HARD ROCK CASINO
M/E Reference 171301
June 21, 2018

BULLETIN NO. 1 PAGE 1 of 3

This Bulletin contains changes to the requirements of the Bidding Documents, Technical Specifications and Construction Drawings which have been issued to date. Such changes are to be incorporated into the Construction Documents and shall apply to the Work with the same meaning and force as if they had been included in the original documents. Wherever this Bulletin modifies a portion of a paragraph of the Project Manual, or portion of any Drawings, the remainder of the paragraph or Drawing shall remain in force.

CHANGES TO THE SPECIFICATIONS

A. Refer to the following specifications (attached) to be added:

1. Section 270500 - Basic Communications Requirements
2. Section 270510 - Communications, General
3. Section 272100 - Local Area Network System
4. Section 274116 - Audio/Visual and Control Systems - Facility Spaces
5. Section 274116.10 - Audio/Visual and Control Systems - Entertainment Bar
6. Section 274116.20 - Audio/Visual and Control System - Multi Purpose Room
7. Section 275225 - Digital Signage System - Infrastructure Cabling
8. Section 280500 - Basic Electronic Safety and Security Requirements
9. Section 281300 - Access Control System - Infrastructure Cabling
10. Section 282300 - I.P. Camera Surveillance System - Infrastructure Cabling

CHANGES TO THE DRAWINGS:

A. Refer to Drawing No. AV000

1. Revised symbols. Added speaker zone schedule. TV model numbers. Revised general notes.

B. Refer to Drawing No. AV001

1. Added new sheet. Rack elevations and wiring diagrams.

C. Refer to Drawing No. AV111

1. Added A/V DMX interface locations. Revised TV layouts and added lighting control connections.

D. Refer to Drawing No. AV111.1

1. Revised speaker layout added zoning subscripts.

E. Refer to Drawing No. AV112

1. Added A/V DMX interface locations. Revised TV layouts and added lighting control connections.

F. Refer to Drawing No. AV112.1

1. Revised speaker layout added zoning subscripts.

G. Refer to Drawing No. AV122

1. Added A/V DMX interface locations. Revised TV layouts and added lighting control connections.

H. Refer to Drawing No. AV122.1

1. Revised speaker layout added zoning subscripts.

I. Refer to Drawing No. AV400

1. Revised speaker and device layout. Added details.

J. Refer to Drawing No. AV401

1. Revised speaker and device layout.

K. Refer to Drawing No. LV000

1. Revised symbols. Added security door details. Revised general notes.

L. Refer to Drawing No. LV111

1. Revised data outlet layout. Added video wall. Revised WAP locations and quantities. Added TV locations, touch panel locations.

M. Refer to Drawing No. LV112

1. Revised data outlet layout. Added video wall. Revised WAP locations and quantities. Added TV locations, touch panel locations.

N. Refer to Drawing No. LV113

1. Revised data outlet layout. Added video wall. Revised WAP locations and quantities. Added TV locations, touch panel locations.

O. Refer to Drawing No. LV122

1. Revised data outlet layout. Added video wall. Revised WAP locations and quantities. Added TV locations, touch panel locations.

P. Refer to Drawing No. LV400

1. Added cable tray and door controllers to enlarged plans.

Q. Refer to Drawing No. LV600

1. Added COMM RACK details and deleted details.

R. Refer to Drawing No. LVS111

1. Added new sheet.

S. Refer to Drawing No. LVS112

1. Added new sheet.

T. Refer to Drawing No. LVS122

1. Added new sheet.

END OF BULLETIN NO. 1

SECTION 270500 BASIC COMMUNICATIONS REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.3 LICENSING

A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.

B. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.4 PERMITS

A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the City prior to request for final payment.

B. Provide electrical inspection certificate of approval from an Engineer approved Inspection Agency prior to request for final payment.

1.5 CODE COMPLIANCE

A. Provide work in compliance with the following:

1. Building Code of Oklahoma State.
2. Mechanical Code of Oklahoma State.
3. Fire Code of Oklahoma State.
4. Energy Conservation Construction Code of Oklahoma State.
5. Oklahoma State Department of Labor Rules and Regulations.
6. Oklahoma State Department of Health.

7. National Electrical Code (NEC).
8. Occupational Safety and Health Administration (OSHA).
9. Local Codes and Ordinances.
10. Life Safety Codes, NFPA 101.
11. Oklahoma State Education Department Manual of Planning Standards.

1.6 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
OK/DEQ	Oklahoma State Department of Environmental Quality
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.7 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	(Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.
Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer.
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.

Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.
Submittals Defined (Technical)	Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on

Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to meBuff-RFI-Sub-Clerk@meengineering.com.

1.9 PROTECTION OF PERSONS AND PROPERTY

A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.12 ROUGHING

A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.

C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.

D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:

1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.13 COORDINATION SHOP DRAWINGS

A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of electronic drawing files or reproducible transparencies, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:

1. The Low Voltage Contractor shall draft location of data racks, A/V equipment, camera, conduits etc. on the base plan, indicating areas of conflict and suggested resolution.
2. The Electrical Contractor shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan, indicating areas of conflict and suggested resolution.
3. The General Construction Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.
4. The Construction Manager shall expedite all drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various contractors as to how to revise their drawings as required to eliminate installation interferences.
5. If a given Contract proceeds prior to resolving conflicts, then if necessary, that Contract shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Contracts.

B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between Contracts, and between Contracts and existing building construction, before they occur in construction. Coordination drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.14 EQUIPMENT AND MATERIAL INSTALLATION

A. Provide materials that meet the following minimum requirements:

1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
2. All equipment and material for which there is a listing service shall bear a UL label.
3. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:

1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.15 CUTTING AND PATCHING

A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.16 PAINTING

A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).

B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.

C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.

D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.

E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

F. Refer to Division 9 - Finishes, for additional information.

1.17 CONCEALMENT

A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.18 CHASES

A. New Construction:

1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Contract. Mechanical and Electrical Contracts shall provide all other openings required for their contract work.
2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

1.19 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.20 NON-RATED WALL PENETRATIONS

A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.21 PENETRATION FIRE STOPPING

A. See Specification Section 078400 07841, Penetration Firestopping, for project wide fire stopping information.

1.22 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.

C. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.23 ACCESS PANELS

A. Provide access panels for required access to respective Contract work. Location and size shall be the responsibility of each Contract. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide Contractor for General Trades with a set of architectural plans with size and approximate locations of access panels shown.

1.24 CONCRETE BASES

A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 6 in. high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.25 ELECTRICAL EQUIPMENT CONNECTIONS

A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

1.26 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.

B. Refer to Section 016000 - Product Requirements for additional information.

1.27 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.28 OWNER INSTRUCTIONS

A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.29 OPERATION AND MAINTENANCE MANUALS

A. Prepare three (3) Operation and Maintenance Manuals. Include in each O&M Manual, a copy of each approved Shop Drawing, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing

contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Bind above items in a three ring binder with name of project on the cover. Deliver three (3) copies to Owner's Representative for review before request for final acceptance.

B. Operation and Maintenance Manuals shall also be submitted electronically, in PDF format on CD or flash drive.

1.30 RECORD DRAWINGS

A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints and one set of reproducible mylars or electronic files) for the purpose of recording as-built conditions.

B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.

C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.

E. The complete set of red marked Contract Documents, completed reproducible mylar or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.

F. Once the as-built drawings have been approved, the Contractor shall have the set scanned or converted to electronic files and submit to the Engineer as the "Record Set".

1.31 FINAL INSPECTION

A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.32 CLEANING

A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:

1. Thoroughly clean entire installation, both exposed surfaces and interiors.
2. Remove all debris caused by work.
3. Remove tools, surplus, materials, when work is finally accepted.

1.33 TRANSFER OF ELECTRONIC FILES

A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of record drawings related to the project, subject to a $50.00 charge per drawing file and the following terms and conditions:

1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by visiting www.meengineering.com/contractor_request.php.
2. M/E Engineering, P.C.'s electronic files will be exported from MicroStation into DWG/DXF files that are compatible with AutoCad as requested. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
3. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
4. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
5. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of

these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.34 VIDEO RECORDING OF TRAINING SESSIONS

A. The contractor shall video record all training sessions required by their discipline. Video shall be in DVD format and two (2) copies submitted to the Owner. DVD to be individually marked with training session name, installing Contractor and date of training.

END OF SECTION 270500

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents. This section specifies general wiring requirements for systems provided under 27 Series sections of these specifications.

1.3 SUBMITTALS

A. Refer to particular Specification Sections covering all systems. Submit system test reports as called for.

1.4 GENERAL REQUIREMENTS

A. Provide conduit systems and special systems as called for.

1. Provide conduit, wireway, wire terminations, etc., necessary to provide for system functions.
2. Cross-sectional area of wires installed in a conduit shall not exceed 40% of the cross-sectional area called for in the National Electrical Code.
3. Provide separate circuit power source for each system.
4. Where allowable by Code and contract documents, special systems wiring may be installed without conduit. Installation and wire insulation types shall be as described by NEC, Article 725. All low voltage wiring circuits 50V and under shall:

    a. Be adequately supported using bridle rings or other approved method when installed horizontally above accessible ceilings or run exposed in unfinished areas.
    b. Be installed in conduit when installed vertically in Mechanical Rooms from panels and devices up to ceiling.
    c. Be installed in conduit in all cases not specifically covered by the above cases, or where subject to physical damage.
    d. Have the proper insulation and meet the requirements of NEC Article 300-22 when installed in plenums or other spaces used for environmental air.

B. Identification:

1. Provide consistent color code wiring and identify with permanently attached number to each end of each wire, except where color coding is prohibited to meet UL burglary protection requirements.

C. Termination:

1. Unless special terminations are required, such as coaxial cable termination, wires shall be terminated on screw type terminal blocks with metal terminal cabinets.

D. Wiring Diagrams:

1. Install systems in accordance with manufacturer's certified correct wiring diagrams.
2. Provide record drawings for each system, with wire identification, numbers and colors, as installed.

PART 2 - PRODUCTS

2.1 MAKE AND SERVICE

A. Provide devices and equipment by an established manufacturer for respective systems. All devices and equipment for which there is a listing shall be UL listed and FM approved.

B. Provide system equipment and devices of one manufacturer who maintains a competent service organization and who shall be prepared to offer a service contract for maintenance of the respective system.

C. Provide three service organization inspections for each system at four-month intervals during the year following final acceptance.

D. Correct defects found in the system at the time of these inspections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide complete installation in a neat and workmanlike manner including all accessories and appurtenances for a complete operating system, including equipment mounting backboards, power supplies, wiring, etc.

B. Each system installation shall be supervised, tested, adjusted and approved by authorized representative of the manufacturer of the system devices and equipment.

C. Provide written statement from the authorized representative of the manufacturer of the system devices and equipment that the completed system has been inspected and tested and is approved.

D. Riser and wiring diagrams are not intended as final installation drawings but only as a guide for bidding. Install system based on final wiring drawings prepared by the manufacturer of the system.

3.2 WIRING

A. Wire sizes shall be as recommended by system manufacturer.

B. #14 AWG wire, minimum unless otherwise called for.

C. #12 AWG wire, minimum for alarm signal circuits and all power supplies.

D. Provide #20/2 copper minimum twisted and shielded with overall jacket for audio frequency circuits. Shield shall be Mylar backed aluminum foil with drain wire, or copper braid. Do not provide spiral wrap shielding.

E. Provide coaxial cable and fiberoptic cable as called for video and RF distribution.

F. Do not install low level lines such as microphone wires in same conduit with high level lines such as speaker wires.

G. All final wire connections and terminations shall be performed by an authorized representative of the equipment manufacturer who is regularly engaged in, and experienced in this type of work. Subcontracting this work to others is not acceptable.

END OF SECTION 270510

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide labor, materials, equipment, services, etc. for a complete functional Local Area Network (LAN) and related work as required in the Contract Documents.

B. The systems to be provided shall be for a switched LAN environment. The system shall hereafter be referred to as the Data Network System.

C. Basic Intent:

1. Located throughout the building as shown on the drawings, are places where computers and associated equipment are intended to be placed and connected to the network for the purposes of utilizing common resources.
2. The IDF's (IDF-151 and IDF-E216) for the data network in the building(s) are located as shown on the drawings.
3. It is intended that these be connected by a fiber optic cable backbone. From each of these locations, data cable is to be run to the data jacks where computer equipment is connected.
4. Patch panels shall be used as termination points for all fiber optic cabling. Provide backbone cabling between IDF's as indicated.
5. Patch panels shall be used as termination points for all data cables and the individual fiber cables in telecommunication rooms.

D. Scope of Work:

1. Extend Telco services from the demarcation location in IDF-151 to the Network Services Core Switches and distribution equipment located in IDF-151.
2. Extend fiber optic backbone cable consisting of 24 strands single-mode and 24-strands 50 micron multi-mode type OM-3 cable from IDF-151 to IDF #E216.
3. Extend fiber optic backbone cable consisting of 24 strands single-mode and 24-strands 50 micron multi-mode type OM-3 cable from IDF-151 to the surveillance data rack in IDF-151.
4. The fiber optic backbone cable routed between IDF-151 and IDF-E216 shall be run via the underfloor 2 in. raceways provided.
5. Provide room build-out of all IDF rooms consisting of plywood backboards, full height on all walls painted with two (2) coats of fire resistant paint, data racks, quantity as indicated, IDF ground termination bars, raceways, sleeves, complete pathways, supports and firestopping. Provide data equipment racks or enclosed lockable cabinets in the quantities indicated on the contract documents. Provide fiber optic enclosures, fiber optic patch panels, copper patch panels, horizontal and vertical cable management system for the complete data rack/cabinet build-out.

