MINNESOTA
SPORTS FACILITIES
AUTHORITY

Minnesota Sports Facilities Authority
1005 4th Street South, Minneapolis, MN 55415

2025 Slow Motion Replay System
REQUEST FOR PROPOSALS (RFP)
ADDENDUM NO. ONE
February 26, 2025

This Addendum forms a part of the documents and modifies the Request for Proposals dated February 3, 2025. The Proposer is responsible for determination of proposal requirements affected by Addendum items.

The following clarifications, revisions, and attachments are hereby incorporated into the Request for Proposal documents effective immediately. Please acknowledge receipt of the Addendum on your Form of Proposal.

Questions and Answers:

1. Please confirm 8 channels of 1080p240 HFR as 8 cameras with 4 phases each. Please refer to Addendum 1, 11 63 53, Section 2.2, A. Two channels of 1080p240 HFR are required.

2. Please confirm existing Adder KVM license size. License size is 192.

3. Please specify how many devices are on the existing Adder KVM system. 105 devices.

4. Please confirm responsibility for disposal of equipment as contractor or owner. Equipment will be returned to owner for disposal.

5. Please specify external MAM connections for new Slow Motion Replay System. One 10G network connection to Vikings VLAN. The connection point is in the control switch stacks.

6. Please provide system functional drawings. Functional drawings will not be provided.

7. Please provide channel IO count for each of the (5) operators. Operator #1-4: (6) IN / (2) OUT, Operator #5: (2) IN / (2) OUT.

8. Please specify if there is any HDR support required. There is no current requirement for HDR within 11 63 53.

9. Please confirm acceptable use of (2) strands from JBA CATWALK CENTER SPLINE for use with new GPA antennas? Yes.

10. Please provide schedule of “dark days” where no work may be done during April 2025 through June 2025. Dark days are April 1-20, May 15-21, and June 10-16.

11. Please clarify “Substantially Complete” date. Two different dates are listed in the RFP documents. Refer to 11 63 53 Section 1.1.E,8. Date is 6/02/2025.

12. Please provide examples of metadata structures in use with the current system. Game play stats and information profile for one play from NFL GSIS.

13. Please provide requirements for roof access. Roof access requirements will be provided.

14. Please provide details on the current statistics provider. NFL GSIS

15. Please provide acceptable patchbay make(s) and model(s) if additional router IQ is required for HFR channels. Match existing patch bay make and model.

SECTION 11 63 53 – SLOW MOTION REPLAY SYSTEM

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 installation of the Slow Motion Replay System, as described in these specifications and illustrated on the associated drawings. The systems shall be called the “Slow Motion Replay System” and the slow motion replay system installer the “installer”. The systems include the following major items:

1. Slow Motion Replay System.
2. KVM Additions.
3. Signal and electrical distribution within each system at each installation point.

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. Installation in accordance with the contract documents, manufacturer’s recommendations, and all applicable code requirements.
5. Installation in accordance with US Bank Stadium Union requirements.
6. Manufacturer’s commissioning for all major items of equipment.
7. Initial tests and adjustments, written report, and documentation.
8. Instruction of operating personnel; provision of manuals.
9. Maintenance services; warranty.

C. The nature of this Contract is “design-build”. That is the Installer is responsible for all subsequent design and engineering not included within the RFP documents. The Installer is responsible for providing all components necessary for a complete and operational system. Any system changes or revisions necessary to make the system conform to the building, walls, electrical services etc., shall be included at the time of proposal and installed 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 work shall be included.

