Confirm that physical labels correspond to drawing labels and most importantly any alphanumeric control system labels (e.g. Tuner 1 should also be called SAT RX 5 and DIRECTV 7)
8. Production and Routing switcher configurations to Owner/Owner preferences this shall include, but not be limited to:
   a. All equipment settings
   b. Configurations
   c. Software setup
   d. All hardware, button, and software labeling on devices into groups as requested by Owner/Owner.
   e. Routing switcher programming including real and virtual naming configurations, salvo setup and programming and the like.
   f. Audio Routing
      1) Provide appropriate virtual labels for audio sources; building mono, left right pairs as directed by the Owner for recording multiple audio sources and/or routing to external locations.
      2) Set gain between exterior ties and the routing system
      3) Verify gain of feeds to and from the PA system, adjust as necessary

4) Configure MADI routing paths to exterior devices, if MADI interface is present.
5) Assist user in setting up routing to VCRs and File servers for appropriate game and non-game audio configurations.

g. Proper Alphanumeric transfer of sources to destinations including under-monitor tally designations, tally and between production and routing switchers. This shall include, but not be limited to:
1) Multi-viewers
2) In-monitor tally/under monitor displays whether connected via router or direct to auxiliary bus

h. Salvos
1) Establish pre-game and game salvos for all video and audio sources and destinations.
2) Modify salvos after all event attendance.
3) Archive each salvo.

i. Interfaces to other devices for proper operation (e.g. machine and file server control from the production switcher, through a control routing layer, to the end devices).

j. Tally programming

k. GPI and/or switcher peripheral setup and control of:
1) Character Generator(s)
2) File server(s)
3) Video Display Processors (which are likely supplied by others)
4) Routing Switcher
5) Audio playback devices
6) Audio Mixers
7) Cameras and robotics

l. Setup and configure all protocol converters that may be used between devices including but not limited to:
1) Different switching systems
2) Scoring and Video Display systems controllers

9. Video Routing and Multi-image viewing
a. Using a SMPTE pathological@ pattern test each check video path from each device to each destination, through routing switcher and direct patch. Correct any anomalies.
b. With user, determine initial multi-image viewer configuration and layout.
c. Assign both functional drawing reference and operational naming convention.
d. Video board processors
e. Setup of video processing returns

10. Distribution Gear and Signal Processing. Setup all software remote interface and operation software including but not limited to:
a. Device labeling corresponding to drawings as well as functional use
b. Signal path processing and/or interconnection paths as allowable
c. Set alarm and notifications screens as allowed.

11. Closed Captioning
a. Setup video and audio routing into and out of the device.
b. Coordinate connection of the captioning steno machine to the encoder
c. Set priority on encoder based upon user preference (e.g. local steno override, or is ignored).
d. Coordinate addressing inputs/outputs from the decoder to scoring and video display.
e. Setup intercom station to receive a headset only on the 2nd output of the intercom station
f. Setup listening mix

12. Setup graticule generator, if provided, for proper alignment of video display and sources.

13. Record all software settings and creating appropriate back up records (paper and electronic as appropriate).
14. Confirm all equipment, loose or fixed is on site. Provide written list and confirmation of such. Note that this list may be the same as the serial number list required for closeout submittals.