6. Provide horizontal wiring consisting of Category 6 data cable for all work area outlets, Point of Sale devices, Automatic Jackpot Machines, TV's, ATM's, data outlets for table game use and all other data outlets unless otherwise noted. Cable jacket color and data jack color shall be blue. Data jack color for TV shall be yellow.
7. Contract documents indicate general locations of surveillance cameras. Extend Category 6 data cable from the Surveillance Equipment data rack in Surveillance System data rack located in the Server Room. For cameras located within the building leave 1 ft. of data cable coiled at the camera location to allow for final positioning of the camera. Cable jacket color and data jack color shall be black.
8. Extend six (6) strands of 50 micron multi-mode fiber optic cable from the Surveillance Equipment Room via underground raceway to pole-mounted parking lot camera locations. Provide media conversion device and extend Category 6 data cable to parking lot cameras.
9. Slot Machine data wiring shall consist of four (4) Category data cables routed from the local IDF indicated to each bank of slot machines unless otherwise noted. Leave the data cables under the raised floor in the area of the slot bank and leave 10 ft. of cable coiled at this location to allow slot bank relocation. All data cables shall be terminated on Category 6 RJ-45 data connectors. All cables shall be terminated and tested. Cable jacket color and data jack color shall be blue.
10. At the individual table game location provide a communication outlet consisting of a 2-gang outlet box with four (4) Category 6 RJ-45 data connectors. Cable jacket and data jack color shall be blue.
11. Wireless Access Points (WAP) shall consist of surface mount box - Panduit #CBX2BL-AY with two (2) Category 6 data outlets and 10 ft. coiled cable whip in ceiling space to allow for final WAP location as directed in field. The data cables shall be routed to local IDF as indicated on drawings. Cable jacket color shall be black and data jack color shall be orange.
12. Provide OTDR and power meter testing of all strands of fiber optic backbone cable, both primary backbone cable and redundant backbone cable.
13. All data cable and Category 6 for all data network wiring system use shall be tested and shall conform to TIA-568-C.2 Standard.

1.3 TELECOMMUNICATION ROOMS (IDI's)

A. Each telecommunication room shall be furnished with 3/4 in. plywood backboard, floor to ceiling on all walls, with the plywood backboard painted with two (2) coats of fire resistant paint (UL/ASTM Class A), all surfaces.

1. ANSI/TIA/EIA Telecommunications Building Wiring Standards.
2. IEEE Telecommunications Standards.
3. BICSI Methods Manuals.
4. NFPA 70: NEC

1.4 QUALITY ASSURANCE

A. Work shall be as specified herein and it shall be neat and orderly installation. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.

B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

C. Installation shall be accordance with NFPA 70 (National Electrical Code), TIA/EIA, IEEE, IEC, state codes, local codes, and requirements of the Authority Having Jurisdiction.

D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMAIEC, TIA/EIA and IEEE Standards.

E. Each item shall be NRTL tested and listed.

F. The system provider must:

1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.
2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years.
3. Maintain adequate spare parts inventory to provide both normal and emergency service.
4. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
5. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.

G. Contractor Qualifications:

1. This Contractor shall be a certified installer for the proposed equipment/system manufacturer(s) and be BICSI certified ITS Installer 2, Copper and Optical Fiber and shall be certified to terminate indicated fiber connectors.
2. The cable installer shall provide documentation and references from three (3) similar installations installed within the previous two (2) years within a 60 mile radius.

H. Installer Qualifications:

1. Cabling installer must have personnel certified by BICSI on staff.

1.5 SUBMITTALS

A. Provide the following in a single clear and organized submittal. Package shall be submitted as specified in:

1. Manufacturers catalog sheets, specifications and installation instructions for all system components.
2. Detailed description of system operation.

3. Itemized list of all features and functions.
4. Dimensioned drawings of all system control cabinets and layouts for all equipment rooms.
5. Wiring diagrams showing typical connections for equipment.
6. Contractor certification and qualifications.
7. Riser diagrams showing all components, devices and interconnecting cable types.
8. List of three (3) installations of equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of one (1) year.
9. Warranty information.
10. System test reports.
11. Provide scaled elevation and plan drawings indicating walls, data racks, patch panels, wire management, cable trays, power strips, door swing, etc. for each cable closet/room.

1.6 SYSTEM DESCRIPTION

A. Provide a complete and fully operational state of the art Local Area Network (LAN) system as described herein and indicated on the contract documents. Include any and all interface equipment to supply a complete network with complete equipment connections necessary to form a complete "turnkey" network system as outlined in these specifications.

B. The complete system shall include, but is not limited to, the following:

1. Equipment Room build-out.
2. Telecommunications Room build-out.
3. Equipment cabinets and racks.
4. Patch panels and patch cables.
5. Wire management.
6. Fiber optic backbone cabling.
7. Horizontal cabling.
8. Modular jacks, backboxes and faceplates.
9. Terminations and testing.
10. Raceways, pathways, cable tray, sleeves, pull boxes.
11. Firestopping.

C. Owner shall provide the network electronics.

D. The following shall be furnished by the Owner, installed, terminated and tested by this Contractor:

1. Data Network System electronics including wireless access points and controllers.

1.7 WARRANTY

A. All cable plant parts shall be warranted to the owner for a period of fifteen (15) years as a complete end-to-end system.

B. All network equipment shall be warranted to the owner for a period of one (1) year. Provide technical support at no charge to the customer for a period of one (1) year after system has been commissioned.

C. Make available an extended warranty to the customer.

D. Warranties shall commence upon final acceptance of the system.

PART 2 - PRODUCTS

2.1 BACKBONE WIRING - FIBER OPTIC CABLE

A. All of the fiber optic cable must meet or exceed the following requirements and specifications.

B. Individual fiber optic cables shall consist of:

1. The fiber.
2. Tight buffer.
3. Thermoplastic jacket.
4. Central strength member.
5. Aramid strength member.
6. Second core wrap with ripcord.
7. Polyester barrier.
8. Outer jacket.

C. All backbone fiber optic cable shall be:

1. Installed in plenum rated innerduct labeled on 10 ft. centers - Fiber Optic Cable.
2. Steel armored fiber optic cable shall be armored labeled on 10 ft. centers - Fiber Optic Cable.

D. Multimode Fiber (Indoor/Outdoor):

1. Maximum attenuation /3300 ft. for each strand of fiber in the cable at temperatures ranging from -40°C to 70°.

    a. 850 nM: 3.5 dB.
    b. 1300 nM: 1.5 dB.

2. Minimum Bandwidth/3300 ft.

    a. 3500 MHz (OM-3).
    b. 1300 nM: 500 MHz.

3. Shall be tight buffer, plenum rated, indoor-outdoor breakout style.
4. Core Type: Graded Index Glass.
5. Core Diameter: 50 Microns.
6. Clad Diameter: 125 (+0/-3) Microns Numerical aperture: 0.275.
7. Minimum Bend Radius:

a. Installation - 15 x O.D.
b. Long Term - 10 x O.D.

8. Maximum Loading:

a. Short term - 660 lb
b. Long term - 330 lb

9. Strength members shall be FGE/Aramid yarn.
10. Cable shall meet requirements for plenum and vertical tray cable specifications of the NEC.
11. All fibers shall be terminated with connectors compatible with cable and patch panel specified.
12. Shall have individual fiber tube colors per TIA/EIA-598 and overall orange jacket.
13. Shall be 100 Kpsi proof-tested.
14. Meet or exceed requirements for TIA/EIA 568-C.3.
15. Manufacturer: Panduit #FODPX24Y

E. Single Mode Fiber (Indoor/Outdoor):

1. Maximum Attenuation per KM:

a. 1310 nM- 0.5
b. 1550 nM - 0.5

2. 1310/1550 nM.
3. Shall be tight buffer, plenum rated, indoor-outdoor breakout style.
4. Core Type: Single Mode.
5. Core Diameter: 8.3 Microns.
6. Clad Diameter: 125 Microns.
7. Minimum bend radius shall be 20 times the diameter.
8. Strength members shall be FGE/Aramid yarn.
9. Shall meet requirements for plenum and vertical tray cable specifications of the NEC.
10. Provide number of fibers/cable as indicated in riser diagram on Drawings.
11. Shall have individual fiber tube colors per TIA/EIA-598 and an overall yellow jacket.

F. Acceptable Manufacturers:

1. Panduit

2.2 HORIZONTAL CABLE

A. Category 6 F/UTP Cable:

1. Cable must be UL listed:

a. Plenum shall be listed for limited power CMP-LP (0.7A)
b. Riser shall be listed for limited power CMR-LP (0.5A)

2. The cable manufacturer shall be ISO 9001/TL 9000 registered.

    a. UL listed CMP-LP (0.7A) supporting up to 100 watts.
    b. UL listed CMR-LP (0.5A) supporting up to 100 watts.

3. Initially, the manufacturer shall perform qualification tests on each cable. These tests shall be performed in accordance with the latest revision of the ANSI/TIA/EIA 568-C.2 Permanent Link Transmission Performance standard prior to shipment.
4. Date of Manufacture: Cable shall be a maximum of one (1) year old, from date of manufacture when installed.
5. Cable shall have a ripcord.
6. Cable shall be plenum rated, 4 pair, 100 OHM, 23 AWG.
7. Cable shall meet all requirements of FCC 68, the latest revision of the TIA/EIA 568B-C.2 and Addenda.
8. Cable shall have blue or black colored thermoplastic jacket with overall diameter not to exceed 0.365 in.
9. The cable pulling tension shall be rated for 25 pounds minimum.
10. Cable shall be able to withstand a minimum bend radius of 1.0 in. at -20ºC without insulation cracking.
11. Cable shall be color coded in accordance with the latest revision of the TIA/EIA T568B polarization sequence.
12. Cable shall not exceed maximum length of 90 meters.
13. Provide a printed report documenting testing based on ANSI/TIA 568 C.2 testing at 250 MHz. The following are the minimum values associated with the cable for a 100 meter length.

    a. Less than 21.000 ohm per 100 m DC loop resistance.
    b. Return loss > 20.0 dB.
    c. Insertion Loss < 31.1 dB/100M.
    d. Near end cross talk (NEXT)> 35.3 dB (43.4 dB).
    e. Power Sum - near end cross talk (PS-NEXT)> 41.0 dB.
    f. Attention to cross talk ratio (ACRF) > 16.2 dB (24.8 dB).
    g. Power Sum - Attenuation to cross talk ratio (PSACRF) > 13.2 dB (21.8 dB).
    h. DC resistance unbalance between any two (2) conductors of any pair shall not exceed 3%.
    i. The capacitance unbalance of any pair to ground shall not exceed 33.0pF.
    j. Delay < 490 ns.
    k. Delay skew < 44 ns.
    l. Cable shall be ANSI/TIA/EIA-568.B.2 Category 6 compliant. The cable shall be tested and characterized by the manufacturer.

14. Acceptable Manufacturers:

    a. Panduit #PUP6004-BU-UY-Blue Jacket
    b. Panduit #PUP6004-BL-UY-Black Jacket
    c. Panduit #PFL6004-YL (Coordinate color with Owner)

2.3 PATCH CABLES

A. Patch Cables - UTP:

1. Provide patch cable for use in the patch panels and field outlets, a minimum of two for each circuit/channel. Quantity of patch cords shall be sufficient to terminate all outlets indicated on drawings as well as 25% spare outlets of each type. Patch cable type shall correlate to the cable color and type to which it is connected to and match or exceed the performance characteristics.
2. Field verify exact length of patch cords for field outlets and patch panel outlets with the Owner. Assume a typical of two (2) meters each.
3. Patch cord shall be stranded with overall jacket and factory made connectors with protective boots.
4. All patch cords shall be third party verified.
5. Acceptable Manufacturers:

    a. Panduit #UTP28SP2BU-Blue
    b. Panduit # UTP28SP2BL-Black

B. Patch Cables - Fiber Optic Cable

1. Provide patch cable for use in the patch panels and field outlets, a minimum of two for each circuit/channel. Quantity of patch cords shall be sufficient to terminate all outlets indicated on drawings as well as 25% spare outlets of each type. Patch cable type shall correlate to the cable color and type and match or exceed the performance characteristics.
2. Field verify exact length of patch cords for field outlets and patch panel outlets with the Owner. Assume a typical of two (2) meters each.
3. Patch cord shall meet the specifications for the cable to which it is connected to.
4. All patch cords shall be third party verified.
5. Acceptable Manufacturers:

    a. Panduit

2.4 PATCH PANELS

A. UTP Cable Patch Panels:

1. All panels should consist of a faceplate, mounting, hardware, isolation bushings, connector assemblies and labels for all ports.
2. Provide angled, unshielded mini-com patch panels in each enclosure or rack to which the cable is to be terminated. Patch panels shall be of the type, performance and Category to match the cabling.
3. Patch panels shall be mounted in standard 19 in. racks/cabinets.

    a. Contractor shall provide multiple 48-port patch panels having wiring configuration specified with insulation displacement connectors on the back and 8P8C universal modular jacks on the front.
    b. Contractor shall provide quantity of patch panels to terminate all UTP cable. There shall be a minimum of 25% spare capacity for future installation.