E. Anticipated Project Schedule

1. Request for Proposal Release - 2/3/2025
2. On Site Pre-Proposal Walk Through – 2/10/2025
3. RFI’s Due – 2/24/2025
4. RFI Responses – 2/28/2025
5. Proposal Due – 3/7/2025
6. Anticipated Award – 3/20/2025
7. Existing System available for demolition – 3/31/2025
8. Substantial Completion – 6/2/2025
9. First Event – 6/9/2025
10. Final Acceptance 7/7/2025

1.2 SYSTEM DESCRIPTION

A. Contractor will be working in the following major locations:

1. Production Control Room
2. Rack Room
3. Technical support spaces

B. The Slow Motion Replay System shall:

1. Support Seamless recording and playout of video and audio feeds.
2. Support baseband inputs and outputs while offering a minimal sunk cost path to support SMPTE 2110 in the future.
3. Integrate with the existing Routing Switcher.
4. Integrate with the existing Production Switcher.
5. Support file-based operations and metadata tagging.

C. Clock and Sync

1. Provide a master clock, redundant clock, and automatic change over to support operations.
   a. Provide GPS connectivity to synchronize clocks.
   b. Replace current on-site clocks and ACO with new solution.

D. KVM and User Interface materials

1. Provide KVM transmitters as required to support operational positions and system operations.
2. Provide KVM receivers, monitors and accessories as noted.

1.3 RESPONSIBILITY AND RELATED WORK

A. Demolition of existing slow motion replay systems.

1. Mark and label all cabling entering impacted area for extension/re-termination.
   a. Extend existing cabling as required for a complete and functional system.
2. Pull existing cable beyond the perimeter of the impacted area.

B. 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.

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

D. Obtain all permits necessary for the execution of any work pertaining to the installation.

E. Any record drawings provided do not show complete and accurate building details. The contractor is responsible for making field measurements necessary to establish exact locations, relationships, and load capacities necessary for the installation of these systems.

F. If a conflict develops between the contract documents and the appropriate codes and is reported to the Owner’s Representative prior to submitting the proposal, the project team will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict in writing and, upon Owner's written approval, perform work.

G. All structural support, design, and engineering for installation of all system components.

H. Power is as existing in the rack room and production control room locations. The Installer shall be responsible for any additional power required for a complete and working system.

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

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

K. Skin or paint equipment as required by the owner.

1.4 QUALITY ASSURANCE

A. Installer's Qualifications: Firm experienced in the installation of systems similar in complexity to those required for this project.

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. Submittals must be original work produced by the Contractor responsible for performing the work defined in this specification. Scanning, photographic copying, materially copying, or any other reproducing of the contents of the drawings or specifications contained within the Contract Documents will be marked as unacceptable and not reviewed for any content. No claim shall be made for delay, undue burden, or additional costs for the effort to produce shop drawings, schedules, and equipment lists addressing this specification or the overall project manual.

D. The following outlines expected submittal packages:

1. Project and Submittal schedule.
    a. Within 1 week of award, provide a project and submittal schedule.
    b. Include major construction milestones and expected delivery date of all submittals.
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.
3. Detail Submittal
    a. Proposed cable labeling technique.
    b. 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.
    c. Schematic drawings of any custom circuitry or equipment modifications, including connector pinouts and component lists.
    d. Patch panel layouts and designation (labeling) strips.
    e. 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.
    f. Representative equipment labeling sizes, styles, and numbering.
    g. Any structural mounting details (including structural engineers seal as appropriate)
    h. Samples as required in various specification paragraphs.
4. Commissioning Completion Submittal.

a. At the conclusion of the commissioning process provide a written submittal indicating the completion of each commissioning task.

5. 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's Representative, formally submit a Training and Event Attendance submittal prior to first training. Submittal shall:
      1) Indicate date, time, and approximate length of training session.
      2) Indicate person(s) conducting training.
      3) Indicate whether training will be recorded.
      4) Intended curriculum and most appropriate attendees (e.g. engineer, operations, IT, etc.)
      5) 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 Contractor actually completing the training indicating that training 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.
      6) Owner's representative attending training at the end of the session shall initial that:
         a) Training Occurred.
         b) Training Materials were provided and left with operator
         c) Training was not interrupted or shortened by equipment or system troubleshooting. If it is, then there should be a line where Operator and Contractor can indicate when make-up training will be provided and how long it should be.
         d) Training was generally sufficient for the proposed curriculum.
      7) Include Notes section for Owner and Contractor to note any issues during training (areas requiring further development, etc.).
   c. Following training occurrence, submit completed daily training records no later than the following business day.
      1) When training a single system over a period of weeks, consolidate and resubmit previously submitted training submittals every 2 weeks as well.

