NASA GLENN RESEARCH CENTER

CENTRALIZED OFFICE BUILDING

AUDITORIUM PRODUCTION SYSTEM

STATEMENT OF WORK

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PART 1 – SUMMARY OF WORK

1.1 DESCRIPTION

The John H. Glenn Research Center (GRC) is constructing a Centralized Office Building (COB) sized at approximately 90,000 square feet to house 300 employees. The COB will contain a large multi-functional space supporting meetings, video teleconferences, training sessions, executive meetings, and other types of gatherings. The Auditorium production system provides a means to record, transmit, and project audio and video, and interface with the Auditorium computer graphics and audio system (by others).

1.2 SCOPE OF WORK – GENERAL

A. The Contractor shall provide a fully functional production system solution. The Contractor shall be responsible for any ancillary service partners required.

B. The Contractor shall possess detailed knowledge of the production system needs to provide services to their clients. The Contractor shall work and coordinate closely with NASA to understand the goals and vision of the institution while providing the production systems solution.

C. The Contractor shall have a permanent in house staff of systems engineers who regularly procure, configure, install, address, troubleshoot, and maintain audiovisual and broadcast production systems.

D. The Contractor and its partners shall have engineers with the most current and top-of-the-line diagnostic tool kits and equipment to analyze production systems before integration and test for successful operation once it is complete.

1.3 SCOPE OF WORK- SPECIFIC

A. Project Identification: Building 162 Auditorium Production System located at the National Aeronautics and Space Administration (NASA) GRC, Lewis Field, Cleveland, OH.

B. Contract Drawings: Below is the list of drawings which are a part of this contract. Reference publications will not be furnished. Contractor shall immediately check furnished drawings and notify the Government of any discrepancies.

AV-001: AUDIOVISUAL SYMBOLS AND ABBREVIATIONS
AV-201: AUDITORIUM FIRST FLOOR SYSTEMS PLANS
AV-220: AUDITORIUM CONTROL ROOM SYSTEMS PLANS
AV-400: AUDIOVISUAL DETAILS
AV-401: AUDIOVISUAL DETAILS
AV-402: AUDIOVISUAL RACK ELEVATIONS

C. Summary of Scope of Work: The Contractor shall be responsible for all work indicated in the contract documents and for coordinating the operations of all trades contractors engaged at the

site, including those performing work under separate agreement. This responsibility shall include scheduling and proper sequencing of the work, supervising the work and assuring quality control. Any assignment of work indicated in the scope descriptions below is for the purpose of organization only and should not be construed to define subcontract relationship or to relieve the AV Contractor from its responsibility to control installation means, techniques and sequence and to coordinate all work required under the contract.

D. The contractor shall provide or perform project requirements as outlined below:

1. Provide operational video, audio, recording, transmission, and projection of content with an interface to the computer graphics and audio system.

2. Provide control rack systems and components.

3. Provide system training.

4. Provide coordination and integration of equipment with NASA's existing systems.

5. Verify all existing conditions, elevations and dimensions prior to the start of work. Notify NASA Contracting Officer (CO) of any discrepancies before proceeding.

6. Provide all shop drawings, samples and submittals required in connection with the work.

7. Provide as-built drawings accurately describing the actual installation where it varies from that shown in the contract documents. As-built drawings shall be updated on a weekly basis and shall be maintained at the project work site. Failure to maintain as-built documents will constitute cause for withholding progress payments by NASA.

8. Provide operation and maintenance manuals and instructions to NASA's personnel as specified prior to commissioning operations.

9. Commission equipment into a fully operational production system.

10. Provide guarantees and equipment warranties.

11. Provide all equipment, scaffolding, ladders, etc. to successfully complete the installation.

13. Remove all debris daily from project site.

14. Contractor shall be responsible for security of their project tools, equipment, and materials stored and installed on premises. COB A/V Control Room 155 is lockable and may be utilized by the Contractor for storage. No other space will be provided on-site for storage.

15. Provide testing and demonstration as required by the project documents.

16. Provide stenciling, labeling, and tagging of equipment and cabling

17. Government will be tagging equipment for property inventory purposes. Coordinate with Government Representative to support this activity.

18. Provide temporary task lighting, telephone service, and field office support as needed by the AV Contractor.

19. Provide material handling through the building and site. Use of operational elevators for vertical transportation in the building is not guaranteed to be available

1.4 WORK COVERED BY CONTRACT DOCUMENTS

The work of the project is defined by the contract documents includes but is not limited to of the following:

1. Audiovisual Production Systems Equipment.

2. Audiovisual Production Systems Cabling interior to the Control Room unless otherwise noted.

1.5 WORK UNDER OTHER CONTRACTS

NASA has or will award separate contracts for performance of certain installation operations at the site. The contractor shall cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this contract.

1.6 NASA-FURNISHED PRODUCTS

NASA will furnish the following items for installation under the contract: 96-point Audio Patch Panel.

1.7 PROJECT SCHEDULE

The Contractor shall have 30 days from issuance of field work Notice to Proceed for completion of field activities.

1.8 INTENT OF DRAWINGS

A. Provide complete and functional systems for the project. The systems shall conform to the details stated in the specifications and shown on the drawings. Items or work not shown or specified, but required for complete systems, shall be provided and conform to accepted trade practices. The drawings and specifications are presented to define specific system requirements and serve to expand on the primary contract requirements of providing complete systems. The drawings are diagrammatic and indicate the general arrangement and routing of the systems included in this AV Contractor's work.

B. Do not scale the drawings. Because of the scale of the drawings, it is not possible to indicate offsets, fittings, valves, or similar items which may be required to provide complete operating systems. Carefully investigate conditions affecting the work associated with this project. Check and verify dimensions and existing conditions at the site. Install systems in such a manner that interferences between pipes, conduit, ducts, equipment, architectural and structural features are avoided. Provide items required to meet the project conditions without additional cost to NASA.

C. These documents may not explicitly disclose final details required for a complete systems installation; however, the AV Contractor shall possess the expertise to include the necessary appointments of complete operating systems.

D. The AV Contractor shall be “Experienced” in this type of installation and realize the extent of the work required. “Experienced” shall be defined as having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.9 DEFINITIONS

Specific terminology, as used herein, shall have the following meanings:

1. “Finished Space” …Space other than mechanical rooms, electrical rooms, furred spaces, pipe chases, unheated spaces immediately below roof, space above ceilings, unexcavated spaces, crawl spaces, tunnels, and interstitial spaces.

2. "Conditioned"...Spaces directly provided with heating and cooling.

3. "Unconditioned"...Spaces without heating or cooling including ceiling plenums.

4. "Indoors"...Located inside the exterior walls and roof of the building.

5. "Outdoors"...Located outside the exterior walls and roof of the building.

6. “Comparable Product”… Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.10 GENERAL STANDARDS OF MATERIALS

A. Equipment and materials, unless otherwise noted, shall be new and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of these products for a period of not less than three years.

B. Equipment of one type shall be the products of one manufacturer; similar items of the same classification shall be identical, including equipment, assemblies, parts and components.

C. Materials furnished shall be determined safe by a nationally recognized testing organization, such as Underwriters' Laboratories, Inc., or Factory Mutual Engineering Corporation, and materials shall be labeled, certified or listed by such organizations. Where third party certification is required for packaged equipment, the equipment shall bear the appropriate certification label.

1.11 APPLICABLE CODES AND STANDARDS

Materials furnished and work installed shall comply with applicable Federal, State, and Local codes, with the requirements of the governmental departments or authorities having jurisdiction.

1.12 WARRANTIES

A. Defective equipment, materials or workmanship shall be replaced or repaired at no extra cost to the Government for the duration of the stipulated guarantee periods.

1. In accordance with FAR clause 52.246-12, the Contractor shall provide a 1-year warranty from "acceptance of the work". NASA GRC interprets this as 1-year from the final completion date. Subcontracts or Supply Purchase Orders shall include these provisions. The following clarifications are made to assure complete understanding of warranty provisions:

   - The prime Contractor shall operate and maintain all equipment and systems installed until the contract completion date. This includes maintenance service inspections, filter replacements and other work as recommended by the manufacturer. Following completion, the Government will assume O&M responsibilities in accordance with the manufacturer's recommendations.

   - The prime Contractor shall provide a written 1 -year warranty from the contract completion date to the Government covering all materials, labor and workmanship. Warranty repairs may require the services of subcontractors or suppliers, but shall be managed and coordinated by the prime.

   - The prime Contractor shall provide a 1-year certificate of warranty from each supplier or provider for all purchased equipment or systems. Requests for warranty repairs shall be made directly to the manufacturer or supplier.

2. This provision is not affected by the Government's beneficial use or occupancy prior to the final completion. The warranty date may be adjusted throughout the course of this contract as required to include contract time extensions with an equitable adjustment to the contract. Should the contractor complete the work ahead of schedule, the warranty provisions will be revised to reflect the actual completion.

   The warranty start date for this contract is calculated as the bid guarantee date plus the awarded period of performance.

B. Warranties specified in other Parts of this SOW shall be in addition to, and run concurrent with, other warranties required by the contract documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the contract documents.

C. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to NASA.

D. Submittal Time: Comply with requirements in Part 6 "Closeout Procedures."

1.13 TEMPORARY SHUTDOWN OF EXISTING SYSTEMS

A. The Contractor shall plan installation of new work and connections to existing work to insure minimum interference with regular operation of existing systems. Some temporary shutdown of existing systems may be required to complete the work.

B. Existing system shutdowns must be performed by the Government. The contractor shall not shut-down any system. The Government reserves the right to require a walk-through of any shutdown prior to the shutdown.

1.14 COORDINATION

A. The contractor shall effectively coordinate work with the Government to permit the work to be installed satisfactorily and with the least possible interference or delay.

B. When work is installed without proper coordination, changes to this work deemed necessary by the NASA CO shall be made to correct the conditions without extra cost to the Government.

1.15 CONTRACTOR USE OF PREMISES

A. During the installation period the Contractor shall have full use of the premises for operations within the specific work areas shown on the Documents.

1. Delivery and assembly at GRC shall be performed from 7:30 am to 4:00 pm, Monday through Sunday. Additional work hours may be worked with the approval of the NASA CO. All work shall be scheduled with the CO and the COB Project Manager (PM) prior to the start of installation.

2. All rubbish and debris shall be removed from GRC and the work areas shall be kept clean at all times. Provide dust and noise control as applicable

3. NASA Occupancy: Allow for NASA occupancy and use by the public of all adjacent roadways and parking areas, buildings and facilities outside the limits of this project.

4. Driveways and Entrances: Keep driveways and entrances outside the limits of this project clear and available to NASA, NASA's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

5. Paved Areas: The Contractor shall take all necessary precautions to protect the newly paved surfaces at the COB from damage. If the Contractor desires to use any of the new asphalt surfaces for a laydown area or staging of equipment, a plan shall be submitted to the Government for approval. The Contractor shall use steel plates or other means, approved by the Government, to protect the new asphalt surface. The Contractor shall be responsible for repairing any damage done to Government property, including roadway and parking surfaces.

6. The Contractor shall be responsible for repairing any damage done to Government equipment during this project.

1.16 OCCUPANCY REQUIREMENTS

Partial NASA Occupancy: NASA reserves the right to occupy and to place and install equipment in completed areas of the site prior to Substantial Completion, provided such occupancy does not interfere with completion of the work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total work.

1.17 PRODUCT DELIVERY AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to ensure compliance with the contract documents and to ensure that products are undamaged and properly protected.

PART 2 - SUBSTITUTIONS

This Section includes administrative and procedural requirements for substitution of products for use in this project after project award.

2.1 DEFINITIONS

A. Products: Items purchased for incorporating into the work, whether purchased for project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the contract documents.

2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product

4. Mandatory Product: As listed in Audiovisual Systems Specification Section 274100 Appendices (Equipment Lists), product required to be provided based on its specific functionality, interface with existing GRC equipment and systems.

5. Substitutions: Changes in products, materials, equipment, and methods of installation from those required by the Contract documents and proposed by AV Contractor. Substitutions are also products, materials, equipment and methods of installation that replace a previously submitted and approved or approved as noted product.

2.2 SUBSTITUTION REQUESTS

A. Substitution Requests shall be addressed through the standard submittal process as defined in the Submittals section of this SOW. Each request shall include Equipment ID Tag and Item Description.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to installation performed by NASA and separate contractors that will be necessary to accommodate proposed substitution.

c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
d. List of similar installations for completed projects with project names and addresses, and names and addresses of architects and owners.
e. Detailed comparison of Contractor's Installation Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of installation cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
f. Detailed breakdown of cost and or credit information, including a proposal of change, if any, in the Contract Sum.
g. AV Contractor's certification that proposed substitution complies with requirements in the Contract documents and is appropriate for applications indicated.
h. AV Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2.3 QUALITY CONTROL

A. Compatibility: Before submitting a substitution request, the Contractor shall conduct a thorough review of the proposed substitute product to ensure that it is compatible with the other products and systems with products previously selected, even if previously selected products were also options.