4. Jacks shall be 8P8C, T568 universal.
5. Panels shall have factory labels for each port.
6. All cables are to be terminated per EIA/TIA 568B or 568A standards, if applicable, and dressed in a neat workmanship way.
7. Modular jacks shall be mounted on PC boards to offer low insertion and NEXT loss.
8. Provide grounding screw assembly with serrated head screw and manufacturer recommended connection to the associated rack.
9. Shall exceed EIA/TIA-568, UL1863 and FCC Part 68 performance specified.
10. Acceptable Manufacturers:

    a. Panduit #CPPLA48WBLY

2.5 OUTLETS AND CONNECTORS

A. UTP Outlets/Connectors:

1. Physical Specifications:

   a. Category 6, 8-position UTP jack module shall terminate 4-pair, 100 OHM unshielded twisted pair cable.
   b. Shall not require use of punchdown tool.
   c. Shall exceed channel requirements of ANSI/TIA-568-C.2, Category 6 standards at swept frequencies up to 250 MHz.
   d. Contacts shall be plated with 50 microinches of gold.
   e. RoHS compliant
   f. Shall be rated for 2500 cycles and shall support power over HDBaseT up to 100 watts.
   g. Manufacturers:

      1) Panduit #CJ688TGBU-Color Blue
      2) Panduit # CJ688TGBL - Color Black
      3) Panduit # CJ688TGOR - Color Orange
      4) Panduit #CJ688TGYL - Color Yellow

2.6 COLOR CODING

A. Cable outer jacket shall follow the color coding scheme as follows. Jacket color shall be continuous. Patch cords shall match the cabling.

B. Fiber Optic Cable:

1. Backbone Cabling:

   a. Single Mode - Yellow
   b. Multimode (OM3) - Aqua

2.7 DISTRIBUTION ENCLOSURES/RACKS

A. All enclosure/racks shall be properly sized and of the proper quantity to house all of the required components and 25% spare space capacity. Provide grounding stud for each vertical rack.

B. Label each rack/enclosure designating it per the latest TIA/EIA standard:

1. Adhered plastic electronic printed label with 1/2" high lettering minimum.
2. Mount to top and bottom of each rack/enclosure.

C. Enclosed, Floor Mounted Cabinet:

1. Steel framed, perforated front and rear doors with lock (keyed to the Owners standard), full length piano hinge and field adjustable swing.
2. Steel Rear Door with Lock (lower half vented).
3. Two (2) eight position vertical mounted PDU units - APC AP 7830.
4. Fan Assembly - Suitable top mounted fans (two minimum) for an ambient temperature of 85°F.
5. Containment brackets for PDU-APC AR7710.
6. Adjustable front and rear mounting rails.
7. Adjustable 19 in. wide mounting rails. Depth to accommodate the intended equipment (32 in. minimum).
8. Color black.
9. Verify swing of door in the field prior to ordering.
10. Unit width shall accommodate racking, power strips and cable management.
11. In locations requiring two or more enclosures, side panels shall be removed and cabinets shall be bolted together allowing access between cabinets.
12. Size: Cabinets shall be 36 in. wide x 43 in. deep.
13. Manufacturer: APC #AR3300

D. Open, Floor Mounted Racks:

1. Nominal size shall be 19 in. wide x 7 ft. high x 20 in. (minimum) deep. Rated for 2000 lb. minimum. Depth to match the intended equipment.
2. Rack shall be constructed of 6061-T6 aluminum extrusion, with EIA = 3 in. x 1.265 in. channel, 1/4 in. thick flange.
3. Provide base angles and top cross bars.
4. The back of rack shall have wire management panels and cable tray to wall.
5. Manufacturer: Panduit R2P.

2.8 CABLE MANAGEMENT

A. All racks are to be provided with cable management hardware to insure a neat, functional system when complete. Racks shall as a minimum, include the following:

1. PVC construction; duct fingers to manage cabling; color to match enclosure.

B. All racks shall have 8 in. wide vertical full height cable management, including cover, front and rear, on both sides of the rack.

C. All racks shall have 2RU space horizontal full width cable management, front and rear, above and below each patch panel and piece of equipment.

D. Cabinets shall have 1RU space horizontal panels, front and rear, above and below each patch panel and piece of equipment.

E. All data distribution frame plywood backboards shall be provided with vertical and horizontal wire management with capacities to house all possible future cabling and patch cords for a neat and orderly installation.

F. Acceptable manufacturers:

1. Panduit

2.9 INNERDUCT

A. Innerduct shall be corrugated HDPE material, plenum rated, flexible, continuous, UV rated with flame/smoke spread in accordance with code and length markings on the outer surface.

B. When in conduit minimum size shall be 3/4 in., otherwise 1 1/2 in. minimum.

C. Acceptable manufacturers:

1. Carlon
2. Maxcell
3. Opti-Com
4. Approved equal

2.10 CABLE TRAY SYSTEMS

A. General:

1. Provide three (3) separate cable tray systems with an under raised floor system, a system to be used above open ceiling areas, and a system for use in IDF's above data equipment racks and cabinets.
2. Below raised floor system shall consist of hand bendable cable tray having loading area of 18 in. wide, 4 in. deep. System shall be furnished complete with all accessories required to provide a complete system. Cable tray system shall be direct floor mount below raised floor system.
3. The system to be used in the above open ceiling area shall be 24 in. wide x 4 in. deep, solid bottom cable tray system furnished complete with all accessories required to provide a complete system.
4. The cable tray system used inside IDF's above cabinets and racks shall be bendable and shall have loading area of 12 in. wide, 4 in. deep. Ssytem shall be furnished complete with all accessories required to provide a complete system. System shall be supported by center support utilizing threaded rods, spaced no greater than 5'-0" O.C.

5. Manufacturer:

   a. Under raised floor cable tray system:

      1) Snake Tray Cable Management System CM101-18-8 Raised Floor Tray CM-1818-Intersection; TF-101-TF-101LS-Turning Fence; CB-12 In-Line Connector.

   b. Above open ceiling system:

      1) B-Line Series Cable tray System #KSA4ASB-24-10; Splice Plates #KS4A-SSP; Bonding Jumper #99-30; Drop Outs #KSA-OUT-24; Trapeze Support Kit #9P-5524-225H.

   c. Above IDF cabinets and racks:

      1) Snake Tray Cable Management System: CM801-4-12-FG5 - Mega Snak tray; CM801-4-12-90 - 90° Turn Sections; CM801-4-12T - T Section; CM801-4-12-CG- Crossing Grid; CM801-SP - Splice Kit.

2.11 LABELING

A. General:

1. System labeling shall be in accordance with the latest revision of TIA/EIA 606. Labeling system and structure shall match the Owners existing. System shall provide as built final conditions for each cable, port, panel, rack, etc. and utilize MS Excel or approved equal documentation. Provide hard and electronic copy of labeling documentation to the Owner as part of the O and M process.
2. Each label shall contain the Telecommunication Room designated, the room number and the port number in the room. Verify color of label and size of font prior to completion. Provide samples as requested.
3. Labels shall correspond to the room/names/numbers upon completion of the project. Contractor shall not necessarily utilize existing room/names/numbers or those indicated on the blueprints.
4. Label each rack and patch panel with 1 in. high lettering, black on white, adhered electronically printed plastic type label with labels at top, bottom, front and back.

B. Patch Panel

1. Individually label all patch panel ports. Port numbers shall match opposite end outlet/port number.

C. Outlets

1. Individually label all patch panel ports. Labels shall be installed in a workman-like manner and fit completely in the recessed area of the labeled location.
2. Contractor shall utilize adhered labels at poke-thru locations and any other locations that do not have a label location.

D. Cable

1. Fiber Optic:

a. Individually label fiber optic cables at each termination point indicating building, destination room, rack number, panel number, port number, strand number and strand color.
b. Each strand color shall match a specific fiber termination number in each closet, i.e. blue - fiber 1, orange - fiber 2, green - fiber 3, etc.
c. Cable label shall be adhered electronically printed plastic type with cable designation fully visible.

2. Copper

a. Specifically label cables at each termination point indicating the destination room, rack number, panel number and port number.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Provide a minimum of one horizontal UTP cable to each communication outlet jack from respective equipment/telecommunications room patch panel as called for. Quantity of data jacks equals minimum quantity of UTP cables (typical).
2. Provide a minimum of one (1) pair (2 strands) of multi-mode fiber optic cable to each fiber jack from respective equipment/telecommunications room as called for. Quantity of fiber jacks equals minimum quantity of 2 strand cables (typical).
3. All risers, and wiring concealed in walls or soffits, shall be installed in metal conduits.
4. All cable above accessible ceilings shall be installed in cable tray or J-hook style cable rings 3 ft. O.C.
5. Provide wire management and Velcro cable wraps every 24 in. throughout closets. Provide Velcro cable wraps every 36 in. elsewhere.
6. Wiring/cabling shall be installed in accordance with the manufacturer's recommendations. If the manufacturer recommends larger wire sizes, they shall be provided. However, smaller sizes or lower cable categories are not acceptable.
7. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements and conduit sizes.
8. Install UTP cable in accordance with latest revision of TIA/EIA 568 standards.
9. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
10. All raceways and closets shall be installed in accordance with latest revision of TIA/EIA-569.
11. All cables shall be labeled in accordance with latest revision of TIA/EIA 606 and these specifications.

12. All horizontal cables shall be terminated in patch panels at the distribution frames, and at the UTP jack at the telecommunications outlet.
13. Maximum length shall be 90 meters.

B. Fiber Optic Cable:

1. Terminate backbone fiber cables in rack mounted patch panels at both ends.
2. Adhere to all manufacturer bend radius recommendations.

C. Terminations:

1. All terminations shall be made by a manufacturer's trained representative.
2. Use termination kits for fiber and UTP that are approved by the manufacturer of the cable.
3. All backbone cable shall be terminated in a patch panel and all connections between horizontal and backbone cables shall be through cross connect cable.

D. Equipment and Devices:

1. Install all devices where shown on drawings. Provide all necessary conduit outlet boxes, junction boxes, supports, etc. Verify all required box sizes with the system supplier and coordinate with bending radius needs. All devices shall be modular for future moves and changes.
2. Install all equipment in specified 19 in. racks/cabinets leaving minimum 30 in. of access space on sides and back of rack and 36 in. in front of rack.
3. Provide all power outlets and plug strips required for system operation but not shown on plans.

E. Raceways:

1. Minimum size raceway shall be 1 in.
2. Minimum backbox size for telecommunications outlet locations shall be two-gang with raised cover; no single-gang boxes allowed.
3. Provide no greater than 180° in bends without pull box in any raceway.

F. Data Network Ground System:

1. Provide grounding system for all equipment rooms and telecommunication rooms as called for in Specification Section 260526.

G. Telecommunications Rooms:

1. Provide 3/4 in. x 4 ft. high continuous plywood backboard with two (2) coats of medium gray fireproof paint in telecommunications rooms.
2. Coordinate with other trades to avoid services being installed above telecommunications racks.

3.2 TESTING

A. Copper Cable: System supplier shall channel test end-to-end each permanent link connection using latest 200 MHz for Cat 6, IEEE testing procedure. Tester must conform to the latest standards at the time of testing not time of bid and be Fluke DTX-5000 with latest software version, or approved equal. Testing shall be performed by a technician trained with the specific testing equipment. Testing shall be witnessed by the Owner's Representative.

B. Fiber Optic Cable: Provide an OTDR test for all fiber optic cable and connections per latest IEEE and ANSI accepted procedures. Test shall utilize Fluke Opti Fiber Pro OTDR.

C. Replace any cables and connectors that do not meet or exceed standards referenced and stated herein and then tested. Testing shall be end-to-end / port-to-port for each cable.

D. Test equipment shall be in good condition and working order, calibrated within one year of its use and utilize leads without twisting and kinks. Unit calibration shall be in accordance with Level III Field Tester per ANSI/TIA 1152.

E. Test Reporting:

1. The field testing shall be accurately documented for submission, inclusion in O&M Manuals and for Owner future use.
2. Test reports shall include data directory table cross-referencing room numbers and cable numbers with the test report. Post copies of directory at telecommunications room location.
3. Report shall utilize electronic Windows based documenting with a hard and electronic copy provided to the Owner.
4. The report documentation for each cable test shall include the following as a minimum:

    a. Project name.
    b. Test equipment manufacturer and model number, and last calibration date.
    c. Date and time of the test.
    d. Patch panel identification.
    e. Cable identification.
    f. Cable type.
    g. Pass/Fail: Pass indicating meeting or exceeding the identified criteria or standard (whichever more stringent) for all parameters. Fail indicating test not meeting identified criteria for one or more parameters.
    h. Test pass criteria.
    i. Cable length.
    j. Propagation delay and attainable bandwidth.
    k. List of tested parameters with test and allowable values. Any failed parameters shall be noted or highlighted.

3.3 TRAINING AND INSTRUCTION

A. Provide four (4) hours minimum of instruction to Owner personnel regarding system set up configuration and management. Training shall be sufficient for the Owner to understand the system operation, components, configuration, functions, testing and troubleshooting. All Owner questions shall be answered.

B. Training agenda (estimated duration, intent, specifications to be covered) shall be submitted for approval prior to the training. A finalized agenda shall be issued to the Owner and construction representative one (1) week minimum prior to the scheduled training. Owner's comments shall be incorporated and agenda redistributed prior to the training.