E. Perform the following Headend tests and adjustments in compliance with NCTA Recommended Practices for Measurements on Cable Television Systems. Correct any technical deficiencies until the NCTA preferred performance objectives are accomplished.
1. Adjust, measure and record carrier frequencies for channels assigned utilizing the spectrum analyzer method. Provide EIA channel number, QAM carrier frequency, digital sub-channel number, and virtual channel number.
2. Adjust the gain of each active device to provide optimum carrier to noise and signal to noise ratio per the manufacturer's instruction.
3. QAM Measurements
    a. Spectrum & digital average power level of each carrier
    b. Modulation Error Rate – MER
    c. Constellation display analysis – 64 & 256 QAM
        1) Gain Compression
        2) System Noise
        3) Phase Noise
    d. Coherent Interference Signal to noise ratio – SNR
    e. Carrier to noise ratio – CNR
    f. Bit Error rate – BER
    g. Tilt
    h. QAM Ingress (Ingress under the carrier)
    i. Coherent Disturbance
        1) Composite Second Order – CSO
        2) Composite Triple Beat - CBT
4. Measure, record and correct any undesired disturbances utilizing a QAM signal level meter and spectrum analyzer. Include a written explanation within the report as to the nature of any uncorrected disturbance.
5. Measure and record any spurious signals.
6. Measure and record the audio and video input/output of each encoder/demodulator at the patch panel.
7. Perform a subjective evaluation of each channels picture quality with an HD television receiver connected to headend test outlet. Provide a system with no visible picture impairments.

F. Perform the following Distribution system tests and adjustments in compliance with NCTA Recommended Practices for Measurements on Cable Television Systems. Correct any technical deficiencies until the NCTA preferred performance objectives are accomplished.
1. Adjust the gain of each active device to provide optimum carrier to noise and signal to noise ratio per the manufacturer's instruction.
2. QAM Measurements
    a. Spectrum & digital average power level of each carrier
    b. Modulation Error Rate – MER:
    c. Constellation display analysis – 64 & 256 QAM
        1) Gain Compression
        2) System Noise
        3) Phase Noise
        4) Coherent Interference
    d. Signal to noise ratio – SNR
    e. Carrier to noise ratio – CNR
    f. Bit Error rate – BER

g. Tilt
h. QAM Ingress (Ingress under the carrier)
i. Coherent Disturbance
   1) Composite Second Order – CSO
   2) Composite Triple Beat - CBT

3. Measure and record the frequency response utilizing the standard broadband or slow sweep method at the headend source, multitaps, amplifiers of any node and each drop-service outlet. A node is a fiber optic receiver or distribution amplifier.
4. Measure and record the forward path digital carrier levels at the output of each amplifier and one television outlet of all multitaps. Measure at channels (QAM carriers) 2 (55.31 MHz), 70 (499.31 MHz) and 135 (859.31 MHz). Temporary set three of the encoder/modulators to these channels and provide, simultaneously, an audio and video test signal.
5. Perform a subjective evaluation of each channels picture quality with an HD television receiver connected to each distribution NODE test outlet. Provide a system with no visible picture impairments.

3.7 TEST EQUIPMENT

A. Provide the following equipment on site for final acceptance testing. Test equipment to be available for the entire period through final system acceptance. Prior to start of testing, provide a list to the Owner's Representative of test equipment make and model numbers that will be used.
   1. Dual-trace oscilloscope: 100 MHz bandwidth, 1 mV/cm sensitivity, TV trigger.
   2. Multimeter: Measurement range, DC to 20,000 Hz, 100 mV to 300 V, 10 ma to 10A.
   3. Television signal generator: Tektronix
   4. 75 ohm, 1 percent terminators, connection adapters, test cabling, etc., as required.
   5. RF Signal Level Meter: Trithlic XFTP M3 Plus
   6. Satellite Meter: Trithlic XFTP SAT LITE
   7. Waveform Monitor: Tektronix WFM5000
   8. Variable Attenuator: Wavetek 7580.
   9. Fiber Optic Cable Test Kit: Optical Wavelength Laboratories KIT-WT-WSVSDST.
   10. Video Test Tape for each format VCR. As supplied or recommended by manufacturer.
   11. Provide two portable VHF or UHF business band radios for use during acceptance testing. Radios should have a transmission range sufficient to cover entire project. Radios to include rechargeable batteries and recharger along with "holster" for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance.

3.8 ACCEPTANCE

A. Upon completion of integration and initial tests and report specified in Part 3, acceptance testing shall be performed by the Architect's Consultant.

