

GENERAL CONDITIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The General Conditions, and other pertinent documents issued by the Architect are a part of these specifications and shall be complied with in every respect; certain paragraphs included in this section are supplemental to similar paragraphs in the above documents and are not intended to supersede those paragraphs.
- B. Each Subcontractor shall be responsible for reading all sections of the specifications and reviewing all drawings in order to understand thoroughly the nature of the entire project, the requirements for coordination among the several trades, and items in other sections which apply to electrical work.

1.02 CONTRACT DOCUMENTS

- A. All contract documents are on file in the Architect's office and shall be inspected by all bidders.
- B. The scale of each drawing is relatively accurate, but the Contractor is warned to obtain the necessary dimensions for any exact takeoffs from the Architect. No additional cost to the Owner will be considered for failure to obtain exact dimensions where not clear or in error on the drawings. Any device or fixture roughed in improperly and not positioned on implied center-lines or as required by good practice must be repositioned at no cost to the Owner.
- C. The mechanical and electrical drawings and specifications are intended to be used together as construction documents forming an integral part of the contract documents. They are intended to define, not limit the required construction and delivery to the Owner of complete systems, in perfect operating condition. Special items required may be shown or mentioned in either the drawings or the specifications, or both; however, it is the intent of the Contract that these systems shall be constructed completely and correctly and shall include all elements necessary to this end.
- D. Symbols for various elements and systems are shown on the drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from the Architect.
- E. It shall be the responsibility of each Contractor to examine the Contract Documents carefully before submitting his bid, with particular attention to errors, omissions, conflicts with provisions of laws and codes having jurisdiction, conflicts between drawings or drawings and specifications, and ambiguous definition of the extent of coverage between Contracts. Any such discrepancy shall be brought immediately to the attention of the Architect for correction, no less than two weeks prior to bid date. Should any of these errors, omissions, conflicts, or ambiguities exist, and the Contractor fails to have them explained and adjusted in writing less than two weeks prior to bid, otherwise, he shall, at his own expense, supply the proper materials and labor to make good any damage or defects in his work or the results obtained therefrom, caused by such discrepancy.
- F. The drawings are generally diagrammatic and the Contractor shall coordinate the work so that interferences are avoided. Provide all necessary offsets in conduit, fittings, etc., required to properly install the work. Exposed work must be kept as close as possible to walls, ceilings, columns, etc., so as to take up the minimum amount of space; all offsets, fittings, etc., required shall be provided without additional expense to the Owner.
- G. It shall be the responsibility of each Contractor to examine the Contract Documents carefully before submitting his bid, with particular attention to errors, omissions, conflicts with provisions of laws and codes having jurisdiction, conflicts between drawings or drawings and specifications, and ambiguous definition of the extent of coverage between Contracts. Any such discrepancy shall be brought immediately to the attention of the Architect for correction. Change Orders will only be accepted for changes in scope. A "change in scope" is defined as work other than what was shown or intended. Costs for Change Orders will be reviewed and processed based on the standard labor rates for the area (either Union or non-Union) and these cost rates shall take precedence over any other contractual or agreed upon rates. All Change Order work shall be executed on a straight time basis (as opposed to overtime or premium time) unless specifically authorized in writing prior to the start of the work. The change order pricing shall be submitted in PDF format. The change order shall be broken down in cost to match the written description issued by the engineer (with full backup). The per line item breakdown shall show labor, material, total costs. A sample of the change order form is shown below:

Cinergy _____

MEP, Delta 5, CCD #03

Thursday, April 6, 2017

The following is a summary of all the changes in the documents. The pricing is to be submitted on a per line item basis (to match this write-up) with total cost, material cost, labor cost with backup.

DWG #	Description of Revisions to Drawings	Cinemark Request	A/E coordination	Clarification	Contractor requested change	Sub-Contractor Cost		
						Labor	Material	Total
E3.1	1. Remove "Ticket" signage	X						
	2. Removed (2) floor boxes for ATMS, power and data to be moved to the adjacent column.	X						
	3. Relocated (2) Ticket exchange kiosk circuit / receptacles	X						
E3.2	1. Add (2) 120V circuits and (2) receptacles for DBOX equipment cabinets	X						
E3.3	1. Auditorium #10 - Add (5) 120V circuits and (23) receptacles for DBOX seats	X						
	2. Auditorium #7 - Add (6) 120V circuits and (24) receptacles for DBOX seats	X						
	3. Add DBOX details	X						
E8.1	1. Removed floor boxes for ATMS. Data to be run up column into projection booth	X						
	2. Relocated (2) ticket exchange kiosk data receptacles.	X						
E8.2	1. Add low voltage for DBOX seats at Auditorium 7 and 10	X						
5					Sub-Total:			
sheets					GC Profit:			
					GC Change Order Total			

- H. Should any of these errors, omissions, conflicts, or ambiguities exist, the Contractor shall have them explained and adjusted in writing before signing the Contract or proceeding with the work; otherwise, he shall, at his own expense, supply the proper materials and labor to make good any damage or defects in his work or the results obtained therefrom, caused by such discrepancy.
- I. Wherever conflicts occur between different parts of the Contract Documents, the greater quantity, the better quality, or larger size shall prevail unless the Architect informs the Contractor otherwise in writing.
- J. When drawing revisions are issued, a written description of the changes will be issued with the revisions. The contractor is to provide pricing on a line item basis (with backup) to match the description of the written changes. Any adds and deducts will correlate for similar scope.
- I. The contractor shall have prior written approval to proceed with work that will result in additional cost to the owner.
- K. The electrical contractor shall verify the electrical characteristics and wiring requirements of all HVAC and plumbing equipment prior to rough-in. If there are any discrepancies between the construction documents and the electrical characteristics and wiring requirements of all HVAC and plumbing equipment, notify the engineer via RFI as soon as possible.