C. Two (2) hard copies and one (1) electronic (pdf) copy of the training materials shall be provided.

3.4 WARRANTY

A. All cable plant parts shall be warranted to the owner for a period of fifteen (15) years as a complete end-to-end system.

B. All network equipment shall be warranted to the owner for a period of one (1) year. Provide technical support at no charge to the customer for a period of one (1) year after system has been commissioned.

C. Make available an extended warranty to the customer.

D. Warranties shall commence upon final acceptance of the system.

END OF SECTION 272100

SECTION 274116.10 AUDIO/VISUAL AND CONTROL SYSTEMS - ENTERTAINMENT BAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide labor, materials and services to perform operations required for the complete installation of the audio/visual and control systems in the Entertainment Bar Lounge Area.

B. Refer to Owner's specifications for equipment to be provided.

1.3 GENERAL REQUIREMENTS

A. All equipment shall be U.L. listed, where a listing is available.

B. All equipment shall comply with pertinent Standards.

C. All materials furnished and all work performed shall comply with all State, County and Local Authority Codes.

1.4 QUALITY ASSURANCE

A. Equipment furnished under this specification shall be the standard offering of a single system integrator having a minimum of ten (10) years' experience in this field.

B. The system integrator shall be a direct manufacture's authorized agent of the product(s) being provided, with employees that are factory-trained and certified in the installation, maintenance and programming of the system components. The system integrator shall produce copies of their employee's current manufactures' and other individual certifications, for all products being supplied in the project. Copies of the system integrators' manufactures dealership agreements and employees' factory training certifications shall be included with each submittal package. A part time or temporary employee, or the subcontracting of individuals for the use of their dealership agreements, certifications or skillsets, is not acceptable.

C. The system integrator shall maintain a service department located within a seventy-five (75) mile radius and have available a minimum of two (2) factory trained technicians within a twenty-four (24) hour period.

D. All components shall be fully tested and documented to operate as a complete system. Equipment racks shall ship to the site with the equipment racked, wired, pre-configured, updated, tested, de-bugged and ready for integration. Equipment racks shall arrive on site wrapped for dust protection, and secured on a skid. Staging, uncrating and assembling of components into equipment racks shall not occur on the job site, and is not acceptable.

E. The system integrator shall provide all hardware, software, terminations, cabling and testing required to make a fully operational system. The system integrator shall guarantee that all replacement parts, or manufactured approved replacement, will be carried in stock for a period of five (5) years minimum from the date that the system is commissioned. All replacement parts must be available within five (5) working days.

F. After training is completed, contractor shall provide the owner with three (3) copies on USB drives, of all applicable system information, programming and intellectual property to include: system passwords, compiled, zipped and able to be edited source code, any / all touch panel layouts, button controller layouts, apps, web pages, customized macros, created libraries, and learned IR files.

G. System supplier must provide documentation and references from two (2) similar installations installed within the previous two (2) years within a one-hundred (100) mile radius.

1.5 SUBMITTALS

A. Manufacturers catalog sheets, specifications and installation instructions for all components.

B. Detailed description of system operation.

C. Itemized list of all features and functions.

D. Preliminary touch panel designs.

E. Wiring diagrams showing typical connections for equipment.

F. Riser diagrams showing all components, devices and interconnecting cable types.

G. List of two (2) equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of six (6) months.

H. Warranty information.

I. Information detailing future additions and pending upgrades to the system.

J. Cut sheets on all cables.

1.6 SYSTEM DESCRIPTION

A. Provide a state of the art audio/visual and control system.

B. Provide system configuration, programming and commissioning.

C. Entertainment Bar control system shall provide (minimally) for touch control of room sound levels, audio source selections, lighting, motorized lifts and head end equipment.

D. Touch panel access shall be password protected.

E. Touch panel shall also be compiled as a web page, and control functions shall be accessible via web browser(s).

PART 2 - PRODUCTS

2.1 PROGRAMMING

A. Provide all programming required to control all devices and equipment as required by Owner.

B. Provide all programming modifications requested by the owner for a period of thirty (30) days after substantial completion at no additional cost.

2.2 CABLING

A. Provide all cabling required for the complete operation of the system. Install all cables in raceways provided by the Division 26 sub-contractor.

B. Provide Teflon coated plenum rated cable where required by code.

C. All cable shall be furnished by the control system manufacturer, or shall be verified by the manufacturer as acceptable for use.

D. Provide signal extenders/converters where required.

2.3 MISCELLANEOUS EQUIPMENT

A. Provide all required power supplies, interconnect panels and equipment required for the complete operation of the system and interconnection with the audio and visual equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Install all wiring conduits provided by the Division 26 sub-contractor.
2. Provide wiring types and signs as recommended by the manufacturer.

3. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements.
4. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
5. Label all cables at both ends.

B. Equipment and Devices:

1. Install all devices where shown on drawings.
2. Install rack mounted equipment in 19 in. fixed racks leaving a minimum of 30 in. of access space on sides of rack and 36 in. in front of rack.
3. Provide surge suppression per Manufacturer's requirements for all equipment.
4. Provide all power outlets and plug strips required for system operation but not shown on plans.

3.2 PROGRAMMING

A. One month prior to job completion, the supplier shall arrange a meeting with the Owner at which time the supplier shall configure the system per the Owner's direction. Provide three (3) electronic copies of program.

B. Provide all Owner requested software modifications for a period of one calendar month after substantial completion at no additional cost to the Owner.

3.3 COORDINATION WITH OTHER TRADES

A. Coordinate all cable installations with the Division 26 Electrical Subcontractor. Install cables in raceways provided by this Contractor.

B. Coordinate all power connections to audio/visual control equipment with the Division 26 Electrical Subcontractor. Provide wiring diagrams depicting all connections.

C. Coordinate installation of the presenter control interface with millwork supplier.

3.4 TRAINING AND INSTRUCTION

A. Provide 8 hours of instruction to 3 Owner personnel regarding system set up configuration and management.

B. Provide two (2) hour classes explaining control system use. Two (2) months after initial training sessions repeat with (2) hour session.

3.5 WARRANTY

A. All standard manufacturers' warranties shall apply.

B. The installation shall be warranted for one (1) year.

C. Provide technical support at no charge to the customer for a period of (1) year after system has been commissioned.

D. Make available an extended warranty to the customer.

END OF SECTION 274116.10

SECTION 274116.20 AUDIO/VISUAL AND CONTROL SYSTEMS - MULTI PURPOSE ROOM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation of the audio/visual and control systems as described in this Section and detailed on the drawings.

B. Audio/visual and control systems shall be provided in the areas as shown on drawings.

C. Control system shall provide (minimally) for touch control of sound levels by zone, audio source selections, lighting, motorized lifts, projector, screen, and head end equipment.

1.3 GENERAL REQUIREMENTS

A. All equipment shall be U.L. listed, where a listing is available.

B. All equipment shall comply with pertinent Standards.

C. All materials furnished and all work performed shall comply with all State, County and Local Authority Codes.

1.4 QUALITY ASSURANCE

A. Equipment furnished under this specification shall be the standard offering of a single system integrator having a minimum of ten (10) years' experience in this field.

B. The system integrator shall be a direct manufacture's authorized agent of the product(s) being provided, with employees that are factory-trained and certified in the installation, maintenance and programming of the system components. The system integrator shall produce copies of their employee's current manufactures' and other individual certifications, for all products being supplied in the project. Copies of the system integrators' manufactures dealership agreements and employees' factory training certifications shall be included with each submittal package. A part time or temporary employee, or the subcontracting of individuals for the use of their dealership agreements, certifications or skillsets, is not acceptable.

C. The system integrator shall maintain a service department located within a seventy-five (75) mile radius and have available a minimum of two (2) factory trained technicians within a twenty-four (24) hour period.

D. All components shall be fully tested and documented to operate as a complete system. Equipment racks shall ship to the site with the equipment racked, wired, pre-configured, updated, tested, de-bugged and ready for integration. Equipment racks shall arrive on site wrapped for dust protection, and secured on a skid. Staging, uncrating and assembling of components into equipment racks shall not occur on the job site, and is not acceptable.

E. The system integrator shall provide all hardware, software, terminations, cabling and testing required to make a fully operational system. The system integrator shall guarantee that all replacement parts, or manufactured approved replacement, will be carried in stock for a period of five (5) years minimum from the date that the system is commissioned. All replacement parts must be available within five (5) working days.

F. After training is completed, contractor shall provide the owner with three (3) copies on USB drives, of all applicable system information, programming and intellectual property to include: system passwords, compiled, zipped and able to be edited source code, any / all touch panel layouts, button controller layouts, apps, web pages, customized macros, created libraries, and learned IR files.

G. System supplier must provide documentation and references from two (2) similar installations installed within the previous two (2) years within a one-hundred (100) mile radius.

1.5 SUBMITTALS

A. Manufacturers catalog sheets, specifications and installation instructions for all components.

B. Detailed description of system operation.

C. Itemized list of all features and functions.

D. Preliminary touch panel designs.

E. Wiring diagrams showing typical connections for equipment.

F. Riser diagrams showing all components, devices and interconnecting cable types.

G. List of two (2) equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of six (6) months.

H. Warranty information.

I. Information detailing future additions and pending upgrades to the system.

J. Cut sheets on all cables.

1.6 SYSTEM DESCRIPTION

A. Provide a state of the art audio/visual and control system.

B. Provide system configuration, programming and commissioning.

C. Multi Purpose Room (MPR) control system shall provide (minimally) for touch control of room sound levels, audio source selections, lighting, projection devices and head end equipment.

D. Touch panel access shall be password protected.

E. Touch panel shall also be compiled as a web page, and control functions shall be accessible via web browser(s).

PART 2 - PRODUCTS

2.1 TOUCH SCREEN DISPLAYS

A. Provide touch screens in the facility, where shown on drawings.

1. Display Size: 9.9"w x 6.7"h 12" diagonal.
2. Resolution 1280x800, Aspect Ratio 16:9
3. Viewing Angle Vertical: ± 89°, Horizontal: ± 89°
4. Touch Overlay Projected capacitive, multi-touch support, 3 simultaneous max
5. Graphics Engine AMX G4
6. Front Panel Components Light Sensor, Proximity Detector, Sleep button.
7. Power Consumption Full-On: 8 W.
8. Temperature Range Operating: 32° F to 104° F (0° C to 40° C)
9. Design Make: AMX MXD-1001-NC

2.2 WIRELESS MICROPHONE

A. Provide a wireless microphone system.

1. Wireless microphone system shall include a true diversity receiver.
2. Receiver shall have 60 channels pre-set per frequency band, 17 compatible channels per 6 MHz TV channel.
3. Receiver shall provide transparent, 24-bit digital audio.
4. Frequency Range 20 Hz – 20 kHz.
5. Receiver shall be 1/2 rack design, with detachable 1/4 wave antenna
6. Receiver shall have a network port for monitoring, and a DC power connector.
7. Receiver shall have XLR and 1/4” outputs that are Mic/line level selectable.
8. Wireless microphone system shall include a transmitters.
9. Transmitter shall have a 3–segment battery fuel gauge with backlit LCD.
10. LCD Display shall show frequency and power settings.
11. Transmitter shall have a control lockout feature.
12. Transmitter shall have an 9 ~10 hour battery operating life.
13. System shall have a 328' (line of sight) operating range.
14. Design Make: Shure QLXD4 receiver, Shure QLX-D2/Beta58a - QLXD-1 Bodypack Transmitter with MX-150 Lavalier Mic and rack mount kit.

2.3 CD / BLUETOOTH MEDIA PLAYER

A. Deck shall be an integrated CD / Bluetooth player with 3.5 mm auxiliary input jack.

B. Playable formats shall include: CD-DA, MP3, WAV.

C. CD-DA Playback specifications:

1. Audio Modes: Stereo / Dual Channel.
2. Sampling Frequency: 44.1kHz
3. Sampling Bit Rate: 16 bit

D. CD-MP3 Playback specifications:

1. Audio Modes: Stereo / Joined Stereo / Dual Channel / Mono.
2. Sampling Frequency: 32/44.1/48kHz
3. Sampling Bit Rate: 32 bit / 320 Variable bit rate

E. CD-WAV Playback specifications:

1. Audio Modes: Stereo / Joined Stereo / Dual Channel / Mono.
2. Sampling Frequency: 8/16/32/11.025/22.05/44.1/12/24//44.1/48kHz
3. Sampling Bit Rate: 16 bit.

F. Auxiliary 3.5mm input jack specifications:

1. Connector: 3.5mm stereo mini jack.
2. Input Impedance: 22k ohms
3. Nominal Input Level: -20dBV (Maximum -4 dBV).
4. Auxiliary RCA output jacks specifications:

    a. Connector: RCA pin-jack.
    b. Input Impedance: 200 ohms
    c. Nominal Output Level: -10dBV (Maximum +6 dBV).

G. Bluetooth specifications:

1. Version 3.0.
2. Output Class: 2
3. Supported profile: A2DP, AVRCP
4. Supported A2DP codec: SBC, AAC, apt X.
5. Supported content protection: SCMS-T

H. Audio Performance specifications:

1. Frequency response20Hz-20kHz, +/-1dB (playback, JEITA).
2. Distortion: 0.01% or less (playback, JEITA).
3. S/N ratio: 90dB or greater, dynamic range: 90dB or greater.
4. Channel separation: 90dB or greater.