B. Acceptance testing will include operation of each major system and any other components deemed necessary. Integrator will assist in this testing and provide any test equipment required specified herein. Integrator shall provide at least 1 technician available for the entire testing period (day and night), to assist in tests, adjustments, and final modifications. Tools and material required to make any necessary repairs, corrections, or adjustments shall be furnished by the Integrator. Testing process is estimated to take a minimum of 3 days.

C. The following procedures will be performed on each System:

1. Video Signal: From all source inputs (for cameras, character generators, video tape units, etc.) through all VDAs, processors, switchers, etc., to all signal destinations. Verification of correct signal timing for each source, via each path will be made using standard test patterns. Each processing device will be checked such that the signal passes through the device in the no processing mode such that unity luminance, chrominance, and signal timing and phasing conditions are achieved.
2. Control functions shall be checked for proper operation, from controlling devices to controlled devices.
3. The audio fidelity test shall consist of driving the system with pink noise and measuring the response in each 1/3 octave band from 40 to 16,000 Hz. Octave, 1/3 octave, or notch filters as specified shall be used to adjust the response as necessary to fit the requirements of the space.
4. Adjust, balance, and align equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for each level control and record these settings, in the "System Operation and Maintenance Manual."
5. Integrated and loose equipment will be inventoried for correct quantity.
6. Any other test on any piece of equipment or system deemed appropriate.

D. In the event the need for further adjustment or work becomes evident during equalization and/or acceptance testing, the Integrator will continue his work until the system is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, or failure of equipment or integration to meet the requirements of these specifications, the Integrator will pay for additional time and expenses of the Architect's Consultant.

E. The Consultant's fees and costs involved in acceptance testing are not the responsibility of the Video Control Integrator, except as described in Part 3 of this specification.

F. In the event that the Video Control Room is used prior to final acceptance, attendance in support of that usage shall not be construed as acceptance, or as event attendance.

3.9 DEMONSTRATIONS AND TRAINING

A. Manufacturer's trainers or manufacturer's authorized or approved trainers to provide operations and service training on the following major equipment components and subject matter to the Owner (this is not commissioning):
   1. Production Switcher (50 hours; minimum). Submit resume on trainer on this device for approval.
      a. Provide an experienced switcher TD to program macros, custom controls, DVE moves, etc. for first events. This will include consultation on: creative content, programming of content, interfacing to file servers, etc.
      b. Switcher TD is specifically to be experienced in game entertainment production (not just broadcast production), preferably in a sporting facility with unique aspect ratio displays.
      c. It is expected that some of this involvement and time will be in advance to actual on site time and work.
      d. It is expected that trainer will need to attend two (2) games.
      e. Curriculum:
         1) Internal timing adjustments
         2) Normal switcher operations
         3) Use of aux busses with DVE
         4) Programming switcher effects memory
         5) Software configuration for:
            a) DVE
            b) Editor

c) GPIs
d) Automation System
e) Routing Switcher
f) Camera/robotic interfaces
g) Other interfaced devices

f. Trainer's Daily reports shall be emailed to those being trained, the Owner's representative, the manufacturer's training department, the systems integrator and the GC/CM as appropriate. The reports should include information required as part of the submittal; as well as detailed information on setup and operational training specific to the project's integration. The Daily reports should be cumulative and edited as appropriate during the training duration.