6. Final Inspection Notification Report. A typed, neatly prepared checkout report for each piece of equipment and the entire system shall be prepared and submitted; it shall include:
   a. 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).
   b. The final report shall indicate that every device tested successfully.
   c. A performance test report indicating that the system meets all of the Installer testing requirements of Part 3.

7. Contract Close Out Submittal
   a. Keep a complete set of drawings on the job, note any changes made during installation, and submit 1 corrected set of reproducible drawings showing Work as installed.
   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 wireless intercom system, based on the as-built documentation, at a reduced scale easy to handle but fully legible.
   g) Maintenance Instructions, including Installer'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.
3) 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.

E. Electronically editable files for all project work:

1. AutoCAD DWG
2. Excel
3. Word
4. 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 install work as shown, recommend solutions and/or submit drawings to the Owner's Representative for approval, showing how the work may be installed.

1.7 ACCEPTANCE TESTING

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

B. Provide a minimum of one person familiar with all aspects of the system to assist the Consultant during acceptance testing.

C. Allocate a minimum of 1 full day on site for acceptance testing with the owner's representative.

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

1.8 WARRANTY

A. In addition to warranty requirements laid out as part of the RFP:

1. Warrant labor and materials provided under this agreement for two years following the date of the first successful game, trouble free operation, or substantial completion, whichever is later.
2. 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.
3. 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.
4. Within the warranty period, answer service calls within 8 hours, and correct the problem within twenty-four hours.
5. Register all manufacturers' warranties (e.g. software, computers, etc.) in Owner's name.

1.9 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 Solutions are listed, the Installer may select from the acceptable at their discretion.

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 installed 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 installation at no additional cost subject to approval by the Owner and Owner's representative.

1.10 OPERATOR OR OWNER FURNISHED EQUIPMENT

A. Certain Equipment is identified as Operator or Owner Furnished Equipment. This Owner Furnished Equipment will be available from the Owner. Coordinate configuration and installation 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 original 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. Existing/Legacy Owner Furnished Equipment reused as part of the system:

1. Network Switches
   a. 20 Ports will be made available for this solution.
   b. Provide network switch for any ports required over the 20 furnished by owner.

1.11 UNIT COST TO SUPPLY AND INSTALL

A. None requested at this time.

1.12 OPTIONS

A. Option 11 63 50-A. Slow Motion and Clips Replacement Option. Provide incremental cost to replace base bid Slow Motion and Clips solution.

1. Option 11 63 50-A1. Evertz Slow Motion and Clips Solution
   a. Supply acceptable Evertz solution in lieu of base bid configuration.
2. Option 11 63 50-A2. EVS Slow Motion and Clips Solution
   a. Supply acceptable EVS solution in lieu of base bid configuration.

B. Options should reflect the net cost (add or deduct) for the option and all impacted elements. In the event an option cannot be provided, list NA on bid form.

PART 2 - PRODUCTS

2.1 GENERAL

A. All equipment and materials shall carry original manufacturer's warranty. Take care during installation to prevent scratches, dents, chips, etc.