I. Power: AC120V, 60Hz, 11watts.

J. Dimensions: 481(W) × 94.5(H) × 298(D) mm, weight 4.5 kg.

K. Design Make: Tascam CD-200BT or approved equal.

2.4 AUDIO POWER AMPLIFIERS

A. Provide Audio Power Amplifiers having the following:

1. DriveCore Technology
2. Configuration and control using HiQnet® Audio Architect™
3. Supports Monitoring and control over TCP/IP
4. Color LCD and front panel user interface for amplifier configuration, control, and monitoring
5. Programmable GPIO (general purpose input/output) control port
6. Digital signal processing (Input/output EQ filters, crossover, input/output delay, Level MAX TM limiters)
7. Support for importing of FIR filter coefficients
8. 20 device presets – 1 factory and 19 user
9. 96kHz/32-bit floating-point signal processing
10. Universal power supply with PFC for reduced current draw
11. Remote power off – Sleep mode activated via AUX port
12. 70Vrms/100Vrms direct drive capable
13. Each channel individually selectable for Low Z or High Z operation
14. Advanced protection circuits – Amplifier and loads are protected against shorted outputs, DC, mismatched loads, overheating, over/under-voltage, and high-frequency overload.
15. Three year, no-fault transferable warranty
16. Design Make: Facility audio amplifiers: Crown DCi 4/1250N Drive Core series

2.5 EQUIPMENT RACK

A. Provide a Floor Standing, lockable equipment rack.

B. Rack shall be 16-gauge steel construction with 1/8” steel internal braces.

C. Rack Overall dimensions shall be 22" W x 48.13" H x 27.0" D. Weight capacity shall be 2,500 lbs.

D. Rackrail shall be constructed of 11-gauge steel with tapped 10-32 mounting holes in universal EIA spacing with black e-coat finish and marked rack spaces.

E. Rack shall be of fully welded construction. Rack shall be constructed of the following materials: top and bottom shall be 16-gauge steel, horizontal braces shall be 16-gauge steel welded to integral structural side panels of 16-gauge steel giving an 1/8” thick structure, rear door shall be 18-gauge steel, all structural elements shall be finished in a durable black powder coat.

F. Rack shall have removable split rear knockout panels with 1/2", 3/4", 1", and 1-1/2" electrical knockouts installed in base and a removable rear knockout panel with 1/2", 3/4", 1", and 1-1/2" electrical knockouts and BNC knockouts for antennae installed in top.

G. Rack shall include solid locking rear door standard and removable key locked side panels with recessed lift handles.

H. Rack shall be UL Listed in the US and Canada. Rack shall be GREENGUARD Indoor Air Quality Certified for Public buildings. Grounding and bonding stud shall be 1/4-20 threaded, installed in base of enclosure.

I. Rack shall be warrantied to be free from defects in materials or workmanship for the lifetime of the rack.

J. Design Make: Middle Atlantic WRK series, with locking, plexi-smoked front door, equipment shelves, storage drawer and power strips, or approved equal.

2.6 LOUDSPEAKERS - OPEN CEILING STYLE FOREGROUND SPEAKER

A. Provide this model speaker at High ceiling locations with no drop tile ceiling.

1. The loudspeaker system shall consist of a 6.5 in low frequency transducer, low frequency voice coil shall be 1 in. in diameter, 1.0 in. soft dome tweeter, and frequency dividing network installed in a ported enclosure.
2. The magnetic assemblies shall use ferrite magnets, with integral shielding of the external magnetic field.
3. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
4. Provide two identical suspension systems (one as main suspension cable and the other as safety cable), each consisting of 4.5 m (15 ft) long 2 mm (0.077 in.) hig-tensile galvanized-steel wire rope suspension cable with spring-clips for clipping onto the loudspeaker bracket and Gripple brand adjustable-height cable fasteners for infinitely adjustable height. Cables have SWL rating of 45 kg (99 lb).
5. Performance: Sensitivity shall be at least 93 dB SPL.
6. Frequency Response: +-3 dB from 75 Hz to 17 kHz.
7. Rated power capacity shall be at least 75 watts continuous pink noise.
8. Enclosure: High impact polystyrene, coordinate color with Owner/Architect.
9. Overall dimensions 13.1 in. diameter by 14.5 in. height.
10. Design Make: JBL, Model Control 67HC/T, with 70 v matching transformer.

2.7 DIGITAL SIGNAL PROCESSOR

A. Provide a Signal Processor with Digital Audio Bus and Dante Networked audio.

1. 4 input/output card slots, configurable inputs/outputs, analog inputs (with Phantom Power per channel), and analog outputs.
2. Digital inputs (AES/EBU and S/PDIF), Digital outputs (AES/EBU and S/PDIF).

3. AEC inputs
4. Telephone interface
5. Dante™ / AES67 audio, 64 x 64 audio input/output channels per device, 256 channel, low latency, fault tolerant digital audio bus
6. Front panel LED indication
7. Bi-directional locate functionality
8. 12 control inputs and 6 logic outputs for GPIO
9. Configuration, control and monitoring from HiQnet London Architect
10. AES67 Compatible
11. Design Make: Soundweb London BLU-806DA

2.8 DIGITAL MEDIA SWITCHER

A. Provide a Digital Media Switcher that capable of 4K and Ultra High Definition (UHD) content, populated with I/O boards.

1. Maximum I/O size 16x16. Enclosure support up to 4 input boards and 4 output boards; each board shall have 4 connections.
2. Per Channel Aggregate Data Rate (Max) 26 Gbps
3. Dimensions With Extractors and Mounting Ears: 6 13/16" x 19" x 16" (17.4 cm x 48.3 cm x 40.6 cm).
4. Design Make: AMX Enova DGX 1600 Enclosure (DGX1600-ENC) with NetLinx® NX Integrated Controller, redundant power supplies and populated with four (4) NMX-DEC-N3221-C input cards and one (1) NMX-ENC-3121-C output Card.

2.9 USER INTERFACE / CONTENT INPUT

A. Provide a floor box / wall mounted user interface, presentation content transmitter.

1. Dimensions: (HWD) 4 1/16" x 3 1/2" x 2 1/4".
2. Cabling: Twisted Pair Cable Type & Length Shielded Cat6; up to 328 ft. for 1080p content, and below.
3. HDMI Compatible Formats: HDMI ,HDCP, DVI (requires conversion cable).
4. HDMI Support Progressive Resolution Support: 480p up to 1920 x 1200 @ 60 Hz.
5. HDMI Audio: Dolby TrueHD, Dolby Digital, DTS-HD Master Audio, DTS, 2 CH through 8 CH L-PCM, Dolby Digital and DTS support up to 48kHz, 5.1
6. Design Make: AMX DX-TX-DWP-WH Module. Provide 10' length HDMI, VGA/3.5mm audio cables for user connectivity. Provide a cable set for each user interface location.

2.10 ANALOG AUDIO I/O USER INTERFACE

A. Provide in the User Interface / content input floor box / wall box, Analog Audio interface.

1. Audio plates shall be all-steel construction.
2. Plates shall be compatible with Decora®-Style Mounting Accessories.

3. Rear Panel Connections shall be on Terminal Blocks.
4. Design Make: RDL D-XLR2F Dual XLR 3-pin Female Jacks on Decora® Wall Plate and D-XLR3M XLR 3-pin Male Jack on Decora® Wall Plate with custom Front-Panel Text. (refer to drawings for text details).

2.11 LARGE VENUE PROJECTOR - MULTI PURPOSE ROOM

A. Provide a Digital projector for use in the Multi Purpose Room.

1. Display Technology: Dark Chip DMD, Native 16:10 aspect WUXGA (1920 x 1200 Resolution).
2. Brightness: 9500 ANSI lumens, contrast ratio: 10,000:1 (Dynamic Black).
3. Input Connections: (1) DVI, (1) Display Port, (2) HDMI 1.4b, (1) 1 BNC SDI, (1) VGA / RGB D-Sub (1) 5 BNC Component Video, (1) HDBaseT RJ-45..
4. Control; R5232C, RJ45/LAN, Wired remote, also compatible with AMX, Crestron and Extron Control Systems.
5. DKTV Formats Supported; 1080p (24 Hz, 25Hz, 30Hz, 50Hz, 60Hz), 1080i (50Hz, 60Hz), 720p (50, 60Hz).
6. Provide mounting hardware for mounting into motorized projector lift.
7. Design Make: Digital Projection E-Vision Laser 10K (part of #118-060) with .75 - .93.1 zoom lens (Part # 115-339).

2.12 PROJECTOR LIFT - MULTI PURPOSE ROOM

A. Provide a motorized projector lift in the Multi Purpose Room.

1. Provide an electrically operated, scissor type projector lift. Lift shall include: housing, ceiling closure, scissor operating mechanism, motor, controls, limit switches, and other components necessary for complete installation.
2. Lift shall be programmable for three (3) positons: Storage position, Show position, and Fully Lowered (maximum 9') to service position.
3. Provide scissor operating mechanism, motor, controls, limit switches, and other components necessary for complete installation.
4. Lift housing shall be fabricated from steel panels for recessing projector lift in plenum ceiling space.
5. Provide with universal closure and metal trim to finish ceiling opening.
6. Operating mechanism: UL approved gear motor with a magnetic brake. Drive to the lifting drum is No. 40 steel chain, output sprocket shall be welded directly to the cable drum - no keyways.
7. Cable drum shall be equipped with US patented fail-safe drum lock.
8. Drum lock shall use a low voltage solenoid to release on the down command with a nylon pawl to override and turn the motor off in case the drum exceeds the speed of the gear motor.
9. Mechanism shall have redundant limit switches.
10. Mechanism operated by 110 VAC, 60 Hz, instantly reversible, thermally protected, lifetime lubricated, gear motor and cable drive system.
11. Provide Cable Management System: Provide lift with means for attachment of cables to rear scissor to eliminate cord tangles. Include 110V pre-wired power cable and pre-wired cable hookups for HDMI, CAT6 shielded and RS232 control.
12. Design Make: SVS Scissor Lift Model SVS 7-9.

2.13 CABLING

A. Provide all cabling required for the complete operation of the system. Install all cables in raceways provided by the Division 26 sub-contractor.

B. Provide Teflon coated plenum rated cable where required by code.

C. All cable shall be furnished by the control system manufacturer, or shall be verified by the manufacturer as acceptable for use.

D. Provide signal extenders/converters where required.

2.14 MISCELLANEOUS EQUIPMENT

A. Provide all required power supplies, interconnect panels and equipment required for the complete operation of the system and interconnection with the audio and visual equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Install all wiring conduits provided by the Division 26 sub-contractor.
2. Provide wiring types and signs as recommended by the manufacturer.
3. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements.
4. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
5. Label all cables at both ends.

B. Equipment and Devices:

1. Install all devices where shown on drawings.
2. Install rack mounted equipment in 19 in. fixed racks leaving a minimum of 30 in. of access space on sides of rack and 36 in. in front of rack.
3. Provide surge suppression per Manufacturer's requirements for all equipment.
4. Provide all power outlets and plug strips required for system operation but not shown on plans.

3.2 PROGRAMMING

A. One month prior to job completion, the supplier shall arrange a meeting with the Owner at which time the supplier shall configure the system per the Owner's direction. Provide three (3) electronic copies of program.

B. Provide all Owner requested software modifications for a period of one calendar month after substantial completion at no additional cost to the Owner.

3.3 COORDINATION WITH OTHER TRADES

A. Coordinate all cable installations with the Division 26 Electrical Subcontractor. Install cables in raceways provided by this Contractor.

B. Coordinate all power connections to audio/visual control equipment with the Division 26 Electrical Subcontractor. Provide wiring diagrams depicting all connections.

C. Coordinate installation of the presenter control interface with millwork supplier.

3.4 TRAINING AND INSTRUCTION

A. Provide 8 hours of instruction to 3 Owner personnel regarding system set up configuration and management.

B. Provide two (2) hour classes explaining control system use. Two (2) months after initial training sessions repeat with (2) hour session.

3.5 WARRANTY

A. All standard manufacturers' warranties shall apply.

B. The installation shall be warranted for one (1) year.

C. Provide technical support at no charge to the customer for a period of (1) year after system has been commissioned.

D. Make available an extended warranty to the customer.

END OF SECTION 274116.20

SECTION 274116 AUDIO/VISUAL AND CONTROL SYSTEMS - FACILITY SPACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation of the audio/visual and control systems as described in this Section and detailed on the drawings.

B. Audio/visual and control systems shall be provided in the areas as shown on drawings.

C. Control system shall provide (minimally) for touch control of sound levels by zone, audio source selections, lighting, and head end equipment.

1.3 GENERAL REQUIREMENTS

A. All equipment shall be U.L. listed, where a listing is available.

B. All equipment shall comply with pertinent Standards.

C. All materials furnished and all work performed shall comply with all State, County and Local Authority Codes.

1.4 QUALITY ASSURANCE

A. Equipment furnished under this specification shall be the standard offering of a single system integrator having a minimum of ten (10) years' experience in this field.

B. The system integrator shall be a direct manufacture's authorized agent of the product(s) being provided, with employees that are factory-trained and certified in the installation, maintenance and programming of the system components. The system integrator shall produce copies of their employee's current manufactures' and other individual certifications, for all products being supplied in the project. Copies of the system integrators' manufactures dealership agreements and employees' factory training certifications shall be included with each submittal package. A part time or temporary employee, or the subcontracting of individuals for the use of their dealership agreements, certifications or skillsets, is not acceptable.