1.03 EXAMINATION OF THE SITE

- A. The Contractor shall examine the site and all conditions thereon and/or therein, prior to submitting bid. All conditions shall be taken into consideration as they may affect the work. The Contractor shall be satisfied as to the existing grades and the actual formation and soil condition. The lack of specific information on the drawings shall not relieve the Contractor of the responsibility of taking into account all site conditions before bidding. No extras will be allowed for work resulting from conditions that would have been evident upon a thorough examination of the site. Notify the engineer prior to bid closing date of any discrepancies or points of doubt or contention. Failing this action, include in the bid for the most expensive course of action.

1.04 PERMITS AND FEES

- A. All necessary permits, licenses, and fees required to carry out the work shall be procured by the Contractor. Also, all necessary certificates of approval which must be delivered to the Architect before final acceptance of the work shall be obtained by the Contractor at his expense.

1.05 CONTRACTORS QUALIFICATIONS

- A. Each individual employed by the Contractor or by any Subcontractor or Contractor's Consultant shall be experienced, qualified and competent to correctly perform all work required of him on this project and to the satisfaction of the Architect.
- B. Technical, supervisory and administrative personnel shall have knowledge of the engineering principles involved in the design of the systems required by the Contract Documents and shall be experienced and qualified in the correct interpretation of the requirements of these Documents to the satisfaction of the Architect.
- C. Any firm or individual not having the necessary experience and/or qualifications shall not be used on this project.

1.06 CODES AND ORDINANCES

- A. The Contractor is expected to know or to ascertain, in general and in detail, the requirements of all Codes and Ordinances applicable to the construction and operation of systems covered by his Contract. He shall know or ascertain the rulings and interpretations of Code requirements being made by all authorities having jurisdiction over the work to be performed by him.
- B. In preparing his bid, the Contractor shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable Codes, Ordinances and Authorities, whether or not these are specifically covered by the drawings and specifications. All cases of serious conflict or omission between the drawings, specifications and codes shall be brought to the Architect's attention as hereinbefore specified. The Contractor shall carry out his work and complete his construction as required by applicable Codes and Ordinances and in such manner as to obtain approval of all authorities whose approval is required.
- C. The Contractor shall procure all necessary permits or licenses to carry out his work and pay the lawful fees required; he shall also obtain all necessary certificates of approval which must be delivered to the Architect before final acceptance of the work.
- D. The Contractor shall confine the storage of materials and the operation of his workmen to the limits provided by law, ordinances, permits or as directed by the Architect.
- E. The 2014 NEC including all Supplements and Amendments, as well as all other state and local amendments are incorporated into the Division 16 specifications as though the Code was published in its entirety in these specifications.

1.07 SCOPE

- A. The Contractor shall provide all labor, materials, tools, machinery, equipment, accessories, hardware, fasteners, layout, supervision, hoisting, scaffolding, shop drawings, cleanup, detailing, packaging, trucking, freight, delivery, permits, insurance and all services necessary to complete the mechanical work under this contract in accordance with all codes. All work shall be coordinated with the work of other trades so as to resolve conflicts without impeding job progress. All out of sequence work shall be included.
- B. ELECTRICAL DISTRIBUTION SYSTEM:
 - 1. A complete electrical distribution system consisting of components indicated on the drawings or specified herein, including, but not limited to:
 - a. 277/480V, 3 PH, 4 wire primary service entrance conduit raceways and conductors.
 - b. All miscellaneous equipment coordination and related appurtenances required by power company, including CTs and metering.
 - c. Motor starters for motors shall be provided by Division 16, however, with the following exceptions:
 - 1) Package equipment with factory mounted starters if specified with factory mounted starters.
 - d. Feeders, branch wiring, electrical distribution equipment.
 - e. All temperature control wiring and installation of control components.
 - f. Access panels and access doors where required for access to equipment installed by Division 16. Access panels and access doors shall be suitable for the specified architectural finishes.
 - g. Wiring between system components if equipment is not prewired.
 - h. Lighting fixtures, lighting controls and associated wiring.
 - i. Telephone raceway system:
 - 1) Grounding risers for use by telephone company.
 - 2) Incoming and primary building raceways.

- j. Support system design and supports for electrical raceways.
 - k. Code required disconnects.
 - l. Power including branch wiring for "heat tracing".
 - 2. Furnishing of shop drawings and brochures.
 - 3. Furnishing of record drawings.
 - 4. Balancing and adjusting of electrical loads.
 - 5. Furnishing operating and maintenance manuals.
 - 6. Miscellaneous items as required for complete and functioning systems as indicated on the drawings and specified herein.
 - 7. All systems, equipment, and services specified herein shall be furnished and installed complete and ready for use.
 - 8. Installation of seismic restraints.
- C. The electrical contractor understands and agrees that time is of the essence, and in the event overtime is required to maintain pace with the construction schedule due to the electrical contractor's lack of progress, it will be performed at no additional cost.
 - D. The work included herein may not be performed in a continuous cycle but in various stages as determined by the General Contractor, the Owner, or delivery of Owner furnished items or equipment. The electrical contractor shall perform the work out of sequence as directed without any additional cost to the Owner or the General Contractor. The electrical contractor shall include any required overtime expense at no additional cost to the Owner or General Contractor to meet the milestone dates and occupancy dates in accordance with the General Contractor's schedule.
 - E. The electrical contractor is to be responsible for employing the proper tradesmen per union jurisdiction, past, present, and future. The subcontractor is also responsible for taking whatever measures that may be necessary, including composite crews, to settle any labor disputes and insure job continuity at no additional cost to the Owner. Should questions of union jurisdiction arise, the contractor shall immediately take steps to settle such disputes and will use such labor as may be determined to have jurisdiction at no additional cost to the Owner or General Contractor. Any work claimed by the Union(s), including terminations of wiring systems for Owner provided equipment, shall be included by this contractor at no additional cost to the Owner or the General contractor. Should he fail to take expeditious action, he will be responsible for the time lost and monetary damages because of delays arising from such disputes.
 - F. The electrical contractor shall provide a journeyman electrician standing by at the project for the first three days (and nights) of the project's opening.