B. Verification: Before submitting a substitution request, the Contractor shall verify the proposed substitute product will fit within the space allotted in the originally designed product and that the weight of the substituted product has no adverse effect on the capacity of the supporting structure.

2.4 PRODUCT, MATERIAL, EQUIPMENT AND METHODS OF INSTALLATION SUBSTITUTIONS

A. Conditions: NASA will consider Contractor's request for substitution when the following conditions are demonstrated to NASA’s satisfaction. If the following conditions are not so demonstrated, NASA will return submittals as Not Approved, except to record noncompliance with these requirements:

1. Requested substitution offers NASA a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities NASA must assume.

2. Requested substitution does not require extensive revisions to the Contract documents.

3. Requested substitution is consistent with the Contract documents and will produce indicated results.

4. Substitution request is fully documented and properly submitted.

5. Requested substitution will not adversely affect the Installation Schedule.

6. Requested substitution has received necessary approvals of authorities having jurisdiction.

7. Requested substitution is compatible with other portions of the Work.

8. Requested substitution has been coordinated with other portions of the Work.

9. Requested substitution provides specified warranty.

PART 3 - PROJECT MANAGEMENT AND COORDINATION

3.1 SUMMARY

A. Section includes administrative provisions for coordinating the Project installation including, but not limited to, the following:

1. Requests for Information (RFIs).

2. Project meetings

3.2 REQUESTS FOR INFORMATION (RFI's)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract documents, Contractor shall prepare and electronically submit a RFI on NASA Form C-9c (MS Word format). A copy of the NASA Form C-9c is included at the end of this SOW.

1. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

2. Unnecessary or Frivolous RFIs (RFI requesting information that is easily determined by reviewing Contract documents) will be rejected.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.

3. Date.

4. Name of Contractor.

5. Name of Project Manager.

6. RFI number, numbered sequentially.

7. RFI subject.

8. Specification Section number and title and related paragraphs, as appropriate.

9. Drawing number and detail references, as appropriate.

10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation, as required.

C. NASA's Action: NASA will review each RFI, determine action required, and respond. If AV Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify NASA in writing within 2 days of receipt of the RFI response.

1. RFI's marked "RFP": Contractor shall submit a cost proposal within 3 calendar days. Include any impact to schedule. Work shall not proceed until proposal is approved by Contracting Officer and NTP is given.

2. RFI's marked "CO": NASA will issue a contract change order. Work is to proceed immediately and Contractor shall submit change order pricing within 3 calendar days.

3.3 PROJECT MEETINGS

A. Post Award Meeting: Before starting contract activities, attend post award meeting scheduled by NASA no later than 14 calendar days after contract award.

1. Review responsibilities and personnel assignments.

2. Attendees: Authorized representatives of NASA, and their consultants; Contractor and its project manager; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative installation schedule.
b. Critical work sequencing and long-lead items.
c. Designation of key personnel and their duties.
d. Lines of communications.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract documents.
j. Submittal procedures.
k. Preparation of record documents.
l. Use of the premises.
m. Work restrictions.
n. Working hours.
o. NASA's occupancy requirements.
p. Responsibility for temporary facilities and controls.
q. Procedures for disruptions and shutdowns.
r. Installation waste management.
s. Parking availability.

t. Office, work, and storage areas.
u. Equipment deliveries and priorities.
v. First aid.
w. Security.
x. Progress cleaning.

4. Minutes: NASA will record and distribute meeting minutes.

B. Pre-installation Meeting: After approval of all submittals and Site-specific Health and Safety Plan (HASP), and within (5) working days of the start of installation, attend a pre-installation conference at Project site conducted by NASA.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.

2. Agenda: Discuss project implementation and coordination details, which may include:

a. Open RFIs.
b. Deliveries.
c. Possible conflicts.
d. Time schedules.
e. Space and access limitations.
f. Regulations of authorities having jurisdiction.
g. Installation procedures.
h. Coordination with other work.
i. Protection of adjacent work.
j. Protection of installation and personnel.
k. Waste Disposal and Property Pass process

3. NASA will record significant meeting discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: NASA will distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

C. Demonstration and Training Courses: The Contractor will schedule, conduct, and provide meeting minutes and a recorded digital record of the demonstration and training courses. This shall be completed per “Demonstration and Training” Part 7 of this SOW and prior to application for final payment and prior to release of any retainage being held at the conclusion of the job. An agenda is to be developed and invitation sent to NASA and all subcontractors indicating the time and location for the training sessions.

D. Daily Tag-up Meetings: NASA will conduct daily tag-up meetings each morning when installation activities are taking place for the purpose of schedule tracking, coordination, and issue resolution.

1. NASA and the Contractor will jointly decide on time of day for meetings.

2. Attendees: In addition to representatives of NASA, the foreman for each contractor, subcontractor, supplier, and other entity working on the project site that particular day shall attend that day's tag-up meeting.

PART 4 - SUBMITTALS

This Section includes requirements for submittals to be provided after project award.

4.1 SUBMITTAL TIMELINE

A. The Contractor shall provide a detailed project schedule and a list of all submittals required to be submitted in accordance with this SOW within 14 calendar days of contract award.

B. The Contractor shall provide all major submittals within 21 calendar days of contract award.

4.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

B. Coordinate transmittal of different types of submittals for related parts of the work so processing will not be delayed because of need to review submittals concurrently for coordination.

   1. NASA reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on NASA's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

   1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. NASA will advise AV Contractor when a submittal being processed must be delayed for coordination.

   2. Resubmittal Review: Allow 7 calendar days for review of each resubmittal

D. Electronic Submittals: All submittals shall be submitted electronically in Adobe Acrobat PDF format, unless otherwise noted, until the submittal is Approved. Upon submittal approval, the contractor shall provide three (3) hard copies to the Government within (5) working days of approval.

   Identify and incorporate information in each electronic submittal file as follows:

   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements and transmittal form.

   2. The submittal numbering format shall be approved by the Government and shall be based on the unique project identifier (WON20357). Each submittal number shall contain a numerical suffix to be used to indicate resubmittals, such that the original

submittal number can remain unchanged from original submission to final approval if resubmittals are required.

3. Provide means for insertion to permanently record AV Contractor's review and approval markings and action taken by NASA.

4. A standard transmittal form approved by the Government shall be used to transmit each submittal and shall be the first page of the submittal. It shall contain the following information:
   a. Project name.
   b. Date.
   c. Name and address of NASA.
   d. Name of Project Manager.
   e. Name of AV Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Submittal purpose and description.
   i. Specification Section number and title, if applicable
   j. Equipment ID Tag, if applicable
   k. Specification paragraph number or drawing designation and generic name for each of multiple items, if applicable
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Related physical samples submitted directly.
   o. Indication of full or partial submittal.
   p. Transmittal number.
   q. Remarks.

E. Options: Identify options requiring selection by NASA.

F. Deviations and Additional Information: On an attached separate sheet, prepared on AV Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by NASA on previous submittals, and deviations from requirements in the Contract documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

   1. Note date and content of previous submittal.

   2. Note date and content of revision in label or title block and clearly indicate extent of revision.

   3. Resubmit submittals until they are marked as Approved by NASA.

H. Government’s Review: NASA will review submittals and provide pertinent notation. Submittals will be returned to the Contractor electronically with the following notations:

   1. Submittals marked "Approved" authorize the Contractor to proceed with the work covered.

2. Submittals marked "Approved as Noted" authorize the Contractor to proceed with the work covered provided they take no exception to the corrections. Notes shall be incorporated prior to submission of the final submittal.

3. Submittals marked "Return for Additional Information" require the Contractor to make the necessary corrections and revisions and to re-submit them for approval in the same routine as before, prior to proceeding with any of the work depicted by the submittal.

4. Submittals marked "Not Approved" indicate noncompliance with the contract requirements and shall be re-submitted with appropriate changes.

No field work shall take place until all major submittals are Approved or Approved as Noted, and NASA CO has issued a Notice to Proceed for field work.

Approval of the submittals by NASA shall not be construed as a complete check, but will indicate only that the general method of installation and detailing is satisfactory. Contractor shall be responsible for the dimensions and design of connection details and installation of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

4.3 SUBMITTALS REQUIRED

A. The following shall be submitted by the AV Contractor for NASA approval:

1. Detailed project schedule

2. List of all submittals required to be submitted

3. Scale shop drawings showing system components with sizing indicated, including but not limited to:

   a. AV Control Room Plan.
   b. AV Control Wall Elevations.
   c. Equipment Rack Elevations.
   d. Equipment locations.
   e. All other equipment specified in attached Division 27 specification sections.

4. Submit manufacturers' data, and/or shop drawings of the following:

   a. Product specification data for system components and materials.
   b. Detailed system schematic diagrams of the audiovisual systems which will meet requirements given. Provide details of hardware and software equipment settings, options, and programs that shall be provided in the final configuration.
   c. Personnel available and their qualifications.
   d. Test equipment available.
   e. Equipment manufacturer’s installer certifications.

5. Samples of finishes and trim exposed to view, such as fixture trim, escutcheon plates and similar items.

6. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

    a. Name, address, and telephone number of entity performing subcontract or supplying products.
    b. Number and title of related Specification Section(s) covered by subcontract.
    c. Drawing number and detail references, as appropriate, covered by subcontract.

7. Key Personnel Names: Within 15 days of starting installation operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office and cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

    a. Post copies of list at Project site. Keep list current at all times.

8. Product Data for cleaning agents. Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces. Cleaning agents must be low VOC and conform to LEED requirements for indoor air quality.

9. Submittals required by attached specification section 274100.

10. Closeout Submittals:
    a. Record Drawings: One set of marked-up record drawings and scanned digital files.
    b. Record Specifications: Submit one marked up paper copy and scanned digital files of Project's specifications, including addenda and contract modifications.
    c. Final Wirelist.
    d. Operation and Maintenance Manuals.
    e. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
    f. Test/adjust/balance records.
    g. Changeover information related to NASA's occupancy, use, operation, and maintenance.
    h. Demonstration and training videotapes: Submit one digital copy within five working days of end of each training module in QuickTime format.

PART 5 – QUALITY REQUIREMENTS

5.1 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in installations with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

5.2 QUALITY CONTROL

A. Manufacturer's Field Services: For the equipment listed below, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

   1. Video Router (Utah Scientific or selected manufacturer)

   2. Pan/tilt Camera Systems and Video Switching Systems (Panasonic or selected manufacturer)

B. Retesting/Re-inspecting: Regardless of whether original tests or inspections were the Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for installation that replaced work that failed to comply with the contract documents.

C. The Contractor’s supervisor shall verbally communicate with the individual performing the inspections and testing so that quality issues can be addressed immediately upon discovery. The individual performing the inspections and testing shall verbally communicate quality issues to NASA’s representative immediately after notification to the AV Contractor’s supervisor.

D. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing installation to accommodate testing and inspecting.

   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 6 – CLOSEOUT PROCEDURES

6.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Project completion procedures.
2. Operation and maintenance manuals.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

6.2 PROJECT COMPLETION PROCEDURES

A. After completing startup and testing of equipment and systems, the Contractor shall generate a rolling punch list of work that is defective or incomplete. This punch list shall be reviewed at the daily tag-up meetings. This punch list shall be worked to completion prior to requesting final inspection for project completion.

B. Complete the following a minimum of 2 working days prior to requesting final inspection for project completion:

1. Perform preventive maintenance on equipment used prior to completion.
2. Submit closeout submittals as defined in this SOW.
3. Prepare and submit Project Record Documents, operation and maintenance manuals and similar final record information.
4. Remove Contractor tools, installation equipment, and similar elements from Project site.
5. Complete final cleaning requirements, including touchup painting.
6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
7. Instruct NASA's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

C. Inspection: Request a final inspection to determine acceptance a minimum of 2 working days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, NASA will either proceed with inspection or notify AV Contractor of unfulfilled requirements:

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

6.3 OPERATION AND MAINTENANCE MANUALS

A. Assemble two complete sets of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in this SOW and as follows:

1. Operation Data:

a. Equipment operating manuals.

2. Maintenance Data:
   a. Wiring diagrams.
   b. Copies of maintenance service agreements.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents. Obtain equipment ID numbers from NASA and index/organize the binder per that numbering system.