C. The system integrator shall maintain a service department located within a seventy-five (75) mile radius and have available a minimum of two (2) factory trained technicians within a twenty-four (24) hour period.

D. All components shall be fully tested and documented to operate as a complete system. Equipment racks shall ship to the site with the equipment racked, wired, pre-configured, updated, tested, de-bugged and ready for integration. Equipment racks shall arrive on site wrapped for dust protection, and secured on a skid. Staging, uncrating and assembling of components into equipment racks shall not occur on the job site, and is not acceptable.

E. The system integrator shall provide all hardware, software, terminations, cabling and testing required to make a fully operational system. The system integrator shall guarantee that all replacement parts, or manufactured approved replacement, will be carried in stock for a period of five (5) years minimum from the date that the system is commissioned. All replacement parts must be available within five (5) working days.

F. After training is completed, contractor shall provide the owner with three (3) copies on USB drives, of all applicable system information, programming and intellectual property to include: system passwords, compiled, zipped and able to be edited source code, any / all touch panel layouts, button controller layouts, apps, web pages, customized macros, created libraries, and learned IR files.

G. System supplier must provide documentation and references from two (2) similar installations installed within the previous two (2) years within a one-hundred (100) mile radius.

1.5 SUBMITTALS

A. Manufacturers catalog sheets, specifications and installation instructions for all components.

B. Detailed description of system operation.

C. Itemized list of all features and functions.

D. Preliminary touch panel designs.

E. Wiring diagrams showing typical connections for equipment.

F. Riser diagrams showing all components, devices and interconnecting cable types.

G. List of two (2) equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of six (6) months.

H. Warranty information.

I. Information detailing future additions and pending upgrades to the system.

J. Cut sheets on all cables.

1.6 SYSTEM DESCRIPTION

A. Provide a state of the art audio/visual and control system.

B. Provide system configuration, programming and commissioning.

C. Facility wide control system shall provide (minimally) for touch control of facility sound levels by zone, audio source selections, lighting, motorized lifts and head end equipment.

D. All Touch panel access shall be password protected.

E. Facility Touch Panels shall be programmed to track each other's status.

F. Touch panels shall also be compiled as web pages, and control functions shall be accessible via web browser(s).

PART 2 - PRODUCTS

2.1 TOUCH SCREEN DISPLAYS

A. Provide touch screens in the facility, where shown on drawings.

1. Display Size: 7.3"w x 4.8"h 8.8" diagonal.
2. Resolution 1024x600, Aspect Ratio 16:9
3. Viewing Angle Vertical: ± 89°, Horizontal: ± 89°
4. Touch Overlay Projected capacitive, multi-touch support, 3 simultaneous max
5. Graphics Engine AMX G4
6. Front Panel Components Light Sensor, Proximity Detector, Sleep button.
7. Power Consumption Full-On: 8 W.
8. Temperature Range Operating: 32° F to 104° F (0° C to 40° C)
9. Design Make: AMX MXD-1001-NC

2.2 CONTROL SYSTEM

A. Provide an I.P. network based control system.

1. Dimensions: 1 4/5”h x 17”w x 9 1/8”d, Weight 6.08 lb. (2.758 Kg)

    a. Memory Card: 8 GB SD, NVRAM: 1 MB, DDRAM: 512 MB, Note: Supports external USB Solid State Drives
    b. Power Consumption Active Power Consumption: 6.6 W
    c. AxLink Port (2) 4-position 3.5mm Screw Terminal, provides data and power to external AxLink control devices
    d. AxLink Indicator (2) AxLink LED (green) indicates the state of the AxLink port.
    e. IR/Serial (8) 2-position 3.5mm Screw Terminal, 8 IR Transmit / 1-way Serial ports, NetLinx Ports 11-18, Support high-frequency carriers up to 1.142 MHz, 8 IR/Serial data signals can be generated simultaneously
    f. I/O Channels (8) One 10-position 3.5mm Screw Terminal, 8-channel binary I/O port for contact closure with each input being capable of voltage sensing, NetLinx Port 22, Channels 1-8

g. I/O Indicator (8) LEDs (yellow) indicate each of the I/O channels (1-8) are active
h. Relays (8) Two 8-position 3.5 mm Screw Terminal, (8) single-pole, single-throw relays, NetLinx Port 21, Channels 1-8, Each relay can switch up to 24 VDC or 28 VAC @ 1 A, Each relay is independently controlled
i. Design Make: AMX Netlinx NX-3200 integrated controller with PSN6.5, 6.5 A Power Supply (FG423-41), include all required IR emitters, control and interconnecting cables.

2.3 WIRELESS MICROPHONE

A. Provide a wireless microphone system.

1. Wireless microphone system shall include a true diversity receiver.
2. Receiver shall have 60 channels pre-set per frequency band, 17 compatible channels per 6 MHz TV channel.
3. Receiver shall provide transparent, 24-bit digital audio.
4. Frequency Range 20 Hz – 20 kHz.
5. Receiver shall be 1/2 rack design, with detachable 1/4 wave antenna
6. Receiver shall have a network port for monitoring, and a DC power connector.
7. Receiver shall have XLR and 1/4” outputs that are Mic/line level selectable.
8. Wireless microphone system shall include a transmitters.
9. Transmitter shall have a 3–segment battery fuel gauge with backlit LCD.
10. LCD Display shall show frequency and power settings.
11. Transmitter shall have a control lockout feature.
12. Transmitter shall have an 9 ~10 hour battery operating life.
13. System shall have a 328' (line of sight) operating range.
14. Design Make: Shure QLXD4 receiver, Shure QLX-D2/Beta58a - QLXD-1 Bodypack Transmitter with MX-150 Lavalier Mic and rack mount kit.

2.4 CABLE HDTV RECEIVERS

A. Provide clamping rack shelves to rack mount the Owner provided cable TV receivers.

B. Provide audio cabling from cable TV receivers to Audio Router inputs.

C. Program for control system control of cable HDTV receivers and audio content/zone routing.

2.5 AUDIO ROUTER / DSP

A. Provide configurable audio DSP's, with a high bandwidth, fault tolerant digital bus, employing Dante Networked Audio protocol. The DSP's shall support 32 audio zones (minimally). The zones shall be as follows:

1. Gaming Zone 1
2. Gaming Zone 2

3. Mezzanine Gaming Zone 1
4. Mezzanine Gaming Zone 2
5. Poker Lounge Zone
6. Poker Zone 1
7. Poker Zone 2
8. Poker Restrooms Zone
9. Poker Corridor Zone
10. VIP Mezzanine Zone
11. West BOH corridor Zone
12. West Restrooms Zone

B. Cabling for Zones 1 ~ 12 shall be routed to IDF #55

1. Gaming Zone 3
2. Gaming Zone 4
3. Gaming Zone 5
4. Gaming Pre-Function Zone
5. East Entry Zone
6. East Exterior Zone
7. East Restrooms Zone
8. East BOH Corridor Zone
9. BOH Corridor Zone
10. EDR Zone
11. EDR Restrooms Zone
12. Saloon Under Mezzanine Zone
13. Saloon Zone 1
14. Saloon Zone 2
15. Saloon Zone 3
16. Bar Zone
17. MPR Zone 1
18. MPR Zone 2
19. MPR Zone 3
20. MPR Patio Zone

C. Cabling for Zones 13 ~ 32 shall be routed to IDF #151Analog Inputs up to 16

D. Digital Inputs up to 16

1. AEC Inputs up to 16
2. Analog Outputs up to 16
3. Digital Outputs up to 16
4. Telephone Connection up to 4
5. 256 Channel, Low Latency, Fault Tolerant Digital Audio Bus.
6. Control RS-232, GPIO
7. Design Make: BSS Soundweb London BLU-806DA, populated with I/O cards as required.

2.6 AUDIO POWER AMPLIFIERS

A. Provide Audio Power Amplifiers having the following:

1. DriveCore Technology
2. Configuration and control using HiQnet® Audio Architect™
3. Supports Monitoring and control over TCP/IP
4. Color LCD and front panel user interface for amplifier configuration, control, and monitoring
5. Programmable GPIO (general purpose input/output) control port
6. Digital signal processing (Input/output EQ filters, crossover, input/output delay, Level MAX TM limiters)
7. Support for importing of FIR filter coefficients
8. 20 device presets – 1 factory and 19 user
9. 96kHz/32-bit floating-point signal processing
10. Universal power supply with PFC for reduced current draw
11. Remote power off – Sleep mode activated via AUX port
12. 70Vrms/100Vrms direct drive capable
13. Each channel individually selectable for Low Z or High Z operation
14. Advanced protection circuits – Amplifier and loads are protected against shorted outputs, DC, mismatched loads, overheating, over/under-voltage, and high-frequency overload.
15. Three year, no-fault transferable warranty.
16. Provide power amplifiers as follows: Models, quantities, and locations.
    a. AMP 1 (IDF 55) – Crown 4/1250n
    b. AMP 2 (IDF 55) – Crown 8/600n
    c. AMP 3 (IDF 151) – Crown 4/1250n
    d. AMP 4 (IDF 151) – Crown 8/600n
    e. AMP 5 (IDF 151) – Crown 4/1250n
    f. AMP 6 (IDF 151) – Crown 4/1250n (Do not duplicate this amp, reference Section 274116.20)
17. Design Make: Facility audio amplifiers: Crown DCi Drive Core series

2.7 EQUIPMENT RACK

A. Provide Floor Standing, lockable equipment racks.

B. Rack shall be 16-gauge steel construction with 1/8” steel internal braces.

C. Rack Overall dimensions shall be 22" W x 70.88" H x 27.0" D. Weight capacity shall be 2,500 lbs.

D. Rackrail shall be constructed of 11-gauge steel with tapped 10-32 mounting holes in universal EIA spacing with black e-coat finish and marked rack spaces.

E. Rack shall be of fully welded construction. Rack shall be constructed of the following materials: top and bottom shall be 16-gauge steel, horizontal braces shall be 16-gauge steel welded to integral structural side panels of 16-gauge steel giving an 1/8" thick structure, rear door shall be 18-gauge steel, all structural elements shall be finished in a durable black powder coat.

F. Rack shall have removable split rear knockout panels with 1/2", 3/4", 1", and 1-1/2" electrical knockouts installed in base and a removable rear knockout panel with 1/2", 3/4", 1", and 1-1/2" electrical knockouts and BNC knockouts for antennae installed in top.

G. Rack shall include solid locking rear door standard and removable key locked side panels with recessed lift handles.

H. Rack shall be UL Listed in the US and Canada. Rack shall be GREENGUARD Indoor Air Quality Certified for Public buildings. Grounding and bonding stud shall be 1/4-20 threaded, installed in base of enclosure.

I. Rack shall be warrantied to be free from defects in materials or workmanship for the lifetime of the rack.

J. Design Make: Middle Atlantic WRK series, with locking, plexi-smoked front door, equipment shelves, storage drawer and power strips, or approved equal.

2.8 LOUDSPEAKERS - OPEN CEILING STYLE FOREGROUND SPEAKER

A. Provide this model speaker at High ceiling locations with no drop tile ceiling.

1. The loudspeaker system shall consist of a 6.5 in low frequency transducer, low frequency voice coil shall be 1 in. in diameter, 1.0 in. soft dome tweeter, and frequency dividing network installed in a ported enclosure.
2. The magnetic assemblies shall use ferrite magnets, with integral shielding of the external magnetic field.
3. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
4. Provide two identical suspension systems (one as main suspension cable and the other as safety cable), each consisting of 4.5 m (15 ft) long 2 mm (0.077 in.) hig-tensile galvanized-steel wire rope suspension cable with spring-clips for clipping onto the loudspeaker bracket and Gripple brand adjustable-height cable fasteners for infinitely adjustable height. Cables have SWL rating of 45 kg (99 lb).
5. Performance: Sensitivity shall be at least 93 dB SPL.
6. Frequency Response: +-3 dB from 75 Hz to 17 kHz.
7. Rated power capacity shall be at least 75 watts continuous pink noise.
8. Enclosure: High impact polystyrene, coordinate color with Owner/Architect.
9. Overall dimensions 13.1 in. diameter by 14.5 in. height.
10. Design Make: JBL, Model Control 67HC/T, with 70 v matching transformer.

2.9 LOUDSPEAKERS - HIGH CEILING STYLE FOREGROUND SPEAKER

A. Provide this model speaker at High drop tile and hard ceiling locations.

1. The loudspeaker system shall consist of a 6.5 in. low frequency transducer, low frequency voice coil shall be 1 in. in diameter, 1 in. soft-dome tweeter on 11 in. diameter wave guide.
2. Performance: Sensitivity shall be at least 93 dB SPL.
3. Frequency Response: +-3 dB from 55 Hz to 17 kHz.
4. Rated power capacity shall be at least 75 watts continuous pink noise.
5. Enclosure: Suitable for use in air handling spaces per UL1480, UL2043, NFPA90 & NFPA 70. S7232/UL Listed, Signaling Speaker, Transformer UL registered per UL1876. In accordance with IEC60849/EN60849.
6. Overall Dimensions: 13.1 in. by 13.8 in. high.
7. Coordinate color with Owner/Architect.
8. Design Make: JBL Model Control 47HC, with 70 v. matching transformer.