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

C. 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 SLOW MOTION REPLAY AND CLIPS PLAYERS

A. Base bid Performance specification

1. Record channels:
   a. 26 channels 1080p 59.94
   b. 2 channels of 1080p240 HFR
2. Playout channels:
   a. Slow motion playout: 12 channels 1080p 59.94
   b. Clips playout: 8 channels 1080p 59.94
3. Operator positions:
   a. (5) Slow Motion Operators with
      1) (1) Slow Motion Control Panel (SCP)
      2) (1) Dual head KVM Receiver (Type 1 EXT)

3) (2) Touchscreen Monitors (Type 1 CPXM)
4) (1) Mini Keyboard (Type 1 KEYBOARD)
5) (1) Mouse (Type 1 MOUSE)

b. (1) Clips operator position
1) (1) Dual head KVM Receiver (Type 1 EXT)
2) (2) Touchscreen Monitors (Type 1 CPXM)
3) (1) Full Size Keyboard (Type 2 KEYBOARD)
4) (1) Mouse (Type 1 MOUSE)

c. (1) Logger position
1) (1) Dual head KVM Receiver (Type 1 EXT)
2) (2) Touchscreen monitors (Type 1 CPXM)
3) (1) Full Size Keyboard (Type 2 KEYBOARD)
4) (1) Mouse (Type 1 MOUSE)
~~4~~5) Logger position to connect in remote locations via network connection. Provide any required conversion for network extension.

4. Storage:
a. Provide adequate storage to record all slow motions channels for 10 hours.
b. Calculate storage for HFR based on selected base bid configuration.
c. Stats integration
d. IDM/XML ties
e. Feature Set
1) 1080p record and playback capable
2) Keyframable, 1080p pan and scan
3) High Frame Rate (4x at 1080p minimum) capable
4) All Players access all recorded content directly
5) File export/import to DNX, ProRes, MPEG I-Frame Only
6) API for clip export
7) Support for data driven auto clipping
8) Binning/banking of clips to automatically export
9) Support consistent clip metadata structure that can be imported by existing editing system
a) Integrate with existing MAM solution
10) Synchronous playback across multiple players
11) Players to have Clip name, clip duration, countdown information able to be displayed via selected multiviewer.
a) If information requires a character output provide additional outputs and RS inputs
12) Production Switcher control of playback--VDCP or AMP
13) Dedicated Controller
14) Include Multiviewer output to router. Where Slow Motion provides HDMI multi-viewer output, provide HDMI to SDI converter.

5. Transport format
a. Slow Motion Replay and Clip Players shall be integrated into an existing baseband workflow. This integration shall be accomplished in a manner to allow minimal sunk costs to transition to a SMPTE 2110 based workflow.
1) System conversion may be accomplished through the use of onboard Baseband IO cards to be replaced with SMPTE 2110 IO cards in the future, on board SMPTE 2110 IO and external IP gateways or External Baseband IO to be replaced with External SMPTE 2110 based IO in the future.
a) If replaceable IO is used, certify manufacturer will make available SMPTE 2110 IO for a period of 5 years following project completion.
2) Only Baseband IO is required to be supported upon commissioning.

B. Vendors with solutions

1. Evertz

a. Evertz contact: Orest Holyk - orest@evertz.com
2. EVS
a. EVS contact: Jerome Wauthoz - j.wauthoz@evs.com

2.3 MONITORS, KVM, AND ACCESSORIES

A. Color picture Monitor (CPXM) Type 1

1. 22” Touch Screen Monitor
2. 1920 x 1080 minimum resolution
3. Acceptable Solutions:
a. Acer UT222Q
b. Asus BE24ECSBT
c. Planar Helium PCT2235
d. View Sonic TD2230
e. As Approved
4. Quantity: As Required plus 2

B. Keyboard (KEYBOARD) Type 1

1. Reduced size keyboard
2. Acceptable Solutions:
a. Adesso AKB-111UB
b. GMYLE 2778
c. SR Mini Keyboard Wired
3. Quantity: As required plus 2

C. Keyboard (KEYBOARD) Type 2

1. Full size keyboard
2. Acceptable Solutions:
a. Dell KB216-B
b. Kensington K64370A
c. Logitech K120
d. As Approved
3. Quantity: As required