C. O/M Electronic File: Assemble O/M package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

6.4 SUBMITTAL OF PROJECT WARRANTIES

A. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual:

1. Bind warranties in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of AV Contractor.

4. Warranty Electronic File: Scan warranties and assemble complete warranty submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

6.5 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with LEED, local, state, and federal laws and ordinances, and Federal and local environmental and antipollution regulations.

B. Cleaning: Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project:

    a. Remove tools, equipment, machinery, and surplus material from Project site.
    b. Remove labels that are not permanent.
    c. Remove excess lubrication, paint droppings, and other foreign substances.
    d. Leave Project clean and ready for occupancy

6.6 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective installations. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged installations and permanent facilities used during installation to specified condition.

    1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

    2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

        a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

    3. Replace parts subject to operating conditions during installation that may impede operation or reduce longevity.

PART 7 – DEMONSTRATION AND TRAINING

7.1 SUMMARY

A. This Section includes administrative and procedural requirements for instructing NASA's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.

2. Training in operation and maintenance of systems, subsystems, and equipment.

3. Coordination

7.2 NASA INSTRUCTION

A. Engineering Training: After final tests and adjustments have been completed, furnish the services of qualified personnel to instruct representatives of NASA in the operation and maintenance procedures for equipment and systems installed as part of this project. Operation and maintenance instructions for these major items of equipment shall be directly supervised by the equipment manufacturer's representative:

1. Video Router (Utah Scientific or selected manufacturer)

2. Pan/tilt Camera Systems and Video Switching Systems (Panasonic or selected manufacturer)

Supply qualified personnel to operate equipment for sufficient length of time as required to meet operation and performance tests and as required to assure that NASA's representatives are properly qualified to take over operation and maintenance procedures.

B. Operator Training: The Contractor shall provide training for NASA as indicated below.

1. The Contractor shall provide two separate on-site training courses for four (4) NASA personnel in each course. The instructor shall be approved by NASA and shall be the equivalent of the project systems engineer. This course shall be videotaped. The training shall consist of, but not be limited to, the following:

   a. The course shall be customized to NASA’s equipment.
   b. The final course curriculum and training material shall be developed in coordination with NASA and submitted final approval.
   c. Provide an overview of the system diagram.
   d. Provide NASA staff members with a working understanding of the systems as installed in the new building. They shall become familiar with the components and features of the equipment through a combination of lecture and hands-on exercises.

7.3 COORDINATION

A. Coordinate instruction schedule with NASA's operations. Adjust schedule as required to minimize disrupting NASA's operations.

SECTION 270500 - COMMON WORK FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cutting and Patching.
2. Cleaning, Protecting and Adjusting.

1.3 CUTTING AND PATCHING

A. Provide ceiling removal and replacement where work above ceilings is required. Replace ceiling components damaged in the process.

1.4 CLEANING, PROTECTING AND ADJUSTING

A. Cleaning

1. General cleaning requirements are specified in Division 1.
2. Upon completion of the work, clean the exterior surface of equipment, accessories, and trim installed. Clean, polish, and leave equipment, accessories, and trim in first-class condition.

B. Protection of Surfaces

1. Protect new and existing surfaces from damage during the construction period.
2. Provide plywood or similar material under equipment or materials stored on floors or roofs. Provide protection in areas where construction may damage surfaces.
3. Surfaces damaged during the construction shall be repaired or replaced at the cost of the AV Contractor at fault. The method or repairing or replacing the surface shall be approved by the Contracting Officer.

C. Protection of Services

1. Protect new and existing services from damage during the construction period.
2. Repair, replace, and maintain in service any new or existing utilities, facilities, or services (underground, overground, interior, or exterior) damaged, broken, or otherwise rendered inoperative during the course of construction.

3. Services damaged during the construction shall be replaced at the cost of the AV Contractor at fault. The method used in repairing, replacing, or maintain the services shall be approved by the Contracting Officer.

D. Protection of Equipment and Materials

1. Equipment and materials shall be stored in a manner that shall maintain an orderly, clean appearance. If stored on-site in open or unprotected areas, equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.
2. Equipment and material, if left unprotected and damaged, shall be repainted or otherwise refurbished at the discretion of the Contracting Officer. Equipment and material is subject to rejection and replacement if, in the opinion of the Contracting Officer or the manufacturer's engineering department, the equipment has deteriorated or been damaged to the extent that its immediate use or performance is questionable, or that its normal life expectancy has been curtailed.
3. During the construction period, protect equipment from damage and dirt.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

D. Apply for detailed and specific information regarding the location of equipment as the final location may differ from that indicated on the drawings. Outlets, equipment or wiring improperly placed because of failure to obtain this information shall be relocated and re-installed without additional expense to NASA.

E. Coordinate the location and elevation of all communications devices and fixtures with the architectural interior elevation plan and reflective ceiling plan prior to installation.

3.2 ENVIRONMENTAL AIR PLENUMS

A. In spaces over hung ceiling which are used for environmental air handling purposes as defined by Article 300.22C of the National Electric Code, power data and communications cable must be in conduit or of the type cable rated for air plenum use. Cable type and/or raceway is

generally indicated on the drawings and specifications although the AV Contractor shall be responsible to clearly define ceiling space used for environmental air purposes.

3.3 SPECIAL ENGINEERING SERVICES

A. In the instance of complex or specialized audiovisual systems that are included in Division 27; the installation, final connections, and testing of such systems shall be made under the direct supervision of competent authorized service engineers who shall be in the employ of the respective equipment manufacturer. Provide the Contracting Officer with copies of instruction manuals and booklets for each system and piece of equipment installed. Provide any additional instruction to the Contracting Officer over and above the listed above in the care, adjustment, and operation of all parts of the production systems.

END OF SECTION 270500

SECTION 274100 – AUDIOVISUAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY OF WORK

A. Provide fully operational and tested audiovisual systems ready for use by NASA. Furnish and install audiovisual equipment, cabling, and supporting devices as required in the contract documents. Provide all software, programming, and provisioning of equipment and systems required for optimal operation of systems.

B. Provide coordination with Building General Contractor, Building Electrical Contractor, and the Contracting Officer for installation of the audiovisual systems.

C. Provide trim rings, flanges, or escutcheon rings as appropriate around all penetrations through finished construction. Provide escutcheon rings at finished ceiling penetrations created by equipment mounts and conduit stubs. The trim rings, flanges, or escutcheon rings color shall match the adjacent finishes or be approved by the Contracting Officer.

D. All individual components required for a fully functioning system may not be shown on equipment lists and schematic diagrams. Provide all components needed for a fully functional audiovisual system. These include but are not limited to:

1. Cabling
2. Interfaces
3. Splitters
4. Terminations
5. Wiring blocks
6. Wiring harnesses
7. Cable assemblies
8. Adapters
9. Connectors
10. Infrared eyes
11. Communications, sensor, and control modules
12. Extenders
13. Distribution amplifiers
14. Mounting hardware
15. Power supplies

1.3 SOFTWARE REQUIREMENTS

A. Uncompiled Source Code

1. The original uncompiled source code for the audiovisual system equipment shall be provided to the Contracting Officer in electronic form with the following stipulations:

a. The AV Contractor or delegated subcontractor shall submit for review and approval with the Contracting Officer, a written agreement restricting NASA's use and distribution of the uncompiled source code. The uncompiled source code shall be permitted to be used only by NASA for future maintenance of and upgrades to the specific audiovisual systems within the scope of this project. The electronic copy of the source code shall remain on NASA's premises. NASA is not permitted to distribute the uncompiled source code into the possession of any third party without written approval from the project subcontractor originally responsible for creating the code. Future third party maintenance providers retained by NASA shall have access to the uncompiled source code on the designated NASA workstation on NASA's premises.

b. Upon acceptance of the written agreement by the Contracting Officer and AV Contractor or delegated subcontractor, the AV Contractor shall submit one (1) copy of the uncompiled source code in electronic form on CD with one license of the Manufacturer's programming software.

1.4 DEFINITIONS

A. The definitions specific to this section are provided below.

1. "Multimedia" in these specifications and contract documents also means the same as audiovisual or AV.

2. "Furnish" shall mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each sentence.

3. "Install" shall be used to describe operations at project site including unloading, packing, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning, and similar operations, as applicable in each instance.

4. "Provide" shall mean furnish and install, complete and ready for intended use, as applicable in each instance.

5. "Directed" shall mean as directed by Contracting Officer prior to installation of equipment.

6. "Indicated" shall mean "indicated on Contract Drawings".

7. "Shown" shall mean "shown on Contract Drawings".

8. "Section" shall mean on of the Specification Sections.

9. "Division" shall mean on of the Specification Divisions.

10. "Article" shall mean on of the numbered paragraphs of the Specification Section.

11. "Work' or "Audiovisual Work" herein includes products, labor, equipment, tools, appliances, transportation and related items, directly or indirectly required to complete the specified and/or indicated electrical installation.

12. "Code" shall mean any and all regulations and requirements of regulatory bodies, public or private, having jurisdiction over the work involved.
13. "Product" used in Division 16 means material, equipment, machinery, and/or appliances directly or indirectly required to complete the specified and/or indicated Electrical Work.
14. "Standard Product" shall mean a manufactured product, illustrated and/or described in catalogs or brochures, which are in general distribution prior to the date of issue of construction documents for bidding. Products shall generally be identified by means of a specific catalog number and manufacturer's name.
15. "Wiring" shall mean fitting, conduits, wires, junction boxes, connections to equipment, splices, and other accessories required to complete the work.
16. Abbreviations and Symbols: See lists for both on drawings.
17. "This AV Contractor" shall mean the AV Contractor responsible for project work.
18. Contract Documents: drawings, specifications, bid forms, addendum, and change orders.

B. Reference to the following codes and standards shall mean:

Reference	Definition
NEC	National Electrical Code Current Edition
ASTM	American Society for Testing Materials
NEMA	National Electrical Manufacturers Association
ANSI	American National Standards Institute
FS	Federal Specification, US Government
CS	Commercial Standards issued by US Department of Commerce
NESC	National Electrical Safety Code
NETA	National Electrical Testing Association
ADA	Americans with Disabilities Act

1.5 QUALITY ASSURANCE

A. Engage an experienced Installer who is a factory-authorized service representative of the specified and approved equipment to perform the work of this Section.

B. All items of equipment including cabling shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

C. The AV Contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The AV Contractor shall maintain at his facility the necessary spare parts in the proper portion as recommended by the manufacturer to maintain and service the equipment being supplied.

D. Pay any and all expenses incurred by these equipment manufacturers' representatives.

E. Electrical Component Standard

1. Provide work complying with applicable requirements of NFPA 70 “National Electrical Code” including but not limited to:

a. Article 250. Grounding.
b. Article 300, Part A. Wiring method.
c. Article 310. Conductors for General Wiring.
d. Article 725. Remote Control, Signaling, Circuits.
e. Article 800. Communication Systems.

1.6 PERFORMANCE OF EQUIPMENT

A. Materials, equipment and appurtenances of any kind, shown on the drawings, hereinafter specified or required for the completion of the work in accordance with the intent of these specifications, shall be completely satisfactory and acceptable in operation, performance and capacity. No approval either written or verbal of any drawings, descriptive data or samples or such material, equipment and/or appurtenance shall relieve the AV Contractor of his responsibility to turn over the same to the Contracting Officer in perfect working order at the completion of the work.

B. Any material, equipment or appurtenances, the operation, capacity or performance of which does not comply with the drawings and/or specification requirements or which is damaged prior to acceptance by the Contracting Officer shall be held to be defective material and shall be removed and replaced with proper and acceptable materials, equipment and/or appurtenances or put in proper and acceptable working order, satisfactory to the Contracting Officer, without additional cost to NASA.

1.7 SUBMITTALS

A. Provide the following submittals for Contracting Officer approval:

1. Cabling list for systems.
2. Final system functional line diagrams indicating equipment and connections for each system.
3. Rack elevations
4. Table of equipment with IP network connections. Submit table to Contracting Officer to complete IP addresses for each piece of equipment.

PART 2 - PRODUCTS

2.1 LABELING AND IDENTIFICATION

A. Cable labels

1. Cable labels shall be pressure sensitive labels with non-smearing printing.
2. The labels shall be long lasting adhesive type.
3. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.
4. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.

5. Provide vinyl substrate with a white printing area and black print. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow, so that the labels are easily distinguishable.
6. Shall be flexible vinyl or other substrates to apply easy and flex as cables are bent.
7. Shall use aggressive adhesives that stay attached to all cable insulation types.
8. Cabling labels shall be generated with laser printers.
9. Physical dimensions of cabling labels provided shall correspond to type of cable. Provide label sizes for various cables as needed.