1.08 ALTERNATES

- A. The Contractor shall determine the scope of each specified alternate proposal by carefully reading all Divisions of the Contract Documents. The Bid Form contains information explaining the extent of the construction to be performed under a specific alternate. Alternate proposals which are not predominantly electrical in scope, are described in other Divisions of the Contract Documents.

1.09 SUPPORT SYSTEM DESIGN FOR ELECTRICAL SYSTEMS

- A. The Division 16 Contractor is responsible for design of all electrical support systems, including hangers, Unistrut, backing, etc.

1.10 GENERAL REQUIREMENTS FOR ALL MATERIALS

- A. Provide all parts and accessories necessary for equipment and complete installation.
- B. Provide factory applied finish on all exterior surfaces of electrical equipment. Any item which has the finish marred shall be refinished to a new condition before final acceptance.
- C. Provide three copies of spare parts lists, and operating and maintenance instructions for all distribution apparatus, major equipment, and auxiliary systems. These shall be bound in folders with suitable identification on front cover. Deliver to Architect prior to final acceptance.
- D. All materials shall be new and of good quality, and shall bear the stamp of approval of the Underwriters' Laboratories, Inc.

1.11 NOISE

- A. Eliminate any abnormal noises, which are not considered by the Architect to be an inherent part of the systems as designed.
- B. Abnormal buzzing in equipment components will not be acceptable.

1.12 SUBSTITUTIONS

- A. Substitutions will be considered up to 2 weeks prior to bid. All approvals must be in via email from spatton@ediengineers.com.

- B. The names of manufacturers and model numbers have been used in the Contract Documents to establish types of equipment and standards of quality. While it is not the intention of the Architect to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. The Contractor shall submit with each request for approval of substitute material or equipment, sufficient data to show conclusively that it is equivalent to that specified in the following respects:
 - a. Performance:
 - 1) Energy consumption at the point of rating shall not exceed that of the specified equipment.
 - 2) Vibration and noise production at the point of rating shall not exceed that of the specified equipment.
 - b. Materials of Construction
 - c. Gages, weights and sizes of all portions and component parts
 - d. Design arrangements, methods of construction, and good workmanship
 - e. Coatings, finishes and durability of wearing parts
 - f. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
 - g. Availability of prompt, reliable and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.
- C. If only one manufacturer is named for a specific item of equipment (except lighting fixtures), an "equal" by another manufacturer may be acceptable. Approval in writing from the engineer as equal must be received prior to bid.
- D. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval.
- E. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer as outlined in Supplementary Conditions.
- F. No attempt has been made to determine if each manufacturer listed for a particular item of equipment will produce material that will comply with all requirements.
- G. If a submittal contains sufficient information to prove compliance with the Contract Documents, then that submittal will be acceptable.
- H. Light Fixtures
 - 1. Substitute light fixtures may be submitted but a substitute fixture must be equal not only from the standpoint of materials, construction, and performance, but for artistic effect as well.
 - 2. Request for substitution must be accompanied by complete data and descriptive sheets; when requested, Contractor must furnish samples of both the specified and substitute fixtures for comparison.
- I. Requests for substitution shall include the Contractor's reason for the request. If the engineer does not consider the items equivalent to those specified, the Contractor shall furnish those specified.

1.13 COOPERATION AND COORDINATION

- A. Coordinate work of this Division with that of other Divisions so that various components of the building will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment, not just that installed in this Division.
- B. Any components of the Electrical Systems which are installed without regard to the above shall be removed and relocated as directed by the Architect at Contractor's expense.
- C. Where various items of equipment and materials are specified and scheduled, the purpose is to define the general type and quality level, not to set forth the exact trim required to fit the various types of ceiling, wall, or floor finishes. Provide materials which will fit properly the types of finishes actually installed.
- D. Where the word verify is used on the documents, the contractor shall field verify the existing conditions and modify the scope of the installation as required to meet the verified conditions.

1.14 DRAWINGS

- A. The drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items by on-

the-job measurements, conformance with Contract Documents and cooperation with other trades.

- B. Prior to locating light fixtures, confer with Architect as to desired method of locating fixtures in the various areas. In no case should fixture locations be determined by scaling drawings. Relocate fixtures and bear cost of redoing work or other trades necessitated by failure to comply with this requirement.
- C. CEILING GRID
 - 1. All light fixtures, vents, etc., shall be located to conform to the ceiling grid system.
 - 2. Examine all drawings to become familiar with this requirement.
- D. In certain instances, the Architect may require relocation of receptacles, switches, light fixtures or other electrical devices, equipment and switches, etc. Where relocation is within ten feet of location shown on drawings, and when Contractor is informed of necessary relocation before work is begun on this portion of the job, the relocation will be at Contractors' expense.
- E. The drawings are schematic in nature and are not intended to show exact locations of conduit, but rather to indicate distribution, circuitry, and control.
- F. Where there is an apparent discrepancy between the architect's drawings and the electrical drawings, such discrepancy shall be called to the attention of the engineer through the form of an Request for Information. In general, the engineer's drawings shall take precedence over the architectural drawings.

1.17 DEVIATIONS

- A. No deviations from plans and specifications made without knowledge and approval of Architect.

1.18 DEFINITIONS

- A. Provide: As used herein shall mean "furnish, install and connect complete unless otherwise noted."
- B. Wiring: As used herein shall mean "wire and cable, installed in raceway within all required boxes, fittings, connectors, and accessories; completely installed".
- C. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.
- D. Review of Shop Drawings: As used herein shall be understood to be a service by the Architect to reduce the possibility of materials being ordered which do not comply with the Contract Documents. See also Paragraph 4.2.7 and Article 3.12 of the General Conditions.
- E. ADA: American Disabilities Act.

