SECTION 274100.00 - AUDIO AND VIDEO SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data:
   1. Bill of Materials (BOM).
      a. Separate list for each system.
   2. Product Datasheets.

B. Shop Drawings:
   1. None

C. Closeout Submittals:
   1. As-built drawings. May be combined with structured cabling as-built.

1.2 SUMMARY

A. Section Includes:
   1. Supply, installation and integration of complete and working audio and video systems.

B. Related Requirements:
   1. Related Sections:
      a. Section 271543 “Faceplates and Connectors” for standard plates supporting horizontal cabling and standards-based AV connectivity inserts.

1.3 WARRANTY

A. The warranty period for individual systems shall not start until the system is complete and working for its intended purpose

B. Poor execution of Work can lead to warranty obligations that extend beyond the termination date of the manufacturer’s warranty.

1.4 SYSTEM DESCRIPTION(S)

A. Removal and reinstallation of a sound system which includes an equipment rack and ceiling speakers install in ACT. Wiring shall be removed and replaced with new. Sound system shall be re-tuned and adjusted.

B. Removal and reinstallation of several wall and ceiling mounted displays.

C. Installation of new displays and/or mounts.

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contract Documents, including specifications in conjunction with the drawings, shall be used together to conclude the project requirements.

2.2 SUBSTITUTIONS

A. Brands and models listed on the drawings represent the Basis-of-Design and standard of quality for the identified components. The use of any product other than a Basis-of-Design product in this Section is considered a substitution. These products must include the feature set and operational characteristics to achieve the design intent.

B. Substitutions must be submitted to designer for review before installation.

2.3 EQUIPMENT

A. System equipment shall be derived from the system diagrams. Provide all products necessary for a complete and working system including those not expressly identified on the documents.

B. Products depicted on the drawings which are not identified by brand and model are the responsibility of the Contractor to furnish and install. The decision whether a Contractor selected product is acceptable remains with the Designer.

C. Supply manufacturer recommended accessories where necessary.

2.4 MISCELLANEOUS

PART 3 - EXECUTION

3.1 INSTALLATION

A. Safety:
   1. Install products in such manner as to protect life and property.
   2. Furnish and install safety accessories recommended by the manufacturer.

B. Grounding:

1. Implement signal and safety grounding and bonding to ensure the safety and performance of the system, its operators and the facility in which it is located.

C. Impedance and Level Matching:
   1. Provide impedance matching devices at points in the system where such devices are technically necessary to achieve proper gain staging, product and system performance.
   2. Provide passive isolation to eliminate ground loops between equipment.

D. Audio Combining and Balancing:
   1. Where audio signal distance exceeds 15', a balanced signal must be used.

E. Speakers:
   1. Speakers destined for installation in suspended ceilings shall be installed using an accessory tile bridge that spans tiles and supports the speaker from the metal ceiling grid system. For secondary support, an accessory safety cable shall be provided to support the speaker from the structure.
   2. Install speakers in a secure manner to sound building structures capable of safely sustaining the load applied to it.
   3. Install speakers using materials and mounting methods that ensure that neither the speaker nor the mounting system emits extraneous audible noise when the speakers operate within design limits.

F. Equipment Racks, Cabinets, Enclosures and Furniture:
   1. Provide vertical and horizontal wire management products to secure and manage cables.
   2. Provide horizontal wire support bars. Secure bars in such locations as to achieve a professional balance between cable support, equipment accessibility, service and appearance.
   3. Install service loops. Service loop length shall be determined as follows:
      a. Long enough that the cable can be relocated to a variety of other compatible ports on the product, sufficient to enable the cable to be landed on a different port if it is incorrectly landed.
      b. Long enough that it can be moved aside without becoming unplugged, being damaged or stressed while attempting to access another nearby connection.
      c. Long enough that no stress is applied to the cable itself, a conductor, any other cable, or connectors on the equipment.
      d. Short enough not to hinder serviceability of an adjacent product.
   4. Install filler panels for unoccupied spaces. Provide a mixture of vent and blank type panels that enable manufacturer requisite airflow over equipment for cooling.
   5. Bundle cables carrying different signal formats and levels separately into independent bundles. Separate bundles with an air space sufficient to prevent interference that adversely affects performance.

G. Mounting and Support:

1. Provide professionally engineered and professionally manufactured mounts and supports for non-portable products.
2. Provide final engineering mounting products.
3. Follow the recommendations of the manufacturer for installation of pre-engineered non-custom mounting assemblies. Consult and follow the recommendations of a mechanical Professional Engineer (PE) in those cases where the manufacturer does not publish specific recommendations for product installation for a specific application.
4. Except where code or the Contract Documents require a higher rating, a minimum safety factor of (5) shall apply to the structural integrity of product mounting methods.