2. Character Generator implementation specialist (75 hours, minimum). Submit resume on implementation specialist on this device for approval.
   a. Provide an experienced CG Owner to assist in development and implementation of CG templates. This will include consultation on: creative content, programming of content, interfacing to graphic and statistical systems, etc.
   b. CG implementation is specifically to be experienced in game entertainment production (not just broadcast production), preferably in a sporting facility with unique aspect ratio displays.
   c. CG Owner is specifically to be experienced with database interfacing to Daktronics DakStats, Statvision, RTD and summary database or other scoring systems (e.g. MLBAM XML; Scorepad, Status Pro, etc.).
   d. It is expected that some of this involvement and time will be in advance to actual on site time and work.
   e. It is expected that trainer will need to attend two (2) games.
   f. No more than 40 hours of this time shall be as traditional CG training; the bulk of the time shall be in assistance of building templates, transitions, 3D effects, clip playout and the like.
   g. Trainer's Daily reports shall be emailed to those being trained, the Owner's representative, the manufacturer's training department, the systems integrator and the GC/CM as appropriate. The reports should include information required as part of the submittal; as well as detailed information on setup and operational training specific to the project integration. The Daily reports should be cumulative and edited as appropriate during the training duration.
3. Clips and Graphic Server(s) (16 hours ON EACH TYPE): Submit resume on trainer on the device(s) for approval.
   a. Trainer's Daily reports shall be emailed to those being trained, the Owner's representative, the manufacturer's training department, the systems integrator and the GC/CM as appropriate. The reports should include information required as part of the submittal; as well as detailed information on setup and operational training specific to the project integration. The Daily reports should be cumulative and edited as appropriate during the training duration.
4. Routing Switcher Training (24 hours)
   a. Include all costs for trainer and commissioning.
   b. See part 3 of this specification regarding other training considerations.
   c. Specific Issues:
      1) Programming switcher
      2) Programming and using salvos
      3) Interfacing routing switcher to the Tally Interface system with appropriate programming
      4) This training shall be distinct from any time that switcher manufacturer may spend commissioning switcher.
   d. Commissioning will be separate from training.
   e. Trainer's Daily reports shall be emailed to those being trained, the Owner's representative, the manufacturer's training department, the systems integrator and

the GC/CM as appropriate. The reports should include information required as part of the submittal; as well as detailed information on setup and operational training specific to the project integration. The Daily reports should be cumulative and edited as appropriate during the training duration.

5. Slow Motion training (36 hours; scheduled in at least three (3) separate sessions separated by 3-6 weeks as determined by Owner). Training shall be separate from commissioning. Plan on original trainer to be present at first designated sporting event.
   a. Trainer's Daily reports shall be emailed to those being trained, the Owner's representative, the manufacturer's training department, the systems integrator and the GC/CM as appropriate. The reports should include information required as part of the submittal; as well as detailed information on setup and operational training specific to the project integration. The Daily reports should be cumulative and edited as appropriate during the training duration.
6. Intercom Training (16 hours). Training shall be separate from commissioning. Training shall be both technical and operational.

B. Manufacturer's training should be assumed to take place on the project site, unless agreed to by the Owner.

C. Training should be scheduled to be non-overlapping, unless agreed to by the Owner.

D. Actual training schedule shall be by agreement with Owner. Do not assume that training will occur over 8 hour days. It is more likely that training will be scheduled in 2-4 hour increments; perhaps over a period of weeks (or even months).

E. In the event that a portion of the training time is occupied in troubleshooting the equipment integration, commissioning the equipment, then the training time shall be extended an equal amount of time.

F. The following is a general idea of the training "curriculum":
   1. A general familiarization of the architecture of the device.
   2. An explanation of how the device interfaces to the rest of the Video Control Room (including data connections; timing requirements and the like).
   3. General training on operating the device.
   4. Specific training on device operation (e.g. on the CG, entering statistics; how to access data retrieval sources; how to create repeatable formats and layouts).
   5. Saving information; backing information up.
   6. Basic troubleshooting
   7. Specific troubleshooting (this information may be conveyed to personnel other than the device's "Owners").
   8. How to upgrade software; precautions taken while doing (e.g. backing-up existing software).

G. Provide no less than 24 hours of "systems operation and maintenance" instruction to Owner designated personnel on the use and operation of the System. This instruction will consist of:
   1. A minimum of five separate sessions, by an instructor fully knowledgeable and qualified in system operation. The System Reference Manuals should be complete and on site at the time of this instruction.
   2. Coordinate these schedules with the Owner.

END OF SECTION