PART 2 - PRODUCTS

2.01 STANDARD PRODUCTS

- A. Each item of equipment furnished under this specification shall be essentially the standard product of the manufacturer. Where two or more units of the same kind or type of equipment are required, these shall be the products of a single manufacturer. All equipment shall be U.L. and NEMA approved and shall be made in the U.S.A.
- B. All material and equipment shall be new, and of the best quality used in good commercial practice and shall be the product of a reputable manufacturer. Each major component shall bear a name plate giving the name and address of the manufacturer and the catalogue number of designation.
- C. Major distribution equipment, such as panelboards, distribution switchboards, motor control centers, dry type transformers, busways, fused switches/ disconnects, substations, and switchgear, shall be the same manufacturer.

2.02 MANUFACTURER'S DIRECTIONS

- A. All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturers, unless herein specified to the contrary.

2.03 EQUIPMENT INSTALLATION

- A. When the Engineer has reviewed equipment submittals it shall be the responsibility of the Contractor to install the equipment to

operate properly and in accordance with the intent of the drawings, specifications, and codes.

- B. Work and equipment shall be supported plumb, rigid and true to line. The Contractor shall study the general, structural, mechanical and electrical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be installed, and shall provide foundations, bolts, inserts, stands, hangers, rackets and accessories for proper support whether or not shown on the drawings. When directed, the Contractor shall submit for review drawings showing foundations and supports.
- C. Concrete Equipment Bases:
 - 1. Concrete pads and bases for switchgear and other equipment will be furnished and installed under Division 3 of these specifications.
 - 2. The Contractor shall establish sizes and location of the various concrete bases required and shall provide all necessary anchor bolts together with templates for holding these bolts in position.
 - 3. Anchor bolts shall be placed in galvanized steel pipe sleeves to allow for adjustment, with a suitable plate at bottom end of sleeve to hold the bolt.
 - 4. Concrete housekeeping pads shall be four inches high and shall project three inches on all sides beyond the equipment.

2.04 NAMEPLATES AND EQUIPMENT IDENTIFICATION

- A. Nameplates: Each major item of equipment shall have the manufacturer's name, address, serial number and model number on a plate securely attached to the item.
- B. Equipment Identification:
 - 1. Unless specified otherwise, all items of equipment, except those in finished areas shall be identified as to number, name, function, capacity and other pertinent data with securely attached laminated plastic name tags of an appropriate size with white letters and black background.
 - 2. Generally, the number and name shall be at least 1/4" high and other data at least 1/8" high.

PART 3 - EXECUTION

3.01 SUBMITTALS

- A. The Contractor shall submit shop drawings to the Architect for approval prior to beginning this work. One electronic copy of each catalog cut sheet (Adobe PDF Files) on the equipment proposed to be furnished and installed, and one electronic (AutoCad 2000 DWG File) of each drawing or diagram.
- B. The Contractor shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by the Architect for purposes of clarification of the Contractor's intent. He shall also submit detailed drawings, rough-in sheets, etc., for all special or custom built items or equipment.
- C. These drawings and diagrams shall show all electrical switch and breaker sizes as well as the manufacturer's name and catalog number of each piece of equipment used.
- D. All specification sheets (submittals), drawings and diagrams shall be submitted within forty-five days from the date the Contractor signs the Contract.
- E. The Architect's review of such drawings shall not relieve the Contractor of responsibility for deviations from the Contract drawings or specifications, unless he has, in writing, called the attention of the Architect to such deviations at the time of the submission, nor shall it relieve him from responsibility for errors or omission in such drawings.
- F. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
 - 1. Proper sizes and capacities.
 - 2. That the item will fit in the available space in a manner that will allow proper service. Provide 1/4" scale plan view and elevations of all electrical rooms showing equipment layouts and clearances.
 - 3. Construction methods, materials and finishes.
- G. Catalog data must be clearly marked to indicate the item or model number being submitted and must include all specified accessories. All information on a catalog sheet not pertaining to the item being submitted must be marked out.
- H. Submittal Format:
All submittal drawings must be submitted electronically. All drawings must also be submitted (emailed) in AutoCad DWG

format. All cut sheets must be submitted (emailed) in Adobe PDF format. Do not submit binders or notebooks. Submit one PDF file per submittal.

- I. One email per shop drawing submittal.
- J. One PDF file per submittal.
- K. Email directly to the Engineer with copy to the architect.
- L. For any item to be installed in or on a finished surface (such as tee bar acoustical ceiling, plaster wall), Contractor certifies by making the submittal that he has checked all applicable Contract Documents and that the item submitted is compatible with the surface finish on which it is to be installed, and will fit in the space allocated.
- J. Refer to sheet MEP1.01 for the list of shop drawings.

3.02 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall take proper precautions to protect adjacent property, as provided by law and the Contract Documents, with which his work comes in contact, or over which he may have occasion to transport, hoist or move materials, equipment debris, etc., and shall satisfactorily repair and make good any damages caused by him during construction operations.
- B. The Contractor shall provide and maintain suitable temporary sidewalks, fences or other structures as required by law, or as otherwise necessary for the protection of workmen and passersby and as necessary to prevent obstruction or interference with traffic in public streets or sidewalks, or private right-of-way. He shall leave access to all fire hydrants, provide temporary walkways around any obstructions made in any public place on account of his work and maintain sufficient lights and barricades to protect passersby at night. All streets, curbs and sidewalks shall be maintained in good condition and so left at the completion of the work. The Contractor shall make all necessary arrangements and perform all services required in connection with or as occasioned by his work for the care, protection and maintenance of all public utilities, including fire hydrants, pipe lines and electrical and/or telephone, telegraph and all other items of similar character on or adjacent to the site, assuming all responsibility and payment of all cost incidental to such care and protection or rectification of damage done for which the Owner might otherwise be liable.