B. Hardware and equipment identification labels

1. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.
2. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.
3. Where insert type labels are used, provide clear plastic cover over label.

C. Grounding and bonding, pathway, and space labels

1. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.
2. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.

D. Panel labels

1. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.
2. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.
3. Where insert type labels are used, provide clear plastic cover over label.

2.2 SYSTEM EQUIPMENT LISTS

A. Refer to Section 274100 Appendices (attached) for detailed equipment lists.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide all calibration and adjustment required for the audiovisual system to perform to its capability and as finally approved by the Contracting Officer.

B. Elevations and dimensions shown on the drawings are approximately correct; however, field check and otherwise verify such data at the site before proceeding with the work. Make necessary survey equipment available at all times and make use of such equipment wherever necessary to properly install equipment.

C. Due to the schematic nature and small scale of the audiovisual drawings, it is not possible to indicate exact locations, offsets, fittings, access panels, pull boxes, and miscellaneous parts which may be required to form a complete system. The drawings are generally indicative of the work to be installed. Arrange work accordingly furnishing necessary parts and equipment as may be required to meet the various conditions and to provide a complete installation.

3.2 LABELING AND IDENIFICATION

A. Cable labeling

1. Label each end of each cable with its identification number prior to pulling. Locate labels at a location which will not be mutilated or destroyed when cables are dressed for terminal installation.
2. Use adhesive type labels for all communications cable labels.
3. Affix labels to cables – marking cable is not permitted.
4. Label both ends of each patch cord provided as part of the system.

B. Labeling of Pathways

1. Pathways shall be marked at each endpoint and at all intermediate pull or junction boxes. In the case of partitioned pathways (i.e., innerduct) each partition shall have a unique identifier.
2. Label pathways using the appropriate abbreviation and a number.
3. Use adhesive type labels.

C. Labeling of equipment racks, cabinets, and frames

1. On each equipment rack, distribution frame, and cabinet, provide a nameplate with white background and black lettering. The nameplate shall be minimum 1/2 inch high and have gothic style font. The nameplate shall be phenolic with engraved designation. Additionally, all rack mounted power strips and receptacles on racks, frames, or cabinets shall be labeled with panel name and circuit number.

3.3 WARRANTY

A. Guarantee material, equipment and labor for a period of one (1) year from date of substantial completion. Replace defective material and workmanship furnished and installed and other work and equipment damaged thereby. In addition this warranty period shall cover all software updates required due to patches for software “bugs” and software compatibility issues. This shall include all upgrades required in order to be compatible with NASA’s Data Network during the warranty period.

B. In addition to the one (1) year guarantee, furnish any warranties or guarantees that come with specific pieces of equipment that exceed this guarantee. These additional warranties shall be given to the Contracting Officer for the time period specified.

C. Any defects arising during this warranty period shall be corrected without cost to NASA. Provide telephone and remote support to NASA within two (2) hours of initial NASA contact during normal business hours. Equipment providing comparable functionality shall be provided within two business days. Equipment shall be replaced with like make and model within two weeks.

D. The AV Contractor shall consider the possibility of allowing NASA's trained maintenance personnel to affect repairs of crucial nature, even before the service representative arrives at the site. For this purpose, a stock of necessary spare parts may be maintained at the facility.

3.4 COORDINATION

A. Coordinate with all Contractors, Contracting Officer, and NASA’s service providers for providing, testing and certifying all of the audiovisual equipment, infrastructure, and supporting hardware and raceways. Provide and initiate coordination needed for fully functioning

audiovisual system prior to the scheduled project completion date. Specifically coordinate with NASA's cable television service provider and NASA's network administrator for integration between the audiovisual systems and NASA's IP network.

B. Coordinate and furnish in writing to others, including the Contracting Officer, any information necessary to permit the work of all contractors to be installed satisfactorily and with the least possible interference or delay.

C. Devices and appurtenances which are to be installed in finished areas shall be coordinated with the Contracting Officer for final approval as it relates to location, finish, materials, color, and texture.

D. When work is installed without proper coordination, changes to this work deemed necessary by the Contracting Officer shall be made to correct conditions without any extra cost to b.

3.5 LOCATIONS

A. Coordinate and apply for detailed and specific information regarding the location of equipment as the final location may differ from that indicated on the drawings. Outlets, equipment or wiring improperly placed because of failure to obtain this information shall be relocated and re-installed without additional expense to NASA.

B. The design shall be subject to such revisions as may be necessary to overcome building obstructions. No changes shall be made in location of outlets or equipment without written consent of the Contracting Officer.

C. Unless otherwise mentioned or indicated, mounting heights of outlets are shown on the drawings or in the specification. Dimensions given shall be considered to be from center of outlet to finished floor.

D. Coordinate the exact location and elevation of all electrical devices and fixtures with the architectural interior elevation plan and reflective ceiling plan prior to installation.

3.6 SCAFFOLDING

A. Furnish and erect scaffolding and ladders required in the installation of wiring, equipment and fixtures.

3.7 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions and the Industry Standard EIA/TIA 568 and 569.

B. Wiring Methods: Install wiring in raceway except within consoles. Conceal wiring except in unfinished spaces.

C. Control Circuit Wiring: Install control circuits in accordance with NFPA 70 as indicated. Provide conductors as recommended by system manufacturer to provide control functions as indicated or specified.

D. Wiring within Enclosures: Provide adequate length of conductors, Bundle, lace and train the conductors to terminal points with no excess. Provide and use lacing bars.

E. Provide physical isolation from each other for speaker-microphone, line-level, speaker-level, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12 inch minimum separation between conductors to speaker-microphone and adjacent parallel power and telephone wiring. Provide physical separation as recommended by equipment manufacturer for other intercommunication system conductors.

F. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes, terminal cabinets and equipment enclosures.

G. Identification of Conductors and Cables: Use color coding of nonstandard SDI video and analog audio conductions and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams. Splicing inline or in wire pathways is not permissible.

H. Repairs: Wherever walls, ceilings, floors, or other building finishes are cut for installation, repair, restore, and refinish to original appearance.

I. Wiring not between components within enclosures shall have sufficient service loops when applicable.

3.8 GROUNDING

A. Provide equipment grounding connections for systems as indicated. Tighten connections to comply with tightening torque specified in UL 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5 ohm ground at equipment location. Measure, record, and report ground resistance.

3.9 WIRING INFORMATION

A. When more than one loudspeaker is used in the same area, all speakers in that area must be connected in phase with each other.

B. All speaker cable shields shall be grounded at the amplifier only. A separate #6 copper ground lead shall be run from the control rack to the ground wire at the AC entrance cable.

C. In addition to the above, all equipment shall be grounded in accordance with NEC regulations.

D. Certain “Inherent Characteristics” of the system require special attention during all phases of installation. Install all system components and associated wiring per the instructions of the manufacturer or his authorized distributors recommendations. All conductors and wiring must be sufficiently isolated from the magnetic field produced by alternating current, or any current produced by any other unrelated wiring that would interfere with the performance of the system. Codes and conditions may require changes to the cabling system.

3.10 FIELD QUALITY CONTROL

A. Provide services of a factory trained service representative to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

B. Upon completing installation of the system, align, adjust, and balance the system and perform complete pre-testing. Determine, through pre-testing, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

C. Upon completion of pre-testing, notify the Contracting Officer a minimum of 10 days in advance of acceptance test performance schedule and conduct tests in his presence. Provide a written record of test results.

D. Perform an operational system test to verify conformance of system to these specifications. Perform tests that include originating and page material at intercommunication stations and observing sound reproduction for proper routing and volume levels and for freedom from noise and distortion.

3.11 INSPECTION

A. Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified. Provide a list of final tap settings of speaker line matching transformers.

3.12 ENVIRONMENTAL AIR PLENUMS

A. In spaces over hung ceiling which are used for environmental air handling purposes as defined by Article 300.22C of the National Electric Code, power data and communications cable must be in conduit or of the type cable rated for air plenum use. Cable type and/or raceway is generally indicated on the electrical drawings and specifications although the AV Contractor shall be responsible to clearly define ceiling space used for environmental air purposes.

END OF SECTION 274100

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
2	Media Recorder	AJA	Ki Pro Rack	5	*
3	Media For Above	AJA	KI-STOR250-R0	10	*
4	HDMI Cables - lengths to be determined	Atlona	ATP-14029-2	5	
5	Processor	AJA	FS1	2	*
6	Fiber optic Trancievers	Multidyne	HD-3000-TRXa-One-ST	12	
7	Card Cage (multidyne)	Multidyne	RM6	2	
8	Power supply Multidyne	Multidyne	PS6-HD	2	
9	HDSDI Audio Embedder	Black magic	BMDCONVOPENGCAUDS	8	
10	Redundent Power supply for DFR-8321-c	(ROSS)	PS8300	2	
11	Rear Monitor Mount	Chief	LTMU	1	
12	Rack Unit+Power supply	Black magic Ross	DFR-8321-C	2	
13	Audio Deembedder	Blackmagic Design	BMDCONVOPENGCSAUD	8	
14	Terenex Processor	Black magic	Blackmagic Design Teranex 3D Processor	1	
15	Disk Recorder	JVC	JVC SR-HD2500US	2	
16	Rear Monitor	LG	47ld452b	1	
17	AV-HS04M3 (2 DVI input Expansion card for panasonic AV-HS400A)	Panasonic	HS04M3	2	*
18	Panasonic AV-HS410A Compact Live Multi-Format SD/HD-SDI Switcher	Panasonic	AV-HS410A	2	*
19	Pitch Mount	Chief	FTRV	4	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
20	Projection Switcher Display	Panasonic	BT-LH2550PJ 26"	4	
21	VHS DVD Player combo	Toshiba	Toshiba SD-V296 DVD/VCR Combo Player	2	
22	Mini Converter Heavy Duty - Analog to SDI	Blackmagic Design	CONVMH/DUTYAAS	2	
25	AJA KONA Encoder	AJA	3G HD/SD SDI 3D Card	1	*
26	AJA - Break out box	AJA	K3G Breakout Box	1	*
27	L band fiber Frame	Evertz	7701FR+PSX	1	*
28	Fiber TX	Evertx	7705LTA13+ST+1 RU	1	*
29	Fiber RX	EVERTZ	7705LR+ST+1RU	1	*
30	Sencore 3187B	Sencore	See Appendix 5	1	*
31	64x64 Video and audio router	Utah Scientific	See Appendix 2	1	*
32	Panasonic Camera	See Appendix 3	See Appendix 3	1	*
33	Disk Player	Yamaha	Yamaha BD-A1010 Blu-ray Disc Player	1	
36	TV One 1T-C2-750 Dual-PIP DVI-I Scaler	TV ONE	TV One 1T-C2-750 Dual-PIP DVI-I Scaler	1	
38	Multi Viewer	Apantac	LI-12HD	1	
39	Component Input	Panasonic	AV-HS04M2 Analog Component Input Board for AV-HS400	2	*