2.10 LOUDSPEAKERS - CEILING STYLE FOREGROUND SPEAKER

A. Provide this model speaker at Standard Height drop tile and hard ceiling locations.

1. The loudspeaker system shall consist of a6.5 in. low frequency transducer, low frequency voice coil shall be 1 in. in diameter, .75 in. titanium film tweeter, and frequency dividing network installed in a ported enclosure.
2. The magnetic assemblies shall use ferrite magnets, with integral shielding of the external magnetic field.
3. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
4. Performance: Sensitivity (SPL at 1 m (3.3 ft) with 2.83 V input, swept from 500 Hz to 1.5 kHz) shall be at least 89 dB SPL.
5. Frequency Response: +-3 dB from 75 Hz to 20 kHz.
6. Rated power capacity shall be at least 75 watts continuous pink noise.
7. Backcan: Formed Steel Baffle/Rim: medium impact polystyrene, fire-rated UL94V-0.
8. Overall dimensions 12in by 10.2 in deep.
9. Coordinate color with owner / architect.
10. Design Make: JBL Model Control 16 C/T, with 70 v matching transformer.

2.11 LOUDSPEAKERS - INDOOR/OUTDOOR WALL-MOUNT BACKGROUND/FOREGROUND SPEAKER

A. Provide this model speaker at Exterior surface mount locations.

1. The loudspeaker system shall consist of an 8” woofer with woven fiberglass cone, low frequency voice coil shall be 1 in in diameter, 1” PEI diaphragm tweeter with fluid cooling, and frequency dividing network installed in a ported enclosure.

2. The frequency dividing network: 2nd order low-pass, 1st order high-pass, plus conjugate shaping.
3. Coverage Angle: 100° x 100°
4. Performance: sensitivity shall be 91 dB, 1W/1m (avg. 100 Hz – 10 kHz).
5. Frequency response: +-3 dB from 45 Hz to 20 kHz.
6. Rated power capacity shall be at least 90 watts continuous pink noise.
7. Enclosure Material: High Impact Polystyrene (HIPS) with 10% glass fill, with high UV resistance.
8. Overall dimensions 15.2in by 11.1 in by 8.6 in.
9. Design Make: JBL Model Control 28-1, with 70 v matching transformer.

2.12 LOUDSPEAKERS - CEILING STYLE FOREGROUND SPEAKER

A. Provide this model speaker at BOH speaker locations:

1. The loudspeaker system shall consist of a (6.5 in) high output driver with polypropylene cone and butyl rubber surround, with a .75 in soft-dome liquid-cooled tweeter, and frequency dividing network installed in a ported enclosure.
2. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
3. Performance: sensitivity shall be at least 91 dB SPL.
4. Frequency response: +-3 dB from 96 Hz to 15 kHz.
5. Rated power capacity shall be at least 50 watts continuous pink noise.
6. Backcan: UL1480, UL2043, NFPA90 & NFPA70; S7232/UL Listed, Suitable for use in air handling spaces, Signaling Speaker; Transformer UL registered per UL1876; ROHS, C-tick N108, CE compliant; Baffle meets UL94-V0 and UL94-5VB flammability rating; In accordance with IEC60849/EN60849 systems
7. Overall dimensions 10in by 8.98 in deep.
8. Coordinate color with owner / architect.
9. Design Make: JBL Model Control 16ct, with 70 v matching transformer.

2.13 PROGRAMMING

A. Provide all programming required to control all devices and equipment as required by Owner.

B. Provide all programming modifications requested by the owner for a period of thirty (30) days after substantial completion at no additional cost.

2.14 CABLING

A. Provide all cabling required for the complete operation of the system. Install all cables in raceways provided by the Division 26 sub-contractor.

B. Provide Teflon coated plenum rated cable where required by code.

C. All cable shall be furnished by the control system manufacturer, or shall be verified by the manufacturer as acceptable for use.

D. Provide signal extenders/converters where required.

2.15 MISCELLANEOUS EQUIPMENT

A. Provide all required power supplies, interconnect panels and equipment required for the complete operation of the system and interconnection with the audio and visual equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Install all wiring conduits provided by the Division 26 sub-contractor.
2. Provide wiring types and signs as recommended by the manufacturer.
3. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements.
4. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
5. Label all cables at both ends.

B. Equipment and Devices:

1. Install all devices where shown on drawings.
2. Install rack mounted equipment in 19 in. fixed racks leaving a minimum of 30 in. of access space on sides of rack and 36 in. in front of rack.
3. Provide surge suppression per Manufacturer's requirements for all equipment.
4. Provide all power outlets and plug strips required for system operation but not shown on plans.

3.2 PROGRAMMING

A. One month prior to job completion, the supplier shall arrange a meeting with the Owner at which time the supplier shall configure the system per the Owner's direction. Provide three (3) electronic copies of program.

B. Provide all Owner requested software modifications for a period of one calendar month after substantial completion at no additional cost to the Owner.

3.3 COORDINATION WITH OTHER TRADES

A. Coordinate all cable installations with the Division 26 Electrical Subcontractor. Install cables in raceways provided by this Contractor.

B. Coordinate all power connections to audio/visual control equipment with the Division 26 Electrical Subcontractor. Provide wiring diagrams depicting all connections.

3.4 TRAINING AND INSTRUCTION

A. Provide 8 hours of instruction to 3 Owner personnel regarding system set up configuration and management.

B. Provide two (2) hour classes explaining control system use. Two (2) months after initial training sessions repeat with (2) hour session.

3.5 WARRANTY

A. All standard manufacturers' warranties shall apply.

B. The installation shall be warranted for one (1) year.

C. Provide technical support at no charge to the customer for a period of (1) year after system has been commissioned.

D. Make available an extended warranty to the customer.

END OF SECTION 274116

SECTION 275225 DIGITAL SIGNAGE SYSTEM EXPANSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the expansion of the existing digital signage system and related Work as required in the Contract Documents.

1.3 QUALITY ASSURANCE

A. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory.

B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

C. Installation shall be accordance with NFPA 70 (National Electrical Code), state codes, local codes, and requirements of authority having jurisdiction.

D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.

E. Each item shall bear the UL Label.

F. The system provider must:

1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.
2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years.
3. Maintain a service organization to provide both normal and emergency service. Emergency service must be available 24 hours per day; 365 days per year and staff must be adequate to respond within 2 hours of an emergency call.
4. Maintain adequate spare parts inventory to provide both normal and emergency service.

5. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
6. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.
7. Provide all system programming to deliver a customized system to the Owner ready for use.

    a. All system programming is to be completed to the satisfaction of the Owner. If after preliminary use of the system, and/or training, the increased understanding of the system's features and capabilities necessitates reprogramming to any extent, it is to be performed at no additional cost.

1.4 SUBMITTALS

A. All items of equipment and accessories specified under this section.

B. Include:

1. Complete equipment list including quantities.
2. Catalog descriptive literature for all equipment.
3. Riser Wiring Diagram showing all devices, wire quantities and sizes.
4. Typical Terminal Wiring Diagram for each type of device.
5. Complete equipment configuration.
6. Test reports as called for.

1.5 SYSTEM DESCRIPTION

A. Digital signage display locations shall provide information regarding activities and other facility information.

B. Updating of information shall be from an existing remote data entry workstation.

C. System shall not solely depend on any single subsystem for operation of directories.

D. System basis shall be digital streamed IP content delivery, to remote decoders at the display locations.

1. System shall be capable of displaying real time information, such as weather information, news ticker, and emergency notifications.

E. Shall have capabilities of adding directories or information without altering the initial system.

F. Receive network switches from Owner, and install in equipment racks in IDF room, as directed by Owner's Representative.

G. Coordinate expansion of existing system, licensing, and capabilities with Owner's network administrator.

PART 2 - PRODUCTS

2.1 DIGITAL SIGNAGE CABLING

A. Digital signage infrastructure cabling shall consist of:

1. A CAT6 cable routed from local IDF, to each field display location.
2. At field locations: Provide a recessed, RJ-45 connector installed on a single gang backbox.
3. All cabling runs shall be supported, terminated, labeled and tested. Provide test results to Engineer for review.
4. Contractor shall install cabling using methods of installation as defined in the Communications General Spec Section 270510.

2.2 DIGITAL CONTENT DECODER

A. Provide a compressed Video over IP Decoder at each field display device.

1. Power: Power Over Ethernet (PoE).
2. Infrared (IR) – Infrared emitter connection allows control of IR display devices.
3. Built-in control capability can trigger TCP/UDP commands to other IP controllable devices.
4. Digital Video Input: Network video over copper via RJ45 port or fiber via 1G SFP port.
5. Video Outputs HDMI, DVI-D (through adapter).
6. Video Formats HDMI, DVI-D (through adapter), HDCP content protection support.
7. Output Resolutions Supports most common HD up to 1080p60.
8. Audio Input Signal Types: Network Audio over Ethernet
9. Audio Output Signal Types: Embedded audio on HDMI, DVI-D (through adapter).
10. HDMI Audio Formats: Stereo 2-channel
11. Analog Audio Formats: Stereo 2-channel
12. Latency 175 ms at 60 fps.
13. Communications: Ethernet: 10/100/1000 Mbps, auto-negotiating, auto-sensing, full/half duplex, DHCP, Auto IP, and Static IP; 1 Gbps port which accepts compatible fiber transceivers or direct attach cables (fiber or copper cabling).
14. HDMI: HDCP, EDID management.
15. Design Make: AMX NMX-DEC-N3232 (FGN3232-SA), Stand Alone.

2.3 FIBER OPTIC CABLE HOUSING - RACK MOUNT

A. Provide a Rack Mount Fiber Enclosure

1. Enclosure shall be designed to serve as a transition from backbone cabling to distribution switching, an interconnect to active equipment, or as a cross-connect or interconnect in a main or horizontal distribution area.
2. Enclosure shall provide easy access to fibers through a fixed bulkhead design.
3. Holds up to eight QuickNet™ Cassettes, FAP adapter panels, or FOSM splice modules.
4. Dimensions: 3.48"H x 17.60"W x 16.30"D (88.4mm x 447.0mm x 414.0mm)
5. Design Make: Panduit FCE2U

2.4 PATCH PANEL 24 PORT - CAT6

A. Provide Modular Patch Panels with built-in strain relief bar.

1. Color: Black
2. Number of Ports 24
3. Number of Rack Spaces: 1RU
4. Connector Type: Shielded
5. Identification Type: Adhesive Label
6. Module Type: Mini-Com
7. Design Make: Panduit CPPL24WBLY

2.5 AUDIO / VIDEO EQUIPMENT RACK

A. Provide equipment racks to house the A/V systems equipment.

1. Racks shall be gangable,
2. Finish: Black Powder Coat
3. Listing Agencies/Third Party Certifications: ASCE: 7-10, RoHS, Greenguard, UL E173107 .
4. Dimensions: Usable Depth: 35.4", Usable Height: 71.875", Panel Width: 19 ". Rack Units: 41
5. Capacity Weight (US): 12000
6. Rackrail Type: 10-32
7. Seismic Load Capacity: 1175, Static Load Capacity: 12000, UL Load Capacity: 3000.
8. Material: Steel
9. Design Make: Middle Atlantic BGR-4138 with power strips, lacing bars, and all related hardware.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall provide all wiring to include power, data, raceway, supports, termination, testing, labeling, etc.

B. Follow the manufacturers written procedures for installation.

C. Contractor shall provide all nuts, bolts, channel and any other hardware necessary for a complete installation.

D. Provide training for a minimum of five owner designated personnel for a period of eight (8) hours. Training shall cover all aspects of the installation.

E. The manufacturer shall provide a minimum warranty of one (1) year after acceptance by the Owner.

END OF SECTION 275225

SECTION 280500 BASIC ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.3 LICENSING

A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.

B. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.4 PERMITS

A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the City prior to request for final payment.

B. Provide electrical inspection certificate of approval from an Engineer approved Inspection Agency prior to request for final payment.

1.5 CODE COMPLIANCE

A. Provide work in compliance with the following:

1. Building Code of Oklahoma State.
2. Mechanical Code of Oklahoma State.
3. Fire Code of Oklahoma State.
4. Energy Conservation Construction Code of Oklahoma State.
5. Oklahoma State Department of Labor Rules and Regulations.
6. Oklahoma State Department of Health.

7. National Electrical Code (NEC).
8. Occupational Safety and Health Administration (OSHA).
9. Local Codes and Ordinances.
10. Life Safety Codes, NFPA 101.
11. Oklahoma State Education Department Manual of Planning Standards.

1.6 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
OK/DEQ	Oklahoma State Department of Environmental Quality
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.7 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	(Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.
Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer.
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.

Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.
Submittals Defined (Technical)	Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on

Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to meBuff-RFI-Sub-Clerk@meengineering.com.

1.9 PROTECTION OF PERSONS AND PROPERTY

A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.12 ROUGHING

A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.

C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.

D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:

1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.13 COORDINATION SHOP DRAWINGS

A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of electronic drawing files or reproducible transparencies, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:

1. The Low Voltage Contractor shall draft location of data racks, A/V equipment, camera, conduits etc. on the base plan, indicating areas of conflict and suggested resolution.
2. The Electrical Contractor shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan, indicating areas of conflict and suggested resolution.
3. The General Construction Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.
4. The Construction Manager shall expedite all drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various contractors as to how to revise their drawings as required to eliminate installation interferences.
5. If a given Contract proceeds prior to resolving conflicts, then if necessary, that Contract shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Contracts.

B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between Contracts, and between Contracts and existing building construction, before they occur in construction. Coordination drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.14 EQUIPMENT AND MATERIAL INSTALLATION

A. Provide materials that meet the following minimum requirements:

1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
2. All equipment and material for which there is a listing service shall bear a UL label.
3. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:

1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.15 CUTTING AND PATCHING

A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.16 PAINTING

A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).