D. Mouse (MOUSE) Type 1

1. Acceptable Solutions:
a. Dell MS116
b. Logitech B100
c. As Approved
2. Quantity: As Required Plus 1

E. KVM Transmitter (EXT) Type 1

1. Acceptable Solution
a. Adder 2022 KVM Transmitter

F. KVM Receiver (EXR) Type 1

1. Acceptable Solution:
a. Adder 2122

2.4 TEST AND SYNC GENERATION

A. Sync Generator (SYNC) Type 1

1. Support for the following signals:
    a. Integral test generator
    b. Digital black
    c. Two independently adjustable black burst outputs
    d. PTP V2
2. Integrate Sync Type 1 into existing systems
3. Provide Connection for Sync Type 1 to GPS via provided receivers
4. Acceptable Solutions
    a. Evertz 5700MSC-IP
    b. Telestream SPG9000 with
        1) Telestream SPG9000-GNSS
        2) Telestream SPG9000-PTP
        3) Telestream SPG9000-RACK
        4) Telestream SPG9000-DPW
        5) Telestream PWR-CORD-NA-S15 (Quantity: 2)
        6) Telestream SPG9000-ACC-ANT
        7) Telestream SPG9000-LICENSE
        8) Telestream SPG9000-LIC-SDI
    c. Leader LT4670 with
        1) Leader LT4670-SER01
        2) Leader LT4670-SER02
        3) Leader LT4670-SER03
        4) Leader LT4670-SER11
        5) Leader LTGPSA1
5. Quantity: 2

B. Sync Change Over (SYNC) Type 2

1. Support sync change over for all signals from Type 1 Sync Generator
2. Provide the same manufacturer as SYNC Type 1
3. Integrate Sync Type 2 in place of existing sync change over
4. Acceptable Solutions
    a. Evertz 5700ACO
    b. Telestream ECO8000 with
        1) Telestream ECO8000 A0 (Quantity: 2)
        2) Telestream ECO8000 DPW
        3) Telestream ECO8000 LTC
        4) Telestream ECO8000 RACK
        5) Telestream ECO8000 REF
        6) Telestream ECO8000 HREF
    c. Leader LT4448 with
        1) Leader LC2185
5. Quantity: 1

2.5 GENERAL PURPOSE CONTROL WIRING, FIBER OPTIC AND RF CABLE/CONNECTORS

A. Cabling to be in accordance with Owner standards.

B. Connectors to be in accordance with Owner standards, with the following exceptions/enhancements:

1. Single Mode Fiber Optic ST Connector:
    a. Connector Type: Single Mode Fiber ST connector.
    b. Temperature Cycling: ≤0.3dB change, -40° to +75° C.

c. Insertion Loss Average: 0.2 dB.
d. Reflectance: ≤ 40 dB typical.
e. Re-matings: minimum of 500.
f. Mechanical splicing not acceptable
g. Acceptable Manufacturers
    1) Belden
    2) Corning
    3) As Approved
h. Provide 25 spare connectors after turn over.

2. Single Mode Fiber Optic LC UPC Connector:
    a. Connector Type: Single Mode Fiber LC connector for use with Neutrik opticalCON connector.
    b. Temperature Cycling: ≤0.3dB change, -40° to +75° C.
    c. Insertion Loss Average: 0.2
    d. Reflectance: ≤ 55 dB typical.
    e. Re-matings: minimum of 500.
    f. Mechanical splicing not acceptable
    g. Acceptable Manufacturer:
        1) Belden
        2) Corning
        3) As approved
    h. Provide 25 spare connectors after turn over.

2.6 DEMONSTRATION AND TRAINING

A. On Site Training. 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):

B. Slow Motion training (36 hours; scheduled in at least three (3) separate sessions separated by 3-6 weeks as determined by operator). Training shall be separate from commissioning. Plan on the original trainer to be present at first designated sporting event.