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
40	Component DA	TV 0ne	TV One 1T-DA-474 RGB-YPbPr Distribution Amplifier	3	
41	Rackmount CD Player with iPod Dock	Tascam	Tascam CD-200i	1	
42	Telephone interface	JK audio	JK Audio Innkeeper 2 - Dual-Line Digital Hybrid	1	
44	Fiber Multiplex system	LYNXTechnik	See Appendix 6	1	*
45	Sync generator	AJA	AJA GEN10 High Definition/Standard Definition Synchronizer/Generator - HD/SD SDI	1	
46	Time Code Generator	ESE	ES 263	1	
47	H.264 Encoder/STB	Optibase	AMP1085 and Amino -140 ZPP8626	1 EACH	*
48	TV One C2-8000 Universal Input Seamless Switcher	TV1	C2-8000	1	
50	Audio Adapters for AJA	Tascam	DTF-803	2	
51	Audio Adapters for AJA	Tascam	DTM-803	2	
53	Scaler	Gefen	Gefen EXT-DVI-2-HDSDISSL DVI to HD-SDI Scaler	2	
55	Apantac Uni- 1-E	Apantac	Uni-1E	1	
56	Apantac Uni- 1-R	Apantac	Uni-1R	1	
57	HDSDI to HDMI	AJA	Hi-5	10	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
58	Power supply	AJA	DWP	10	
59	Head worn Mic	Audio-Technica	BP893cT4 MicroEarset Condenser Headworn Microphone (Black)	2	
60	Plantronics Savi W720 Multi Device Wireless Headset System	Plantronics	SAVI W720	2	
61	AJA 3GDA 1x6 3G/HD/SD-SDI Re-Clocking Distribution Amp	AJA	HD-10DA 1x6 SD/HD-SDI Distribution Amplifier	3	
62	AJA DWP Power Supply for D & HD Series Converters	AJA		12	
63	Blackmagic Design OpenGear SDI Distribution Converter	Black Magic Design	CONVOPENGSDIDA	1	
64	Rane DA-216S - 2x16 Splitter/Distribution Amplifier	Rane	DA-216S - 2x16	3	
65	Audio-Technica AT8801 Single Channel 48V DC Phantom Power Supply	Audio Technica	AT8801	2	
66	AJA HA5 HDMI to SD/HD-SDI Video and Audio Converter	AJA	HA5	5	
67	AJA HD10AVA Analog Audio/Video to HD/SD-SDI Converter	AJA	HD10AVA	4	
68	Middle Atlantic	MIDDLE_ATLANTIC	PDS-2X315R 15-Amp Power Sequencing & Distribution Unit	6	
69	AJA RMB-RO Rackmount Bracket	AJA	RMB-RO	20	
70	Telex SYS-243 - Three-User 2.4GHz Wireless Intercom System	Telex	Telex SYS-243	1	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
71	Telex PH-88 - Lightweight Single Sided Intercom Headset	Telex	Telex PH-88 -	5	
72	Tascam SS-R100 Solid State Digital Audio Recorder	Tascam	SS-R100	1	
73	Mackie BIGKNOB - Control Room Monitoring Distributor	Mackie	Mackie BIGKNOB	1	*
74	Bogen Communications Desktop Dynamic Gooseneck	Bogen	DDU250	1	
75	ESE ES-215P6 Triple Stereo Audio Level Indicator 1 3/4in Rack Mount	ESE	ES-215P6	1	
76	PTZ Network Camera	Axis	AXIS-214PTZ	1	
79	Rack System	Middle Atlantic	See Appendix 4		*
81	Dsan Remote mouse	DSAN	Pcmicro	2	
82	Laptop audio ports	DSAN	Lsp1	3	
84	fiber jumpers - length to be determined			20	
85	Blackmagic CONVMCAUDS Audio to SDI Mini Converter	Black Magic	BMD-CONVMCAUDS	5	
88	Len LMPHDS8 Rackmount Passive HD-SDI Panel w/8 1-Channel HD Splitters	LEN	LEN-LMPHDS8	1	
89	16 point patchbay	Connectronics	Connectronics 16 point 2GHz BNC Feed-thru Patchbay	6	
90	Verbatum Flash drive	Verbatum		5	
91	Proco Sound Ms-2 Microphone splitter	Proco	ms-2	2	
92	Art Splitcom pro	ART	Splitcompro	1	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
94	DVI to HDMI Adapter	GEFEN	Gefen ADA-DVIM-2-HDMIFN	6	
95	HDMI to DVID Adapter	Tecnec	HDMIF-DVIDF	4	
97	Gyration Air Mouse Elite with Low Profile Keyboard	Gyration	GYM5600LKNA	1	
98	BNC Connector	Neutric	NBNC75BLP9 Rear Twist BNC for Belden 1505A and Canare L	As Required	
99	Coax Cable	Gepco	VPM2000	As Required	
100	5 Volt 2 Amp AJA Power Supp	CTXps1	Connectronics CTX-PS1 ROHS Compliant	5	
101	Power adapter	Hosa	Hosa YAC-407 Dual NEMA 5-15R to NEMA 5-15P Power Extension Y Cab	10	
102	Format converter	AJA	HI5 HD-SDI to HDMI Video and Audio Converter	2	
103	AJA HA5 Format converter	AJA	AJA HA5 HDMI to SDI/HD-SDI Video and Audio Converter	2	
104	Audio Cable	Belden	Belden 8451 22 AWG Stranded Microphone Cable 500 Foot	As Required	
105	Audio Cable	Canare	Canare L-2T2S Audio Cable Gray	As Required	
106	Punch Tool with RPT Tip	AVP	AT-RPT-PTK	1	
107	Punchdown block	AVP	AVP-RPTWB	2	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
108	Rack Shelf	Middleatlantic	U1	10	
111	Color LCD Monitor (17")	GE	GEL-17VGA	1	
112	Monitor Mount	Chief	FSRV	2	
113	Monitor	Sharp	Sharp LC52LE640U 52" AQUOS LED TV	1	
114	Monitor Mount	Sanus	Sanus VisionMount VMPL50A Tilting Wall Mount for 32-70" Flat-Panel TV	1	
116	Hard Wired mics	Shure	Beta 58	2	*
117	Lapel Mics HW	Shure	Shure MX185 - Cardioid Wired Lavalier Microphone	3	*
118	Omni Lave for Wireless	Shure	Shure WL93 Omnidirectional Lavalier Condenser Microphone for Wireless …	2	*
119	Windscreens for 58s	Shure	A58WSBK	4	*
120	Remote mixer	Mackie	1604VLX3	1	*
121	Antenna	Winegard	Winegard HD8200U Heavy Duty Platinum VHF/UHF/FM HDTV Antenna (HD-8200U)	1	
122	48 Port STP Patch panel	Commscope		48 port	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
1	64 frame loaded 64 inputs by 64 outputs 3G HD/SD video with EQ, reclocking and HD-BNC's (2RU). Includes built-in web browser for configuration and control with single inline power supply. 2 Year Warranty	UTAH SCIENTIFIC	100/UDS64-2	1	*
2	UTAH-100/UDS redundant inline power supply for 32 frame. 2 Year Warranty	UTAH SCIENTIFIC	PS/UDSV-2	1	*
3	UTAH-100/UDS redundant inline power supply for 144 frame. 2 Year Warranty	UTAH SCIENTIFIC	PS/UDSV2-2	1	*
4	UTAH-300 AA-64 frame loaded 64 inputs by 64 outputs dual channel analog audio. Power requirement of 250 watts per chassis.	UTAH SCIENTIFIC	300/64AA64x64	1	*
5	400 watt AC PS-3 power supply system.	UTAH SCIENTIFIC	PS-3AC/4W/SYS	1	*
6	SC-400E control system with redundant control cards and power supplies.	UTAH SCIENTIFIC	SC-400E/ACSYSR	1	*
7	1 user design and deployment software for GUI based virtual control panels.	UTAH SCIENTIFIC	SoftPanel 2/1	1	*

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
8	Full matrix control and status panel. Features 12 source and 4 destination user assignable buttons, 16 level control and a 20 button keypad. Panel communicates via UNET, E-NET or RS-232/422. Fully programmable from UCON. (2RU)	UTAH SCIENTIFIC	UCP-XY/E	1	*
9	User configurable control and status panel. Features 32 LCD relegendable/ programmable user buttons. Panel communicates via UNET or E-NET. (1RU)	UTAH SCIENTIFIC	UCP-LC32	1	*
10	Utah Scientific's 10-year limited warranty and 24 hour, 7 day a week customer support is included. (Except where noted.)	UTAH SCIENTIFIC	Warranty	1	
11	Complete system programming, customized to customer specifications is included.	UTAH SCIENTIFIC	Programming	1	
12	Per day charge for professional onsite assistance in trouble-shooting, commissioning and verification of new systems and/or upgrades. All travel expenses are additional and billed directly.	UTAH SCIENTIFIC	Training Commissioning & Support	1	

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
27	Integrated HD/SD Three 1/3 U.	Panasonic	AW-HE120KPJ	2	*
28	Wall Mount Bracket for BRC-H700, XU-80 & HE120 PTZ Cameras	Vaddio	535-2000-223	2	*
19	MULTI-FORMAT HIGH DEFINITION Camera	Panasonic	AW-HE870N	2	*
30	HD/SD-SDI Output Option Card for AW-HE870N Camera	Panasonic	AW-HHD870N	2	*
31	HDTV Motor Drive Videoconferencing Lens	Panasonic	XA20sx8.5BMDDSD	2	*
32	Heavy Duty Wall mount for use with PH400 PTZ Head	Panasonic	FEC-3640WM	2	*
33	Multi-Function Control Panel	Panasonic	AW-RP655	1	*
34	High Performance Pan-Tilt System.	Panasonic	AW-PH400	2	*

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
	Feet For Riser Base	Middle Atlantic	MIDDLE ATL VFEET-5-12 FOOT SET, 6" TALL	4	*
	Riser Base	Middle Atlantic	302681 MIDDLE ATL RIB-1-WRK-32 1 BAY RISER BASE FOR 32D	4	*
	Racks	Middle Atlantic	303419 MIDDLE ATL WRK-44-32LRD 44SP/32D MULTIBAY WRK LRD	4	*
	Side Panels	Middle Atlantic	N/S MIDDLE ATL SPN-44-312 PAIR OF SIDE PANELS FITS MRK-4431 AND WRK-44-32 BLACK FINISH	2	*
	Power Strips	Middle Atlantic	319819 MIDDLE ATL PDT-2X1020T PDT SERIES POWER STRIP 20 AMP 20 OUTLETS, 72 3/4" W/ J-BOX GROUND TOP	8	*
	Lacing STRIP	Middle Atlantic	412973 MIDDLE ATL LACE-44-OP 77" HEIGHT 3 1/4" WIDTH CABLE LACER STRIP WITH CABLE TIE POSTS, 6 PIECES	2	*
	LACING BAR	Middle Atlantic	231181 MIDDLE ATL LBP-1A LSHAPED LACING BAR 10/PK	2	*

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
	LACING BAR	Middle Atlantic	290518 MIDDLE ATL LBP-4A L BAR, 4" OFFSET 10/PK	1	*
	Lacing Bar	Middle Atlantic	290519 MIDDLE ATL LBP-6A L BAR, 6" OFFSET 10/PK	1	*
	GANGING Hardware	Middle Atlantic	231093 MIDDLE ATL GANG-10 GANGING HARDWARE FOR 10 RACKS	1	*
	Mounting Screws	Middle Atlantic	231157 MIDDLE ATL HW500 CAPTIVE CUP WASHER RACK SCREWS PHILLIPS 10/32 500/PK IN RESEALABLE JAR	2	*
	Rack Top	Middle Atlantic	MIDDLE ATL MW-LVT LARGE PERF VENTED TOP FOR ANY DRK, WRK, MRK, VRK, OR VMRK BLACK FINISH	4	*
	Cable Chase	Middle Atlantic	N/S MIDDLE ATL CC-44-312 VERTICAL CABLE CHASE 77" (44 RACK UNITS) FOR MRK-4431	3	*

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
	1RU Atlas MRD	Sencore	MRD 3187B	1	*
	Repair/Cal Ext Service Agreement for MRD - 2 year	Sencore	MRD 3187B-ESAR		*
	Atlas 4:2:0/H.264 VID AUD DEC	Sencore	8732	1	*
	DVBS/S2 Input option	Sencore	8716	1	*
	Dual Port IP Card	Sencore	8727	1	*
	MRD SD or HD Video Output Card	Sencore	8708	2	*
	Analog Output Cable	Sencore	8708 OPT 1	1	*
	DIG/ANLG AUD W/DOLBY E	Sencore	8707A	1	*
	Cable, XLR w/Dolby E male BNC	Sencore	8707A OPT 1	1	*

Equipment ID Tag	Item Description	Manufacturer	Model	Quantity	Mandatory Product
	OTX 1840-3Gbit SDI to Fiber Transmitter	LYNX Technik	100006180	4	*
	OH-TX-4-1270 CWDM 1270nm SFP Module	LYNX Technik	OH-TX-4-1270	1	*
	OH-TX-4-1290 CWDM 1290nm SFP Module	LYNX Technik	OH-TX-4-1290	1	*
	OH-TX-4-1310 CWDM 1310nm SFP Module	LYNX Technik	OH-TX-4-1310	1	*
	OH-TX-4-1330 CWDM 1330nm SFP Module	LYNX Technik	OH-TX-4-1330	1	*
	ORX 1800-3Gbit Fiber to SDI Receiver	LYNX Technik	1000021810	4	*
	RFR 1000-Rackmount Chassis for Yellobrik	LYNX Technik	1000000042	2	*
	RPS 1000 - 12VDC PSU for RFR 1000	LYNX Technik	6155011208	4	*
	LC/LC SIM - Fiber Patch Cable (0.5m)	LYNX Technik	100004185	9	*
	LC/ST SIM - Simplex LC/ST Fiber kit	LYNX Technik	10000001815	2	*
	OCM 1841-1270nm -1330nm CWDM MUX	LYNX Technik	1000011841	2	*
	RFR 1018 - 19" Frame for 2 x OCM Modules	LYNX Technik	1000000043	2	*

REQUEST FOR INFORMATION

NASA GLENN RESEARCH CENTER
CONSTRUCTION MANAGEMENT BRANCH

RFI NO:

DATE:

CONTRACT

PAGE 1 OF

CONST. REP:

PHONE:

PROJECT TITLE:

Transmitted From: ☐ NASA ☐ PRIME: _____ ☐ SUB: _____

By:

To:

Discussed With:

Subject:

Reference Dwg / Spec.:

Requests:

Attachments: ☐ Yes ☐ No

Reply:

ACTIONS REQUIRED

Documents Enclosed: ☐ Yes ☐ No

Status: ☐ Closed ☐ RFP* ☐ C/O**

Document Description:

* RFP - Contractor is requested to submit a cost proposal. Include any impact to schedule.
** C/O - NASA will issue a contract change order.