3.03 CUTTING AND PATCHING

- A. All necessary cutting and patching of walls, floors, partitions, ceilings, etc., required for the proper installation of the work under these contracts shall be done at the contractor's expense in a neat, careful and workmanlike manner, and as approved by the Architect.
- B. No concrete joists, beams, girders or columns shall be cut by any contractor without first obtaining the written permission of the Architect.
- C. All drilling and patching for expansion bolts, hangers and other supports shall be done by the contractor subject to the approval of the Architect.
- D. Labor and materials required to replace or rebuild parts cut or injured shall be furnished at the contractor's expense subject to the satisfaction of the Architect.

3.04 CLEANING UP AND REMOVAL OF RUBBISH

- A. The contractor shall be responsible for keeping the premises (including the outside area) free of all rubbish, debris and waste materials of every kind at all times during the Contract period.
- B. This requirement is mandatory and shall apply regardless of whether such rubbish, etc., accumulates in consequence of his work or his Subcontractors operations.
- C. Specifications covering additional work such as mechanical and electrical trades calls for cleaning and removal of rubbish by these trades but this Contractor is charged with the responsibility of enforcing and coordinating the clean up and removal services for all trades.

3.05 OPERATING INSTRUCTIONS AND MATERIAL LIST

- A. At the time of final completion of the work and as a condition to be fulfilled prior to final payment, the Contractor shall carefully instruct the Owner's designated representative in the proper operation, maintenance and service of all work and equipment provided.
- B. The Contractor shall furnish the Owner a complete list identifying actual materials and devices incorporated in the work. The

identification shall include source of supply, date of purchase, model and serial number, operating and maintenance data, parts list, etc., as required to facilitate future repairs and replacements.

3.06 GUARANTEE

- A. The Contractor shall and does hereby guarantee for a period of one year from date of final acceptance by the Architect all work as called for in the various Divisions of these specifications. When such work is performed by Subcontractors, and where special guarantees are required by Subcontractors, the Contractor shall secure warranties from said Subcontractors and deliver copies of same to the Owner upon completion of the work.
- B. The Contractor shall replace with new materials and/or equipment by material failing to give satisfactory service during the guarantee period. Replacement of materials, equipment, including all labor involved, shall be at no cost to the Owner.
- C. Nothing in the above intends or implies that this guarantee shall apply to work which has been abused or neglected by the Owner.

3.07 POWER SERVICE ENTRANCE:

- A. GENERAL: The power service entrance from the utility company and all fees required there of are furnished by the Owner.
- B. SCOPE: The service entrance included by this contractor shall be as follows:
 - 1. Underground Primary Service (UGP): Raceway and Conductors provided and installed by the Contractor.
 - 2. Transformation: The Power company shall provide the transformer.
 - 3. Secondary Services:
 - a. Provided by Contractor.
 - b. Refer to drawings for pertinent information.
 - 4. Metering:
 - a. Provide all metering equipment as required by the governing authority , the utility company, and shown on the drawings.
 - b. Meter Location: As indicated on the drawings and per the utility company's direction.
 - 5. Transformer Pad:
 - a. Provided by contractor in accordance with the power company's requirements.
 - b. Refer to the architectural site plan for the location.

3.08 INSPECTION OF SITE

- A. Site Visit
 - 1. Before submitting a bid, all bidders shall carefully examine the drawings and specifications, and visit the site.
 - 2. Bidders shall fully inform themselves in detail as to all existing conditions, limitations, available clearances; shall thoroughly check all obstructions which are to be removed or relocated to permit installation of the new equipment and facilities; and shall include in their proposals a sum to cover the cost of all contingencies and work as required under the drawings and specifications included in the Contract.
- B. Failure on the part of any bidder and/or Contractor to familiarize himself with all existing conditions as may be encountered or enumerated above will not be considered sufficient justification to request or obtain any extra compensation over and above the Contract Price.

3.09 PROTECTION OF EQUIPMENT

- A. Do not deliver equipment to jobsite until progress of construction has reached the state where equipment is actually needed, or until building is closed in enough to protect equipment from the weather. Equipment allowed to stand in weather will be rejected, and Contractor is obligated to furnish new equipment of a like kind.
- B. Adequately protect equipment (including all Owner-furnished items) from damage after delivery to job. Cover with heavy cloth or other suitable material as required to protect from damage.
- C. Equipment which has been marred, bent, etc., by construction activities will be rejected. Replace with new equipment as specified.

3.10 RECORD DRAWINGS

- A. Obtain, at Contractor's expense, a set of white prints and keep these on jobsite during construction. During course of construction, mark on these prints any changes which are made, noting particularly locations of those items which will need to be located for servicing.
- B. At completion of job, obtain (at Contractor's expense) a set of "washoff" erasable mylar sepias and incorporate all changes noted on the work prints. This must be done by a skilled draftsman. Mark each sheet "Record Drawings", with date, and deliver to Architect.

- 3.11 FINAL TESTS
- A. Upon completion of the work, test the individual systems, including all feeders, branches, outlets, lighting, motors, apparatus, and appliances.
 - B. Provide all instruments, labor and materials required by Architect for any essential intermediate and final tests.
 - C. Tests shall indicate full compliance with specifications, drawings and applicable codes.
- 3.12 INSPECTION
- A. Entire installation subject to Engineer's inspection, final approval and acceptance.
 - B. Any corrections to the installed work shall be at the Contractor's expense.
- 3.13 REQUESTS FOR INFORMATION (RFIs):
- A. RFIs to be emailed directly to the Engineer.
 - B. One email per RFI
 - C. One RFI per shop email.
 - D. Use the project name in the subject line.
- 3.14 MEP SITE OBSERVATION REPORTS
- A. The Engineer will distribute periodic Site Observation reports. The report will list deficiencies in the construction.
 - B. The General Contractor will have 5 business days to respond to the report and a total of 10 days to make corrections.
- 3.15 GUARANTEE
- A. The Contractor shall and does hereby guarantee for a period of one year from date of final acceptance by the Architect all work as called for in the various Divisions of these specifications. When such work is performed by Subcontractors, and where special guarantees are required by Subcontractors, the Contractor shall secure warranties from said Subcontractors and deliver copies of same to the Owner upon completion of the work.
 - B. The Contractor shall replace with new materials and/or equipment any material failing to give satisfactory service during the guarantee period and shall replace any refrigerant or oil lost during the guarantee period. Replacement of materials, equipment, oil or refrigerant, including all labor involved, shall be at no cost to the Owner.
 - C. Nothing in the above intends or implies that this guarantee shall apply to work which has been abused or neglected by the Owner.