1. Trainer's Daily reports shall be emailed to those being trained, the Owner's representative, the manufacturer's training department, Contractor.
    a. 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 installation.
    b. The Daily reports should be cumulative and edited as appropriate during the training duration.

C. Provide not less than 16 hours of "systems operation and maintenance" instruction to Owner designated personnel on the use and operation of the System. This instruction will consist of two portions:

1. A minimum of 2 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. Event Attendance within the following requirements:
    a. Be present at the first home games or other events as designated by the Owner, up to a maximum of 5 events total.
    b. During these events, attendance shall begin at the first crew call and conclude when the crew is released. 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.

c. 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.
d. Coordinate these schedules with the Owner.

PART 3 - EXECUTION

3.1 GENERAL

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

B. Mount equipment and enclosures plumb and square. Permanently installed 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 installed on appropriate equipment where local codes require such installation.

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. 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 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 Owner’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 steel, standard rack sizes, brushed black anodized finish unless otherwise noted. (Brush in direction of 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 labels on the front and rear of active equipment mounted in racks. Mount labels in a neat, plumb and permanent manner. Embossed labels are acceptable. Coordinate color and mounting location with end user. Equipment labels to have at least three lines of text 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 IP address where applicable.
2. Equipment labels to have 1/8" high characters minimum. Labels to be black with white characters except where indicated.
3. 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.
4. 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 Installer. Add cable designation codes to system schematic drawings included with Project Record Drawings.
5. 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.
6. 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).

3.4 CONTRACTOR TESTS AND ADJUSTMENTS

A. Verify the following before beginning actual tests and adjustments on the system:

1. All products are installed 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 installed and in proper working condition (Ethernet, IP addressing)

3.5 COMMISSIONING

A. Commissioning shall be performed by a commissioning team consisting of the Contractor, the manufacturer or a separate commissioning agent retained by the Contractor.

B. 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 Contractor without a defined commissioning process statement.

1. 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

2. 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 Production 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. Install 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.
3. KVM Systems
   a. Label all source and destinations with meaningful labels (e.g. “COMP 15-01” is not acceptable; “C15-01; ICOM” Director is).
   b. Coordinate labeling
   c. Determine the extent that certain users should be locked out (e.g. not all users should have access to CG keyboard).
   d. Set up a default user environment as to which users can share or just monitor.
   e. Setup KVM in a training mode, to allow a single user to operate the software, while multiple users can Monitor only the trainer.
   f. 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.

3.6 TEST EQUIPMENT

A. Prior to start of testing, provide a list to the Owner’s Representative of test equipment make and model numbers that will be used.

B. Test equipment to be available for the entire period through final system acceptance.

C. Provide the following equipment on site for final acceptance testing:

1. Dual-trace oscilloscope: 100 MHz bandwidth, 1 mV/cm sensitivity, TV trigger.
2. Fiber Optic Cable Test Kit: Optical Wavelength Laboratories KIT-WT-WSVSDST.

3.7 ACCEPTANCE

A. Upon completion of installation and initial tests and report specified in Part 3, acceptance testing shall be performed by the Owner's Representative.

B. Acceptance testing will include operation of each major system and any other components deemed necessary.

C. Contractor will assist in this testing and provide any test equipment required specified herein.

D. Contractor 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 Contractor.

E. Testing process is estimated to take a minimum of 1 day.

F. In the event the need for further adjustment or work becomes evident during equalization and/or acceptance testing, the Contractor will continue 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 installation to meet the requirements of these specifications, the Contractor will pay for additional time and expenses of the Owner's Consultant.

G. The Owner's Representative's fees and costs involved in acceptance testing are not the responsibility of the Contractor, except as described in Part 3 of this specification.

H. In the event that the Slow Motion Replay System is used prior to final acceptance, attendance in support of that usage shall not be construed as acceptance, or as event attendance.

END OF SECTION 11 63 53