AUDIOVISUAL ABBREVIATIONS

1/C	SINGLE CONDUCTOR
A/C	AIR CONDITIONING UNIT
A	AMPS
AC	ALTERNATING CURRENT
ACT	ABOVE CEILING TILE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
ADJ	ADJUSTABLE
ALT	ALTERNATE
ARCH	ARCHITECTURAL
AUTO	AUTOMATIC
AVG	AVERAGE
AV	AUDIOVISUAL
BC	BONDING CONDUCTOR
BKR	BREAKER
BLDG	BUILDING
BTM	BOTTOM
C	CONDUIT
CT	CURRENT TRANSFORMERS
CAP	CAPACITY
CL	CENTERLINE
CFM	CUBIC FEET/MINUTE
CIRC	CIRCULATING
CKT	CIRCUIT
CLG	CEILING
CO	COMPANY
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CPU	CENTRAL PROCESS UNIT
CRT	CATHODE RAY TUBE
CU	COPPER
DF	DRINKING FOUNTAIN
DED	DEDICATED
DET	DETAIL
DHW	DOMESTIC WATER HEATER
DIAM	DIAMETER
DIM	DIMENSION
DISC	DISCONNECT
DIV	DIVISION
DN	DOWN
DPR	DAMPER
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
EWC	ELECTRIC WATER COOLER
EA	EACH
ELEC	ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY ONLY
EM GEN	EMERGENCY GENERATOR
ENCL	ENCLOSURE
ER	ELECTRIC-PNEUMATIC
EQUIP	EQUIPMENT
ER	EQUIPMENT ROOM
ETR	EXISTING TO REMAIN
EXH	EXHAUST
EXIST	EXISTING
EXTER	EXTERIOR
F & I	FURNISHED AND INSTALLED
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FP	FIRE PROTECTION
FPC	FIRE PROTECTION CONTRACTOR
FAB	FABRICATE
FIN	FINISH
FIXT	FIXTURE
FLASH	FLASHING
FLR	FLOOR
FLUOR	FLUORESCENT
FTN	FOUNTAIN
FU	FUSE
GC	GENERAL CONTRACTOR
GFI	GROUND FAULT INTERRUPTER
GA	GAUGE
GAL	GALLONS
GRD	GROUND
HC	HORIZONTAL CROSSCONNECT
HV	HIGH VOLTAGE
HW	HOT WATER
HGT	HEIGHT
HORIZ	HORIZONTAL
HP	HORSEPOWER
HTG	HEATING
HZ	HERTZ
IC	INTERMEDIATE CROSSCONNECT
INCL	INCLUDE
INST	INSTANTANEOUS
INSUL	INSULATION
JB	JUNCTION BOX
JAN	JANITOR
JT	JOINT
LV	LOW VOLTAGE
LTG	LIGHTING
LTS	LIGHTS
LVR	LOUVER
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCT	MAIN CROSSCONNECT
MCC	MOTOR CONTROL CENTER
MER	MECHANICAL EQUIPMENT ROOM
MH	MANHOLE
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUG ONLY
MM	MULTIMODE FIBER OPTIC STRAND
MTD	MOUNTED
MTG	MOUNTING
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO	NUMBER
NOM	NOMINAL
OC	ON CENTER
OH	OVERHEAD
OPNG	OPENING
PC	PLUMBING CONTRACTOR
PE	PNEUMATIC-ELECTRIC
PEND	PENDANT
PH	PENTHOUSE
PS	PULL SWITCH
PLBG	PLUMBING
PNL	PANEL
PR	PAIR
PRESS SW	PRESSURE SWITCH
PTs	POTENTIAL TRANSFORMERS
RA	RETURN AIR
REC	RECESSED
RECEPT	RECEPTACLE
REQD	REQUIRED
RM	ROOM
:SECT	SECTION
SIM	SIMILAR
SM	SINGLE MODE FIBER OPTIC STRAND
SMR	SURFACE MOUNTED RACEWAY
SQ FT	SQUARE FOOT
STAT	THERMOSTAT
STD	STANDARD
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
SURF	SURFACE
SUSP	SUSPENDED
SUSP CLG	SUSPENDED CEILING
SW	SWITCH
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TE	TELECOM ENCLOSURE
T-STAT	THERMOSTAT
TV	TELEVISION
TELE	TELEPHONE
TEMP	TEMPERATURE
TERM	TERMINAL
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
THK	THICK
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TR	TELECOM ROOM
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
UTP	UNSHIELDED TWISTED PAIR
UV	UNIT VENTILATOR
VT	VAPOR TIGHT
VDT	VISUAL DISPLAY TERMINAL
VERT	VERTICAL
VOL	VOLUME
WP	WEATHERPROOF
WT	WEIGHT
XFMR	TRANSFORMER

GENERAL SYMBOLS

6	KEY NOTE INDICATOR
5	ELECTRICAL EQUIPMENT INDICATOR
2	SCHEDULED ITEM INDICATOR
2	DRAWING REVISION INDICATOR
AC 1	MECHANICAL EQUIPMENT INDICATOR
?? ????	DETAIL INDICATOR
?? ????	ELEVATION/SECTION INDICATOR

AUDIOVISUAL SYMBOLS

A	INFRARED EMITTER WALL PANEL FOR ASSISTIVE LISTENING SYSTEM
CP	AUDIOVISUAL CONTROL PANEL
S	PROGRAM SPEAKER WALL MOUNTED
	FLAT PANEL DIRECT VIEW MONITOR WITH WALL MOUNT
$ PS	PROJECTION SCREEN WALL SWITCH
$ PL	PROJECTION LIFT WALL SWITCH
	AUDIOVISUAL EQUIPMENT RACK
H	CEILING MOUNTED PROJECTOR
S	LOCAL ROOM SYSTEM FLUSH CEILING SPEAKER.
WV	WALL MTD AUDIOVISUAL BACKBOX PROVIDED BY GENERAL CONTRACTOR. "x" DEFINES TYPE. REFER TO AUDIOVISUAL BACKBOX SCHEDULE.
IP"X"	AUDIOVISUAL INPUT/OUTPUT PANEL, "X" DEFINES TYPE.
PTZ	CAMERA
DC	CEILING DOCUMENT CAMERA
IR	CEILING IR SENSOR
FF X	FLUSH FLOOR BOX PROVIDED BY GENERAL CONTRACTOR, "X" DENOTES FLOORBOX TYPE
FF X	FLUSH POKE THROUGH DEVICE PROVIDED BY GENERAL CONTRACTOR, "X" DENOTES POKE THROUGH TYPE
TB X	FLUSH TABLE BOX, "X" DENOTES TYPE
BM	TABLE BOUNDARY MICROPHONE
CM	CEILING MICROPHONE ARRAY
PS X	PROJECTOR SCREEN SCHEDULE EQUIPMENT TAG
PM X	PROJECTOR MOUNT SCHEDULE EQUIPMENT TAG
DP X	DIGITAL PROJECTOR SCHEDULE EQUIPMENT TAG
FP X	FLAT PANEL SCHEDULE EQUIPMENT TAG
CA X	CAMERA SCHEDULE EQUIPMENT TAG
PO X	PODIUM SCHEDULE EQUIPMENT TAG
ER X	EQUIPMENT RACK SCHEDULE EQUIPMENT TAG
FF X	FLUSH FLOOR BOX, "X" DENOTES TYPE
	TELECOM OUTLET
CLG	TELECOM OUTLET CEILING MOUNTED
	TELECOM OUTLET MOUNTED ABOVE COUNTER TOP
"XX"	TELECOM OUTLET MOUNTED AT HEIGHT "XX"

RACEWAY SYMBOLS

– – PS – – –	EXISTING PLUG STRIP
– – SMR – – –	EXISTING SURFACE MOUNTED RACEWAY
CT-XX	CABLE TRAY - SIZE AS INDICATED BY "XX"
	CABLE TRAY MOUNTED BELOW FINISHED FLOOR

DRAWING LIST

AV001	AUDIOVISUAL SYMBOLS & ABBREVIATIONS
AV201	AUDITORIUM FIRST FLOOR SYSTEMS PLAN
AV220	AUDITORIUM CONTROL ROOM SYSTEMS PLAN
AV400	AUDIOVISUAL DETAILS
AV401	AUDIOVISUAL DETAILS
AV402	AUDIOVISUAL RACK ELEVATIONS

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FD
BUILDING SOLUTIONS FOR RESEARCH

SYSTEM ID BLDG	FACILITY ID	CONFIG CTRL	
DR.		DES.	
CONTRACTOR BURT-HILL		D.ENG.	
CONTRACT NO. NNC09CA01C		PROJ. MGR.	TECH LEAD/BR CH
TASK ORDER		FAC/SYS MGR:	DIV CHIEF:
DRAWN KDS / DESIGNED / CHECKED EAW		RELEASE STATUS:	
APPROVED APR / APPROVAL DATE			

CHG	NUM	DESCRIPTION	DATE	ISSUED BY

REVISIONS

LAST APPROVED EDMS REVISION	TECH LEAD:	FAC-SYS MGR:	REV DATE:

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JOHN H. GLENN RESEARCH CENTER
LEWIS FIELD
CLEVELAND, OHIO

BUILDING 162
AUDITORIUM PRODUCTION SYSTEMS

AUDIOVISUAL SYMBOLS AND ABBREVIATIONS

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
CE	0162 -	WON20357 -	AV-	001

AREA: SHEET 01 OF 06

UNITS: ENGLISH | SOFTWARE: AUTOCAD 2008 | REVISION -

SCALE: NO SCALE | OFFICIAL DATE: 06-21-2013

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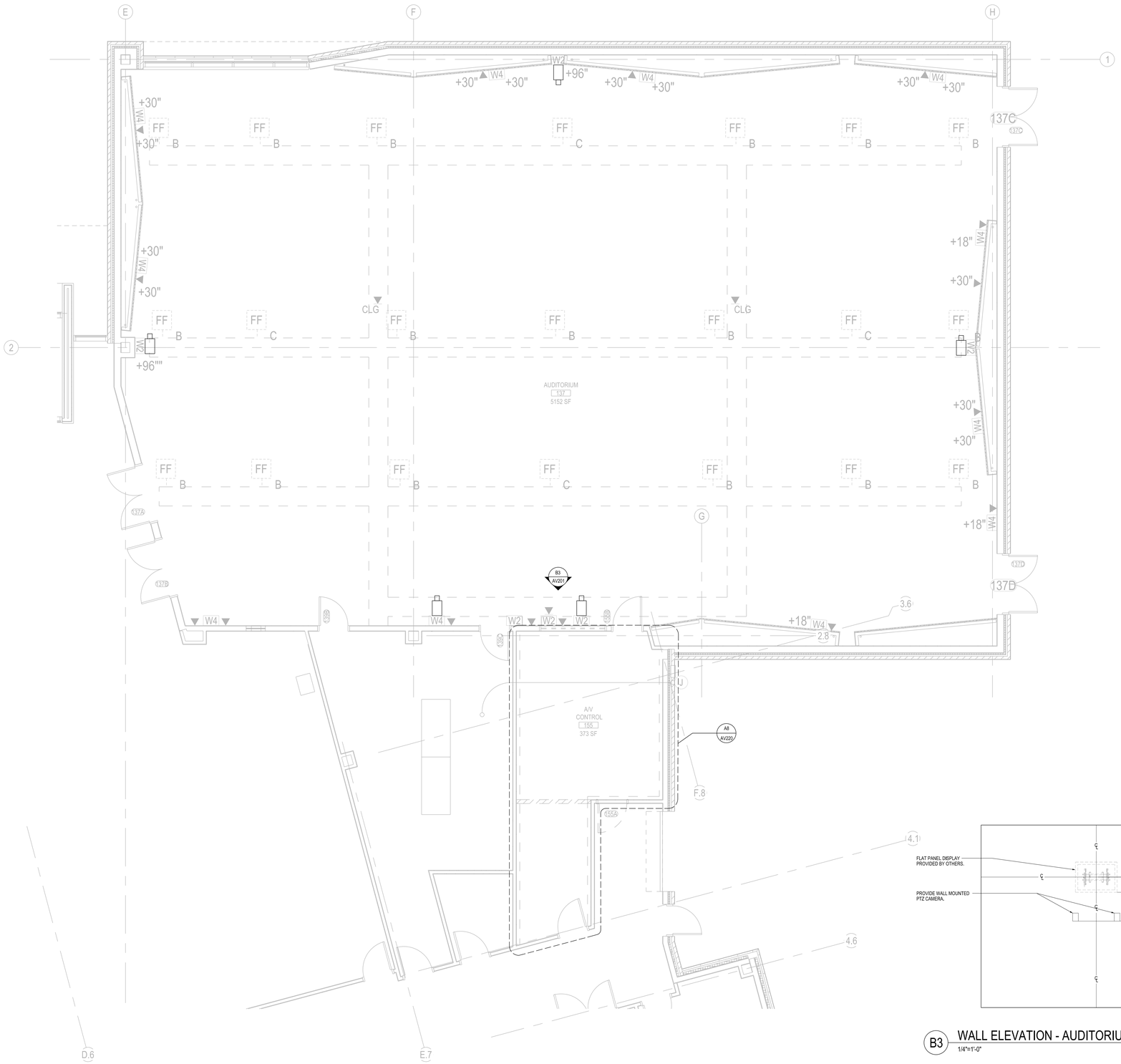