END OF SECTION

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

- A. Furnish all required labor, materials and equipment for complete wiring systems for lighting, power, burglar alarm system, fire alarm system and P/A system, including all light fixtures and lamps, and with all motors and electrically operated equipment (including owner furnished equipment) connected and tested.
- B. Provide line voltage power wiring and connection to neon transformers and signage provided by and installed by others.
- C. Provide all starters and disconnects for electrically operated equipment.

1.02 RELATED WORK DESCRIBED ELSEWHERE:

- A. Quality assurance - See Architectural Notes.
- B. Projection and sound equipment furnished and connected by Owner under separate contract - See Architectural Notes.
- C. Temporary service - See Architectural Notes.
- D. Fire protection sprinkler system - Section 15300.
- E. Temperature controls wiring components - Section 16900 (furnished and installed as indicated on the drawings).

1.03 STORAGE OF MATERIALS

- A. Store all materials in building areas designated by General Contractor.

PART 2 - MATERIALS AND INSTALLATION

2.01 SYSTEM DISTRIBUTION AND METERING

- A. Service current characteristics are 277/480 volts, 3-phase, 4-wire for power loads.
- B. Power Company metering and transformer shall be as indicated on drawings, installed in accordance with the exact requirements with local power company.
- C. The contractor shall contact the power company, make application for service on the Owner's behalf, and install the metering in accordance with the exact requirements of the power company.

2.02 WIRING METHODS

- A. Feeders and power wiring: Conductors in rigid galvanized steel conduit where exposed and subject to damage. EMT may be used where concealed in attic space or not subject to damage.
- B. Branch conduits: Conductors in EMT, except where embedded in concrete, in contact with the earth or when in earth, in which case the conductors shall be installed in rigid galvanized conduit or PVC (with separate ground). MC cable is acceptable for power branch circuits wire size #8 and smaller conductors. MC cable in the auditoriums shall be well secured. MC cable shall not be used above hard ceilings. MC cable shall not be used where exposed. In projection booths with no ceiling, there shall be no MC cable below 9 ft.
- C. Telephone system: Plenum Cable. Drops in wall, extended runs, and above hard ceilings in conduit.
- D. Temperature controls wiring (ATCS): Plenum Cable (except in conduit from the sensors to the projection booth and as noted or detailed on the drawings)
- E. Fire Alarm: EMT or Plenum Cable as allowed by the Governing Authorities.
- F. Projection and Sound: As indicated on the drawings

G. "Smurf" or similar is not acceptable.

2.03 DIMMERS

A. Dimmers located in the projection booth serving the auditoriums will be furnished by the Owner, installed by the contractor. For installation and wiring, see drawings.

B. All other dimmers, including wall box dimmers located in the auditoriums, will be furnished and installed by the contractor.

2.04 DRY TYPE TRANSFORMERS

A. Dry type transformers shall be of rating shown on plan and for 480 volts Delta Primary connection and 120/208 volt, 3-phase, 4-wire, Wye secondary.

B. Provide four 2-1/2 % full capacity taps in primary winding, two above and two below normal voltage.

C. The insulation system shall be for 220 degrees C. and the transformer designed for 150 degrees C. above a 40 degree C. ambient temperature.

D. Transformer shall have steel enclosure with knockouts for conduit connections.

E. The transformer will be for floor or wall mounting.

F. The transformer manufacturer will be the same as the approved panelboard manufacture.

G. Provide 1/2" Neoprene pads below transformers.

H. Exterior transformers shall have NEMA 3 enclosures.

I. Maximum impedance shall be as scheduled on the drawings or 5.5% maximum.

J. Transformers shall be "Energy Star" compliant (TP1) and shall meet the energy code requirements for impedance.

2.05 SERVICE SWITCHBOARD

A. Provide a service panelboard as scheduled on drawings.

B. Service panelboard shall have grounded bus, neutral bus, removable tie between grounded bus, neutral, and removable link in neutral.

C. Service panelboard shall have service entrance rating.

D. Provide fused switches or breakers as scheduled.

E. Label all circuits.

F. Circuit Breakers

1. Group mounted molded case circuit breakers are to be totally front accessible.

2. The circuit breakers are to be mounted in the switchboard to permit installation, maintenance and testing without reaching over any line side bussing.

3. The circuit breakers are to be removable by the disconnection of only the load side cable terminations and all line and load side connections are to be individual to each circuit breaker.

4. No common mounting brackets or electrical bus connectors will be acceptable.

5. Breakers shall be the over-the counter toggle operating type with the handle going to a position between "On" and "Off" to indicate automatic tripping.

6. Breakers shall be bolt-on.

7. Each circuit breaker is to be furnished with an externally operable mechanical means to trip the circuit breaker, enabling maintenance personnel to verify the ability of the circuit breaker trip mechanism to operate, as well as exercise the circuit breaker operating mechanisms.