B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.

C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.

D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.

E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

F. Refer to Division 9 - Finishes, for additional information.

1.17 CONCEALMENT

A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.18 CHASES

A. New Construction:

1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Contract. Mechanical and Electrical Contracts shall provide all other openings required for their contract work.
2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

1.19 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.20 NON-RATED WALL PENETRATIONS

A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.21 PENETRATION FIRE STOPPING

A. See Specification Section 078400 07841, Penetration Firestopping, for project wide fire stopping information.

1.22 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.

C. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.23 ACCESS PANELS

A. Provide access panels for required access to respective Contract work. Location and size shall be the responsibility of each Contract. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide Contractor for General Trades with a set of architectural plans with size and approximate locations of access panels shown.

1.24 CONCRETE BASES

A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 6 in. high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.25 ELECTRICAL EQUIPMENT CONNECTIONS

A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

1.26 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.

B. Refer to Section 016000 - Product Requirements for additional information.

1.27 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.28 OWNER INSTRUCTIONS

A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.29 OPERATION AND MAINTENANCE MANUALS

A. Prepare three (3) Operation and Maintenance Manuals. Include in each O&M Manual, a copy of each approved Shop Drawing, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing

contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Bind above items in a three ring binder with name of project on the cover. Deliver three (3) copies to Owner's Representative for review before request for final acceptance.

B. Operation and Maintenance Manuals shall also be submitted electronically, in PDF format on CD or flash drive.

1.30 RECORD DRAWINGS

A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints and one set of reproducible mylars or electronic files) for the purpose of recording as-built conditions.

B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.

C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.

E. The complete set of red marked Contract Documents, completed reproducible mylar or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.

F. Once the as-built drawings have been approved, the Contractor shall have the set scanned or converted to electronic files and submit to the Engineer as the "Record Set".

1.31 FINAL INSPECTION

A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.32 CLEANING

A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:

1. Thoroughly clean entire installation, both exposed surfaces and interiors.
2. Remove all debris caused by work.
3. Remove tools, surplus, materials, when work is finally accepted.

1.33 TRANSFER OF ELECTRONIC FILES

A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of record drawings related to the project, subject to a $50.00 charge per drawing file and the following terms and conditions:

1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by visiting www.meengineering.com/contractor_request.php.
2. M/E Engineering, P.C.'s electronic files will be exported from MicroStation into DWG/DXF files that are compatible with AutoCad as requested. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
3. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
4. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
5. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of

these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.34 VIDEO RECORDING OF TRAINING SESSIONS

A. The contractor shall video record all training sessions required by their discipline. Video shall be in DVD format and two (2) copies submitted to the Owner. DVD to be individually marked with training session name, installing Contractor and date of training.

END OF SECTION 280500

SECTION 281300 ACCESS CONTROL SYSTEM - INFRASTRUCTURE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SCOPE OF WORK

A. Provide conduits, back boxes, infrastructure cabling and cabling support devices, for future installation of the Owner provided access control system. Cabling shall be routed from select door entrance locations, to the access control panel room location as shown on the contract documents.

B. Entrances shall be cabled to accommodate the following field devices: Card reader location, electric strike, request to exit sensor, local alarm and door position switch.

1.3 QUALITY ASSURANCE

A. All methods of construction and details of workmanship that are not specifically described or indicated in the Contract Documents shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

B. Installation shall be in accordance with NFPA-70 (National Electrical Code), state codes, local codes, and requirements of authority having jurisdiction.

C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.

D. Each item shall bear the UL Label.

1.4 WIRING

A. All wiring/cabling shall be as specified herein and shall meet all the requirements of the National, State and Local Electric Codes.

B. All wires shall be color coded and tagged at all junction and termination points and shall be tested free from grounds or crosses between conductors.

1.5 INSTALLATION

A. Preparatory work required to accommodate the installation (i.e., conduit, junction and pull boxes, outlet boxes, brackets, and all conduit fittings and accessories including power outlets as required) shall be furnished and installed by the Electrical Contractor.

B. The installation shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in this type of work.

1.6 SUBMITTALS

A. Submittals Package: Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.

B. Include:

1. Bill of Materials.
2. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be accepted).

PART 2 - PRODUCTS

2.1 SYSTEM CABLING AND EMPTY CONDUIT

A. All cabling shall meet manufacturer's requirements for wire gauge, shielding and number of conductors. Jacket color for all access control cabling shall be yellow.

B. Each door being provided with access control devices shall have a NEMA Security System Junction Box installed on secure side of door.

C. Provide multi-conductor cable consisting of 22 AWG, 3-pair, shielded and 18 AWG, 4 conductor shielded routed from Security System Junction Box to local IDF indicated.

D. Leave 8 ft. of cable coiled in the NEMA box and 25 ft. of spare cable coiled in the local IDF for final termination.

E. Cable shall be labelled per the following: IDF - Door Number

F. Provide separate 3/4 in. raceways with pull rope from NEMA box to door header and to card reader location. Card reader shall be installed 4'-" AFF.

2.2 CABLE LABELING

A. Provide labels at the ends of each cable being provided, to include both IDF and door number.

B. Each label shall identify the doorway entrance that will be controlled, and the room location of the access control panel serving the doorway entrance.

C. The Contractor shall utilize Interlink-Label for Windows labeling software or approved equal.

D. Labels shall be installed in a workmanlike manner and shall be completely covered with clear shrink wrap tubing.

E. Verify color of label and size of font prior to completion. Provide samples as required.

F. Contractor shall record each label on all record drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. After installation of wiring and apparatus has been completed, all cabling shall be tested by the Contractor to insure continuity, proper splicing, freedom from grounds (except "made" grounds and those required for protection), and insulation resistance in accordance with UL requirements and electrical regulations. The Contractor shall furnish and use suitable instruments such as ammeters, voltmeters, meggers, scanners, etc.

3.2 INSTALLATION

A. All cabling will be done with a Teflon-coated fire-retardant sheathing approved for use in plenums.

B. All cabling shall be installed in a conduit system from NEMA box to overhead cable tray system..

C. Provide adequate equipment for installation of cable. Pull all cables in such a manner as not to overstress or stretch any cable, and use precautions as not to score, cut, twist or damage the protective covering of insulation.

D. Cables shall be handled and placed in such a manner as to avoid kinks and other sheath deformities. Minimum bending radius of all cables shall be 10 times the diameter of the cable. Cable kinked or flattened shall not be used. Lead sleeves or duct splices shall not be permitted.

E. Cables shall be installed parallel or perpendicular to the building lines.

F. Wire and cable shall not be supported from electrical conduits or mechanical piping.

G. All equipment shall be properly mounted and anchored. All holes or voids caused by the Contractor shall be patched.

3.3 SYSTEM GROUNDINGS

A. Provide a #6 bare grounding conductor from the equipment enclosure to the main building service ground. Each gas tube protector shall also be connected to ground with a #6 insulated copper conductor.

END OF SECTION 281300

SECTION 282300 I.P. CAMERA SURVEILLANCE SYSTEM - INFRASTRUCTURE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide conduits, back boxes, infrastructure cabling and cabling support devices, for future installation of the Owner provided IP Camera surveillance system. Cabling shall be routed from select camera locations, to the data room location as shown on the contract documents. Leave 10 ft. cable coiled neatly at camera location.

B. Parking area camera locations shall be cabled to accommodate the following field devices: Fiber to copper media adapters.

1.3 QUALITY ASSURANCE

A. All methods of construction and details of workmanship that are not specifically described or indicated in the Contract Documents shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory.

B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

C. Installation shall be accordance with NFPA-70 (National Electric Code), National Electric Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.

D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.

E. Each item shall bear the UL Label.

F. The system provider must:

1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.

2. Demonstrate that they have successfully installed these systems utilizing their standard products for a period of five (5) years.
3. Maintain a service organization to provide both normal and emergency service. Emergency service must be available 24 hours/day, 365 days/year, and staff must be adequate to respond within two (2) hours of an emergency call.
4. Maintain adequate spare parts inventory to provide both normal and emergency service.
5. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
6. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, setup, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and, where appropriate, certifications in the proper training and use of the tools and/or equipment.

1.4 GENERAL DESCRIPTION

A. The work included in this section is shown on the drawings or described in the specifications and consists of furnishing all labor, material, services, and skilled supervision necessary for the construction, erection, installation, and connection of all circuits, apparatus, and equipment specified herein or shown on the drawings in a first class, workmanlike manner, and its delivery to the Owner ready for use.

B. Each part of work is to be complete in detail and operable in unison with all other sections, to constitute a completely installed video surveillance system cabling infrastructure, and connections of same as shown on drawings and described in the specifications.

C. Work in this section includes:

1. Outlining the requirements for complete and satisfactory operating systems.
2. The Contractor and system provider shall do everything necessary to provide thoroughly satisfactory and working systems, including furnishing and installing all items required to complete the work, whether specifically called for or not. The Contractor shall obtain all wiring requirements from the system manufacturer prior to building and include in his bid all wiring as recommended by the manufacturer.
3. The Contractor shall furnish and install all necessary raceways and outlet boxes for installation of the video surveillance system cabling infrastructure, including furnishing and installing all raceways required to complete the work.
4. All video surveillance system cabling shall be as specified herein.
5. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the project specifications.
6. All work in conjunction with the video surveillance system installation shall comply with all the provisions of the NEC, all local and national codes, and authorities having jurisdiction.

D. Intent:

1. Provide conduit system, cabling and back boxes to camera locations identified on the drawings to allow for installation of cameras.

1.5 SCOPE OF I.P. CAMERA SURVEILLANCE SYSTEM WORK

A. Provide outlet boxes, raceways, and system cabling from the local data rack to each camera location indicated on the drawings. All cabling shall be installed in a conduit system. Refer to Section 270510 - "Communications, General" for raceway type. Provide one (1) Cat 6 cable to each camera location.

B. Terminate all Cat 6 cabling at I.P. camera surveillance system patch panel in the data rack indicated on the drawings. Provide RJ-45 connections on both ends of cable.

C. Test all systems cabling.

PART 2 - PRODUCTS

2.1 I.P. CAMERA SURVEILLANCE SYSTEM CABLE

A. Systems cabling to each facility camera location shall be one (1) Cat 6 UTP with a black PVC jacket. Provide with RJ-45 jack at each end. Provide a dedicated patch panel for I.P. camera surveillance system at rack. Terminate at I.P. camera surveillance patch panel at rack location as indicated on drawing.

B. System cabling to parking area cameras shall be six (6) strands, 50 micron, multi-mode fiber optic cable.

C. At parking area locations: Provide a pole mount weather proof enclosure designed to house the media converter device.

D. Provide a UV resistant, 3' Cat 6 patch cable to connect media converter to (future) IP camera.

E. All cabling runs shall be supported, terminated, labeled and tested. Provide test results to Engineer for review.

F. Contractor shall install cabling using methods of installation as defined in the Communications General Spec Section 270510.

2.2 CABLE LABELING

A. Provide labels at the ends of each cable being provided, to include both camera field end, and data room location.

B. Each label shall identify the camera field end location, and data room location.

C. The Contractor shall utilize Interlink-Label for Windows labeling software or approved equal.

D. Labels shall be installed in a workmanlike manner and shall be completely covered with clear shrink wrap tubing.

E. Verify color of label and size of font prior to completion. Provide samples as required.

F. Labels shall correspond to the room/names/numbers upon completion of the project. Contractor shall not necessarily utilize existing room/names/numbers of those indicated on the blueprints.

G. Contractor shall record each data port label on all record drawings.

PART 3 - EXECUTION

3.1 SYSTEM WIRING

A. Cables shall not be supported from electrical conduits, mechanical piping or ductwork. All cabling shall be installed in a conduit system.

B. Wiring shall conform to NEC Article 725.

C. All outlet boxes required as a part of the mounting arrangement for devices shall be installed in accordance with the manufacturer’s instructions.

D. All wires and cables shall be color coded and tagged at all junction and termination points and shall be tested free from grounds or crosses between conductors.

E. Raceways shall be sized to suit the number of wires required by the system supplier’s equipment being installed. Size raceways and associated boxes as required by the NEC limiting fill to 40%, unless otherwise indicated or further reduced by manufacturer's representative’s recommendations. Terminate all conduits with bushings.

F. The video surveillance system drawings are schematic and locate devices only. The Contractor shall be responsible for complete wiring requirements and conduit sizes.

3.2 INSTALLATION

A. Preparatory work required to accommodate the video surveillance system installation (i.e. conduit, junction and pull boxes, outlet boxes, brackets and all conduit fittings and accessories, including power outlets as required), shall be furnished and installed in accordance with applicable local, state and national codes.

B. The installation shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in video surveillance system type of work.

3.3 SYSTEM TEST, ADJUSTMENTS AND APPROVAL

A. Contractor shall conduct an acceptance test of every system cable. All tests shall be repeated until all defects have been remedied. Testing shall be conducted as specified in Section 270510, Communications, General.

B. The video surveillance infrastructure shall be physically inspected by the Owner's Representative to assure that all equipment is installed in a neat and workmanlike manner.

C. Provide two (2) copies of Operation and Maintenance Manuals to Owner.

3.4 WARRANTY

A. All equipment shall be provided with a one (1) year manufacturer's warranty.

END OF SECTION 282300