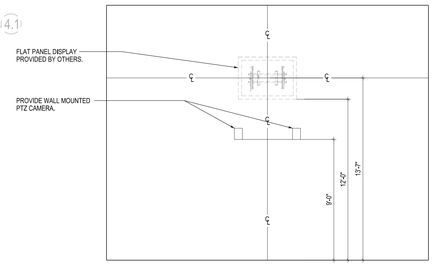

B3 WALL ELEVATION - AUDITORIUM CONFIDENCE MONITOR

1/4"=1'-0"

A8 AUDITORIUM - FIRST FLOOR SYSTEMS PLAN

1/4"=1'-0"

GENERAL NOTES

KEY NOTES

CHG	NUM	DESCRIPTION	DATE	ISSUED BY

REVISIONS

LAST APPROVED EDMS REVISION | TECH LEAD: | FAC-SYS MGR: | REV DATE:

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JOHN H. GLENN RESEARCH CENTER
LEWIS FIELD
CLEVELAND, OHIO

BURT, HILL
3700 Park East Drive, # 200
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Fax: 216/454-9995

THORSON BAKER & Associates, Inc. Consulting Engineers
3030 West Streetsboro Road Hudson, Ohio 44236 (330) 650-4288 Ph. (330) 650-3670 Fax

FD BUILDING SOLUTIONS FOR RESEARCH

CONTRACTOR	BURT-HILL
CONTRACT NO.	NNC09CA01C
TASK ORDER	
DRAWN	KDS
DESIGNED	
CHECKED	EAW
APPROVED	APR
APPROVAL DATE	

SYSTEM ID BLDG	FACILITY ID	CONFIG CTRL
DR.	DES.	
D.ENG.		
PROJ. MGR.	TECH LEAD/BR CH	
FAC/SYS MGR:	DIV CHIEF:	
RELEASE STATUS:		

BUILDING 162
AUDITORIUM PRODUCTION SYSTEMS

AUDITORIUM FIRST FLOOR SYSTEMS PLAN

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
CE	0162 -	WON20357 -	AV-	201

AREA: | SHEET 02 OF 06

UNITS: ENGLISH | SOFTWARE: AUTOCAD 2008 | REVISION -

SCALE: 1/8" = 1'-0" | OFFICIAL DATE: 06-21-2013

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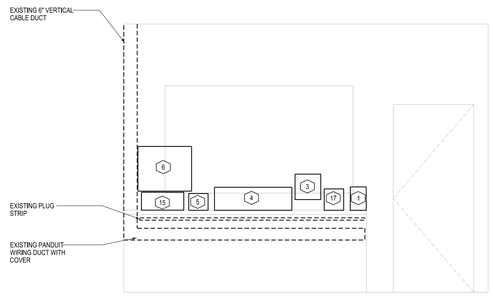
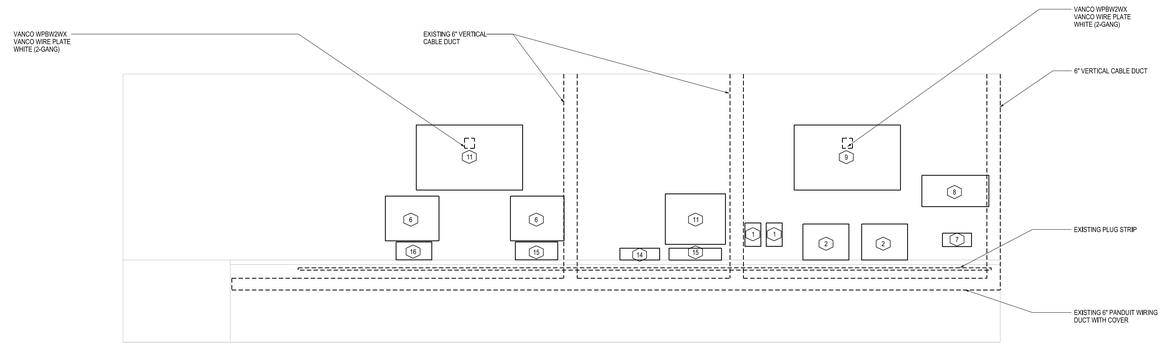
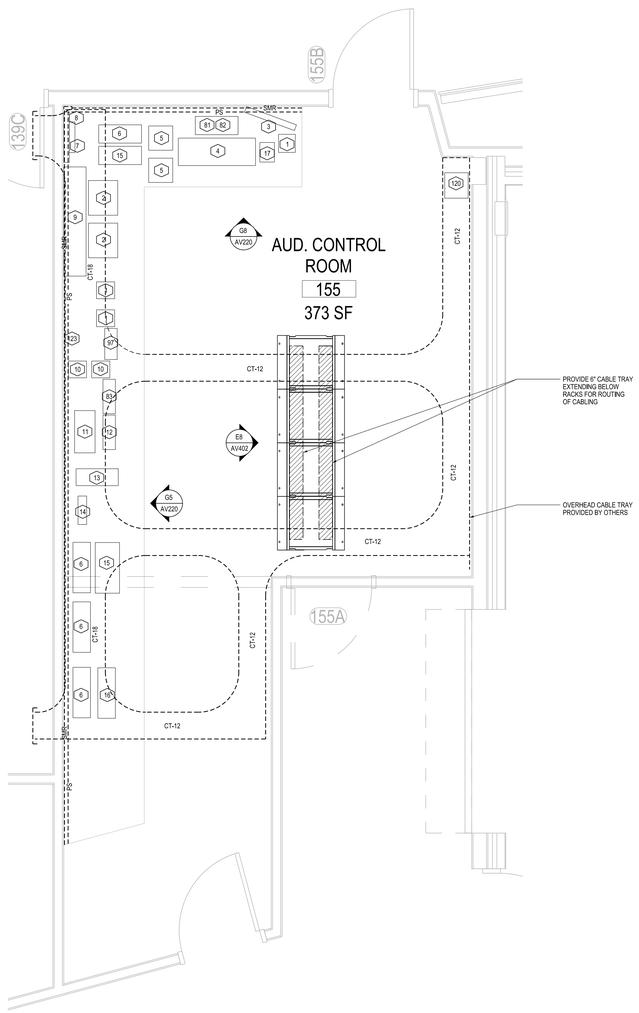


G8 AUDITORIUM CONTROL ROOM WALL ELEVATION
1/2"=1'-0"



G5 AUDITORIUM CONTROL ROOM WALL ELEVATION
1/2"=1'-0"



A8 AUDITORIUM CONTROL ROOM 155 SYSTEMS PLAN
1/2"=1'-0"

EQUIPMENT TAG (THIS SHEET ONLY)	EQUIPMENT DESCRIPTION
1	TELEPHONE
2	LAPTOP
3	DIGICO MONITOR
4	DIGICO SD9 MIXER
5	EXTRON CONTROLLER
6	SWITCHER MUTLIPLIER
7	BIG KNOB 13X6
8	LIGHT CONTROLLER
9	MULTIVIEWER MONITOR
10	PLATONICS
11	MONITORS
12	KEYBOARD
13	CPU
14	REMOTE ROUTER PANEL
15	SWITCHER
16	PTZ CAMERA CONTROLLER
17	TALK BACK MICROPHONE
83	WIRELESS KEYBOARD
81 82	DSAN REMOTE QUE CONTROLLER AND DIRECT BOX
97	GYRATION AIR MOUSE ELITE WITH LOW PROFILE KEYBOARD
120	FLOOR MIXER

D4 COUNTER SYSTEMS EQUIPMENT SCHEDULE
NTS

GENERAL NOTES

KEY NOTES

NASA GRID NORTH
37° 51' 21"
N

BURT, HILL
3700 Park East Drive, # 200
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Phone:216/454-2150
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5125 Mark Dominion Road
Ashland, OH 44805
(330) 289-0228 PH
(330) 289-0229 FX

FD BUILDING SOLUTIONS FOR RESEARCH

CONTRACTOR: BURT-HILL		D.ENG.	
CONTRACT NO: NNC09CA01C		PROJ. MGR.	TECH LEAD/BR CH
TASK ORDER		FAC/SYS MGR:	DIV CHIEF:
DRAWN: KDS	DESIGNED	CHECKED: EAW	
APPROVED	APPROVAL DATE: APR	RELEASE STATUS:	

SYSTEM ID	FACILITY ID	CONFIG CTRL
BLDG		
DR.	DES.	

CHG	NUM	DESCRIPTION	DATE	ISSUED BY
		REVISIONS		

LAST APPROVED EDMS REVISION	TECH LEAD:	FAC-SYS MGR:	REV DATE:

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BUILDING 162
AUDITORIUM PRODUCTION SYSTEMS

AUDITORIUM CONTROL ROOM SYSTEMS PLAN

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
CE	0162 -	WON20357	AV-	220

AREA: SHEET 03 OF 06

UNITS: ENGLISH | SOFTWARE: AUTOCAD 2008 | REVISION

SCALE: 1/8" = 1'-0" | OFFICIAL DATE: 06-21-2013 | -

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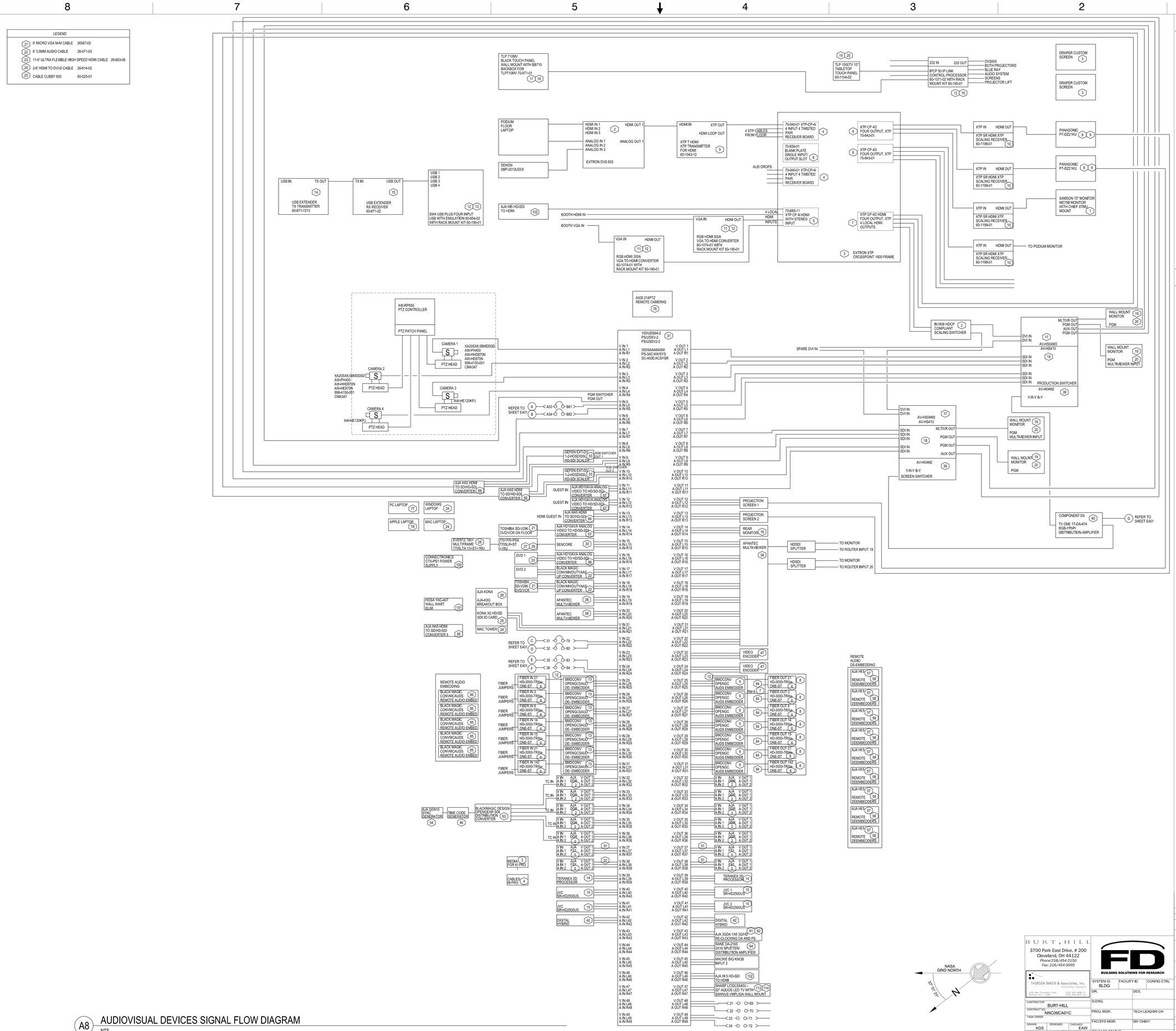