8. Panels requiring modular circuit breakers shall not be used.

9. Any service disconnect switches or breakers 1000 amps and greater shall have GFI protection.

6. The AIC rating of the breakers shall meet or exceed that of the respective panel.

- G. Cabinet shall be of code gauge steel treated with a phosphatized rust inhibitor and finished with grey baked enamel.
 - 1. Front of panel shall have engraved laminate plastic plate with panel name and rating.
- I. Service panelboard shall be UL approved.
- J. Furnish and install the service entrance switchboard as herein specified and shown on the associated electrical drawings.
 - 1. The switchboard shall meet the latest requirements of Underwriters Laboratories standard #891, NEMA PB2.
 - 2. The switchboard shall be furnished with an Underwriters Laboratories label.
 - 3. The switchboard shall be deadfront with front accessibility required.
 - 4. The switchboard frame shall be of formed code gauge steel rigidly welded and bolted together to support all cover plates, bussing and component devices during shipment and installation.
 - 5. Steel base channels shall be bolted to the frame to rigidly support the entire shipping section for moving on rollers and floor mounting.
 - 6. Each switchboard section shall have an open bottom and an individually removable top plate for installation and termination of conduit.
 - 7. The switchboard enclosure shall be painted on all exterior and interior surfaces.
 - 8. The paint finish shall be a medium light gray standard finish applied by the electro-deposition process over an iron phosphate pre-treatment.
 - 9. All front covers shall be hinged and removable and all doors shall be hinged with removable hinge pins.
 - 10. Top and bottom conduit areas shall be clearly indicated on shop drawings.
 - 11. A NEMA 3R enclosure for the switchboard shall be provided as indicated on the drawings.
- K. Bussing:
 - 1. The switchboard bussing shall be of sufficient cross-sectional area to meet UL Standard 891 temperature rise. The buss shall be non-tapered.
 - 2. Through bus shall be aluminum. The through bus shall have an ampacity as shown on the drawings.
 - 3. The through bus supports, connections and joints are to be bolted with hex-head bolts and Belleville washers to minimize maintenance requirements (and shall have provisions for the addition of future sections).
- L. Each switchboard, as a complete unit, shall be given a single short circuit current rating by the manufacturer. Such ratings shall be established by the actual tests by the manufacturer, in accordance with UL specifications, on equipment constructed similarly to the subject switchboard. The panel and breakers shall be fully rated, series rated is not allowed.
- M. The service disconnect devices shall be molded case circuit breakers or fused switch totally front accessible and front connectable. Disconnect devices to be provided with ground fault protection as required by the NEC and UL Listing. Circuit breakers shall have a short circuit rating equal or greater than that of the switchboard.
- N. TVSS shall be factory installed.

2.06 DISTRIBUTION AND LIGHTING PANELS

- A. Provide where indicated on drawings. Such panels shall be of dead front, bolt-in circuit breaker type with lugs in mains, unless otherwise shown on drawings. Panels requiring modular or plug-in circuit breakers shall not be used. Panels shall be fully rated with a customer specific breaker layout.
- B. Panels shall be three-phase, four-wire, solid neutral, voltage specified, with main lugs sized for each respective feeder and main bus equal to or greater in capacity than the rating of the respective over current protective device serving the panel. The panel board shall be the same manufacturer as the switchboard.
- C. Cabinets
 - 1. Cabinets to be for flush or surface mounting as shown.
 - 2. Cabinets constructed of code gauge galvanized steel in accordance with NEMA and Underwriters' Standards.
 - 3. Provide trim with hinged doors and combined lock and catch with two keys. All panels keyed alike.
 - 4. All cabinets and trim finished pearl gray or prime coat for field painting as directed. Cabinets shall be a maximum of 20" wide.
 - 5. Provide a typewritten panel directory to indicate circuits controlled, under plastic, with all spares marked "SPARE" in pencil.
 - 6. Front of panel shall have engraved laminate plastic plate with panel name and rating.
 - 7. Each panel shall bear Underwriters' Label of approval.
- D. Bus to be aluminum or copper. The neutral bus shall be set screw type with screw base clamping conductor inside opening of

neutral bar.

- E. Circuit Breakers
 1. Circuit breakers to be bolt-on, thermal magnetic type with 20 ampere minimum frame size. Trip setting to be as shown.
 2. All multi-pole breakers shall be of the internal common trip type.
 3. Circuit breakers shall meet or exceed the AIC rating of the panel and shall be clearly labeled.
 4. All panelboard breakers shall be listed and marked ASWD for switch duty.
 5. All panelboard breakers serving mechanical equipment shall be marked AHACR for heating, air conditioning and refrigeration loads.
 7. Breaker layout shall be as shown on the panel schedules (as close as possible). The breaker layout is "customer specific" or "User Placement"
 8. The AIC rating of the breakers shall meet or exceed that of the respective panel.
- F. Branch conduits shall be consecutively numbered and sequence phased in accordance with NEMA standards.
- G. Each panelboard, as a complete unit, shall be given a single short circuit current rating by the manufacturer. Such ratings shall be established by the actual tests by the manufacturer, in accordance with UL specifications, on equipment constructed similarly to the subject panelboard. The panels and breakers shall be fully rated.
- H. The electrical rooms in the project are laid out using Square D equipment. If the contractor purchases equipment of another manufacturer, then he is responsible for verifying (and relocating the equipment as required) that all of the equipment of the alternate manufacturer will fit in the space provided.
- I. Two Section panelboards shall have feed through lugs of the same rating as the panel board.
- J. Panels shall be General Electric, Square D, Seimens or Westinghouse.
- N. TVSS shall be factory installed.
- K. At the completion of the project, the contractor shall insert a typed, as-built panel schedule.

2.07 PHASE IDENTIFICATION AND BALANCE

- A. All branch circuit wiring color coded. Neutrals of 277v systems shall be gray. Neutrals of 120V systems shall be white.
- B. Feeder and power cables color coded or provided with approved phase taping or labels at all terminals.
- C. Phase connections at all panels identical for all areas.
- D. At the completion of the project, light and power wiring shall connected for best possible phase balance and to approach a power factor of one.
- E. Home runs to panels shall contain only conductors of different phases therein.