H. Video Displays:
1. Install displays in locations identified on the drawings, and mount at the height(s) designated.
2. If a mounting height is not designated in the Contract Documents, coordinate mounting height with the Designer prior to installation.
3. Install display using mounts that are rigidly supported and braced from building structure.
4. Install display so that it is securely attached to the mount. Furnish and install security straps and/or other security products recommended by the mounting hardware and display manufacturers.

3.2 IDENTIFICATION

A. Label each system product.

3.3 ADJUSTING

A. General:
1. Upon completion of physical installation, each system shall be adjusted. Adjustments shall be as necessary to make the system usable for its intended purpose and to the satisfaction of the owner's representative and designer.
2. Adjustments shall be performed as recommended by each product manufacturer, recommended as a best practice by a referenced standard or a recognized related trade organization, and where additionally directed by the Designer.
3. Products featuring analog controls shall be marked with self-adhesive dots or arrows to indicate their final settings.

B. Adjustments:
1. Audio Subsystems:
a. Gain staging:
1) Adjust equipment to achieve optimum signal-to-noise ratio and lowest possible distortion. Optimum settings will generally be achieved when points in the signal chain reach maximum level / clipping / distortion at the same time.

2) Adjust input trim gain and pads on mixers.
3) Adjust the gain of both analog and digital products.
4) Record settings for future reference.

b. Frequency crossovers and filters:
1) Adjust crossovers for minimum interaction between components throughout the crossover frequency region.
2) Set crossover frequencies and filters according to recommendations of the loudspeaker manufacturers.
3) Adjust crossover delays for maximum coherency and minimal acoustic comb-filtering.
4) Record settings for future reference.

c. Equalize the complete electro-acoustic system:
1) Adjust filters that serve the entire electro-acoustic system to achieve the target frequency contour. Where system equipment capability allows, use separate filter sets upstream from the individual loudspeaker filters.
2) Adjust filters to achieve tonal balance between areas covered by different models of loudspeakers.
3) Adjust filters to achieve a balance between gain before feedback performance and tonality.
4) Contact the Designer for target equalization curves prior to performing system equalization.
5) Record settings for future reference.

d. Voltage and power limits:
1) Adjust settings that allow the system to reach but not exceed maximum sound pressure level maximums established by the Designer or Owner.
2) Adjust settings that limit the voltage and power delivered to loudspeakers to within the safe operating range as published by each individual loudspeaker manufacturer. These settings are generally independent of settings used to limit sound pressure levels.
3) Lock down, cover, and protect these settings from unauthorized change.
4) Record settings for future reference.

e. Miscellaneous:
1) Adjust manual and automatic audio mixers. Review and adjust settings available on the product; adjust to achieve performance that is acceptable to the Designer.
2) Enable phantom power on inputs that are intended to accommodate direct connection of condenser microphones and disable phantom power on those inputs that are not intended to accommodate direct connection of condenser microphones.
3) Adjust automatic gain controllers (AGC).
4) Adjust expanders.
5) Adjust compressors.
6) Adjust limiters.

7) Adjust noise gates.
8) Adjust ambient level sensing.
9) Adjust signal-processing equipment.
10) Record settings for future reference.

2. Video Subsystems:
   a. Display Equipment:
      1) Adjust video display equipment following the guidelines set forth by the display equipment manufacturer.
      2) Adjust image size and position.
      3) Adjust color temperature and color settings.
      4) Color match display images that appear side-by-side.
      5) Adjust image brightness and contrast.
   b. Convergence:
      1) Adjust video transmission products in accordance with each individual manufacturer's instructions so that individual colors are aligned at the output of links.

3.4 TESTING

A. General:
   1. Tests shall be performed on the system to the degree necessary to confirm that the system is fully usable to the Owner for its intended purpose to the satisfaction of the Designer.
   2. Tests shall be performed to confirm that the products are performing according to manufacturers' specifications.

B. Speaker Line Impedance Verification:
   1. Prior to landing speaker circuits onto amplifiers, measure and record the impedance of each individual speaker circuit. Confirm that the measured impedance coincides with the calculated impedance conditions and that they are within the safe operating range of the amplifier used.

3.5 REMEDIAL ACTIONS

A. Replace defective products, re-terminate defective connections, perform re-adjustments and re-test offending elements of the system should any deficiencies be found during execution of the Work.

3.6 TRAINING

A. Provide (1) hour of training / assistance for sound system.

3.7 PROTECTION

A. Protect products from damage and from environmental conditions and contaminates that could adversely affect performance, reliability, manufacturers' warranty or longevity.

B. If physical protection must be removed for continuation of Work, protection shall be removed only for the duration and extent necessary. Product shall be cleaned prior to reinstallation of protection.

3.8 CLEANING

A. Clean each system product after installation, immediately prior to substantial completion, and at additional times during performance of Work as recommended by the product manufacturer.

B. Clean the interior of system racks, enclosures and furniture.

C. At the start of the warranty period, system equipment shall feature manufacturer factory-fresh appearance.

End of Section 274100.00