A8 AUDIOVISUAL DEVICES SIGNAL FLOW DIAGRAM

NTS

GENERAL NOTES

KEY NOTES

CHG	NUM	DESCRIPTION	DATE	ISSUED BY
		REVISIONS		

LAST APPROVED EDMS REVISION | TECH LEAD: | FAC-SYS MGR: | REV DATE:

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LEWIS FIELD
CLEVELAND, OHIO

BUILDING 162
AUDITORIUM PRODUCTION SYSTEMS

AUDIOVISUAL DETAILS

BURT, HILL
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Cleveland, OH 44122
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Fax: 216/454-9995

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Consulting Engineers
5235 West Streetsboro Road
Richfield, Ohio 44286
(330) 656-6888 Ph.
(330) 656-6879 Fax

FD BUILDING SOLUTIONS FOR RESEARCH

SYSTEM ID	FACILITY ID	CONFIG CTRL
BLDG		

DR. | DES. | D.ENG. | PROJ. MGR. | TECH LEAD/BR CH | FAC/SYS MGR: | DIV CHIEF: | RELEASE STATUS:

CONTRACTOR: BURT-HILL
CONTRACT NO.: NNC09CA01C
TASK ORDER:
DRAWN: KDS | DESIGNED: | CHECKED: EAW
APPROVED: APR | APPROVAL DATE:

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
CE	0162	WON20357	AV-	400

AREA: | SHEET 04 OF 06

UNITS: ENGLISH | SOFTWARE: AUTOCAD 2008 | REVISION -

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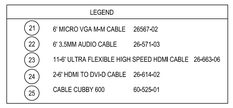
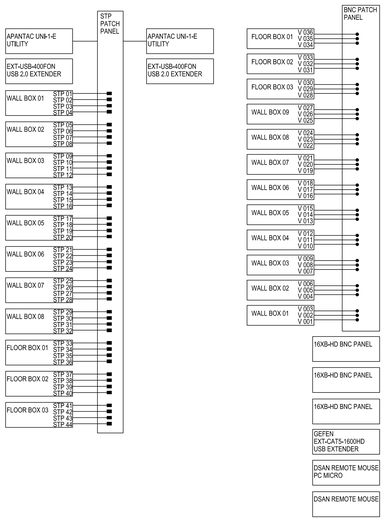
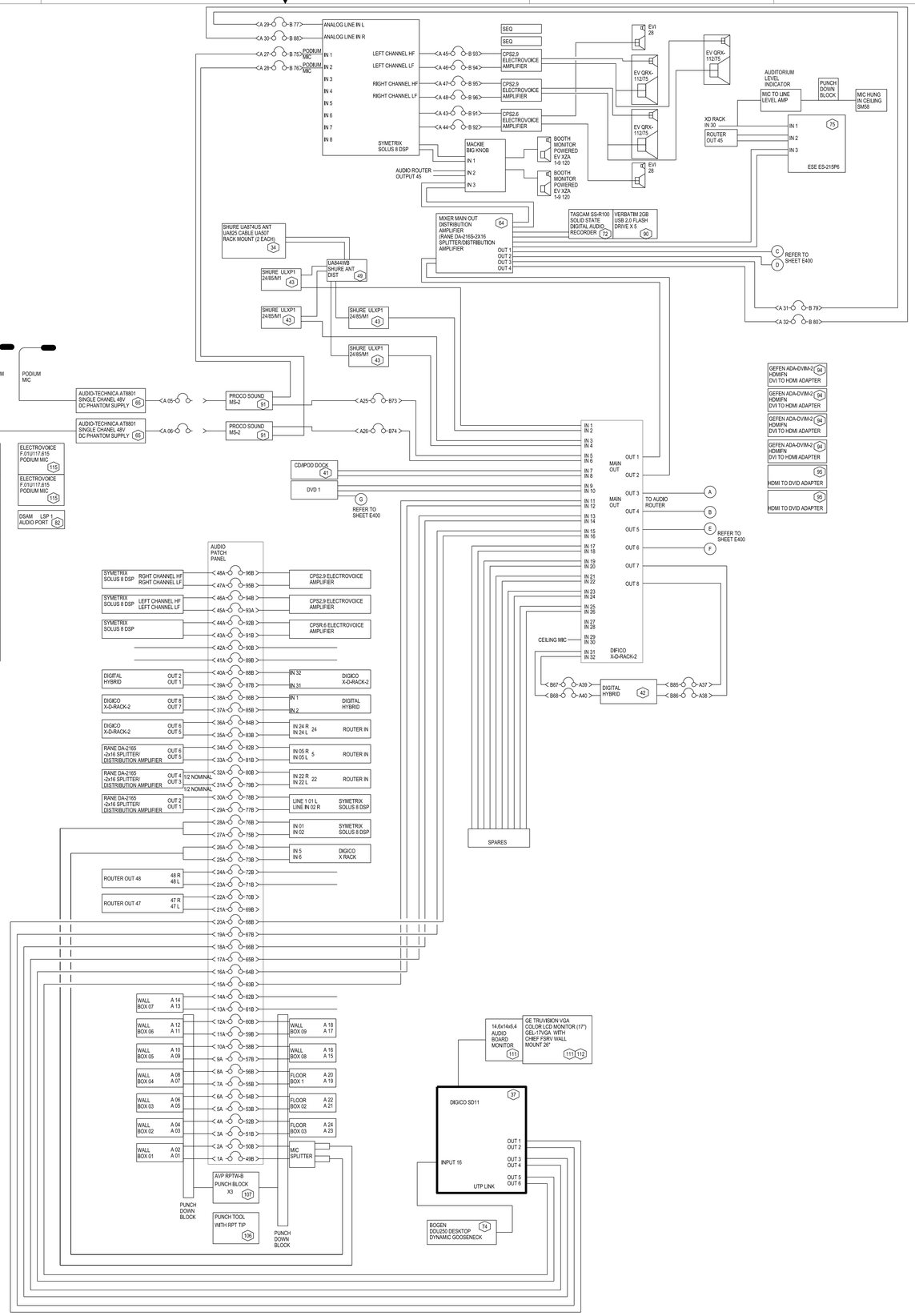
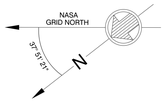






A8 AUDIOVISUAL DEVICES SIGNAL FLOW DIAGRAM

NTS



GENERAL NOTES

KEY NOTES

CHG	NUM	DESCRIPTION	DATE	ISSUED BY

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AUDITORIUM PRODUCTION SYSTEMS

AUDIOVISUAL DETAILS

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Cleveland, OH 44122
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THORSON BAKER & Associates, Inc. Consulting Engineers
2230 Bell Shandley Road Hudson, OH. 44236 (330) 655-0006 Fax (330) 655-9475

SYSTEM ID BLDG	FACILITY ID	CONFIG CTRL	
DR.		DES.	
D.ENG.			
PROJ. MGR.		TECH LEAD/BR CH	
FAC/SYS MGR:		DIV CHIEF:	
RELEASE STATUS:			

CONTRACTOR	BURT-HILL		
CONTRACT NO	NNC09CA01C		
TASK ORDER			
DRAWN JSM	DESIGNED	CHECKED DCB	
APPROVED APR	APPROVAL DATE		

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
CE	0162 -	WON20357 -	AV-	401

AREA: | SHEET 05 OF 06

UNITS: ENGLISH | SOFTWARE: AUTOCAD 2008 | REVISION -

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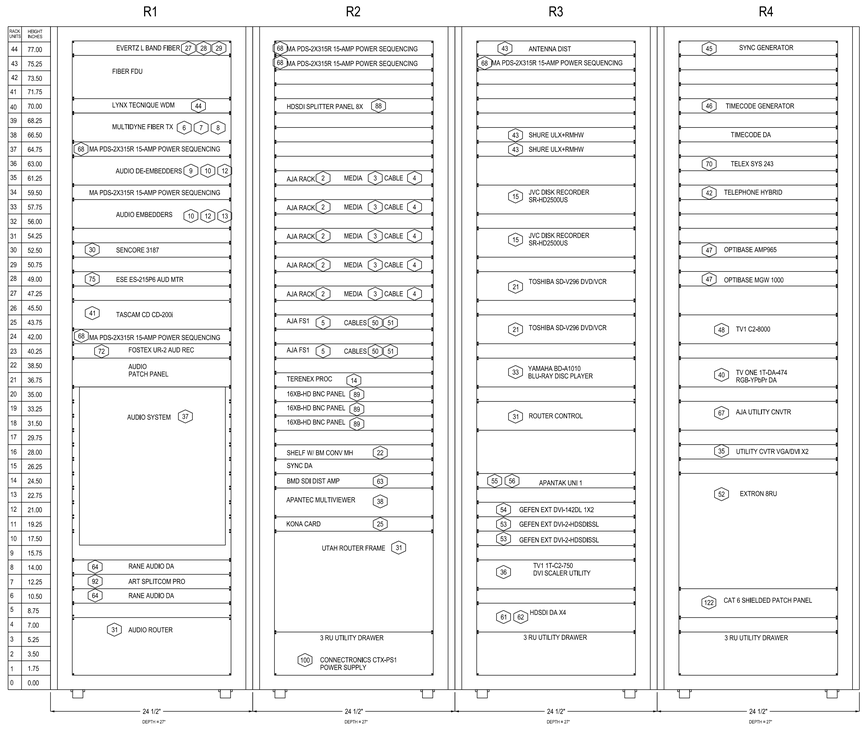

E8 CONTROL ROOM RACK ELEVATION

NTS

NOTES:

PROVIDE QUANTITY OF TEN (10) 1 RU RACK SHELF (ITEM 108).
PROVIDE QUANTITY OF TWENTY (20) AJA RACK MOUNTING BRACKETS (ITEM 69).

GENERAL NOTES

KEY NOTES

NASA GRID NORTH
37° 57' 21"
N

BURT, HILL
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Cleveland, OH 44122
Phone:216/454-2150
Fax: 216/454-9995

THORSON BAKER & Associates, Inc.
Consulting Engineers
3230 West Streetsboro Road
Richfield, Ohio 44286
(330) 659-4688 Ph.
(330) 659-6676 Fax

FD BUILDING SOLUTIONS FOR RESEARCH

SYSTEM ID BLDG	FACILITY ID	CONFIG CTRL	
DR.		DES.	
D.ENG.			
PROJ. MGR.		TECH LEAD/BR CH	
FAC/SYS MGR:		DIV CHIEF:	
RELEASE STATUS:			

CONTRACTOR	BURT-HILL		
CONTRACT NO.	NNC09CA01C		
TASK ORDER			
DRAWN KDS	DESIGNED	CHECKED EAW	
APPROVED APR	APPROVAL DATE		

CHG	NUM	DESCRIPTION	DATE	ISSUED BY
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BUILDING 162
AUDITORIUM PRODUCTION SYSTEMS

AUDIOVISUAL RACK ELEVATIONS

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
CE	0162 -	WON20357 -	AV-	402

AREA:		SHEET 06 OF 06	
UNITS: ENGLISH		SOFTWARE: AUTOCAD 2008	REVISION -
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