2.08 CONDUIT WORK

- A. Install all conductors in rigid steel conduit, electrical metallic tubing conduit as specified under wiring methods.
- B. All conduit and electrical metallic tubing shall be of standard dimensions, smooth inside and out, and shall be galvanized or sheradized.
- C. Connectors and couplings
 1. For electrical metallic tubing exposed to weather, connectors shall be watertight couplings with hexagonal heads or tap-on, multiple point, stainless steel locking ring type, with insulated throat.
 2. All conduit shall have threaded couplings with lock nuts and bushings.
 3. Conduits shall enter and be secured to all boxes, etc. in such a manner that each system will be electrically continuous from service to all outlets.
 4. All conduit runs from cabinets and junction boxes shall terminate in specified outlet boxes or conduit fittings.
 5. Outlet boxes and conduit fittings for exposed work shall be cast iron or galvanized, Crouse-Hinds condulets, or Appleton, and of the size and type to fit the location.
 6. Conduit connection to any box which has no threaded hub for its reception shall have double lock nuts.

7. Connections to panel cabinets and pull boxes shall have grounding wedge lugs between the bushing and the box, or shall have lock nuts designed to bite into the metal.
 8. Provide an insulated bushing at each end of each conduit run.
 9. Use insulated bushings with separate lock nuts on all conduits entering panel cabinets.
 10. All conduit entering outlet boxes shall be provided with either an insulated throat connector or separate lock nut and insulated bushing. Bushing must be installed before any wire is pulled.
- D. Where the word "conduit" is used here in after, it shall mean either thick wall conduit, electrical metallic tubing or PVC.
- E. Flexible conduit shall be single strip.
- F. Conduits shall be continuous from outlet to outlet, from outlet to cabinet, junction box and pull box.
- G. Approved conduits are as follows:
1. Flexible Conduit:
 - a. Pittsburgh Wheatland Amerflex Anaconda Seallite Republic Youngstown Electroflex Steelduct
 2. Electric Metallic Tubing:
 - a. Allied Republic Carlon Clifton Steelduct PGH Pittsburgh Wheatland Barrett Youngstown
- H. All conduit lines left empty for future use and for telephone wire shall be left with a No. 16 gauge wire pulled in them and the ends securely corked or capped.
- I. Installation:
1. No conduit shall be trapped except where so shown on the drawings.
 2. Generally, all conduit shall be concealed unless otherwise directed or indicated on the drawings.
 3. No bends permitted with a radius less than six (6) times the diameter of the conduit nor more than 90 .
 4. Conduits shall not be installed within six (6) inches of any surface which may be hotter than 140 F.
 5. Provide junction boxes or pull boxes to avoid excessive runs or too many bends between outlets.
 6. The conduit sizes shown on the plans may be increased if desired to facilitate the pulling of cables.
 7. Where rigid conduit is laid below ground or below floor slabs on grade, they shall be thoroughly coated with one (1) coat of Rustoleum No. 769 and a second coat of asphaltum. Touch up all wrench marks.
 8. Run exposed conduit parallel with or at right angles to the building Walls and support from walls or ceilings at 5'-0" intervals with galvanized iron clamps or hangers. Devices attached to concrete shall be secured with inserts and bolts or lead expansion sleeves.
 9. Home runs shown on plans shall not be combined.
 10. Conduit couplings of the Erickson type shall be used at locations requiring joints in two conduit runs with separate origins.
 11. Concealed conduit run above the ceiling shall be supported independent of ceiling construction.
 12. Where ceilings of the lay-in type are used, conduits must be installed high enough to permit removal of ceiling panels.
 13. In general, the conduit installation shall follow the layout shown on the plans. However, this layout is diagrammatic only; and where changes are necessary due to structural conditions, other apparatus, or other causes, such changes shall be made without any additional cost to the Owner.
 14. Under no circumstances shall conduit penetrate the demising walls between auditoriums.
 15. No PVC conduit shall be installed above grade or slab. When the occupied space is above another occupied space, No PVC conduit shall be installed below slab.
- J. EMT conduit with steel set screw insulated throat-type fittings or die-cast set screw type fittings will be acceptable on interior of building, above grade, where permitted by the National Electrical Code. Below slabs on grade and on exterior of building, EMT (steel) set-screw insulated throat-type fittings or die-cast set-screw fitting will be acceptable where permitted by the National Electrical Code.
- K. All conduit runs which extend from the interior to the exterior of the building shall be sealed to prevent the circulation of air.
- L. Expansion fittings shall be installed on all conduit which passes through expansion joints in the building. Install expansion fittings in the conduits across structural joints (including building expansion joints) and in long, straight runs of non-metallic conduit (in accordance with National Electric Code). The expansion fitting(s) shall be designed to compensate for expansion and contraction and shall be sealed to prevent the entrance of water or moisture. Expansion fittings shall be UL listed and approved for grounding duty.
- M. Flexible conduit shall be used in making up short flexible connection to rotating or vibrating machinery or equipment. It shall be as

short as possible but shall have a minimum length of 12".

- N. Flexible steel conduit shall be used in making short flexible connection from outlet boxes to recessed lighting fixtures. The conduit at these locations shall be as short as possible, but shall have a minimum length of 48".
- O. A bonding jumper shall be installed inside of all flexible conduits.
- P. Emergency circuits shall be run in a separate raceway.

2.09 CONDUCTORS

- A. Install complete system of wiring with all feeders and branches as shown on drawings.
- B. No wires or cables shall be pulled into the conduit until the conduit system is complete. Only listed lubricants may be used in pulling the wire.
- C. Conductors shall be continuous from outlet to outlet and from outlet to junction box or pull box.
- D. All splices and joints shall be made to be mechanically and electrically solid with pressure type connectors, T & B "Wire Joints", 3M "Scotch-lok", or Ideal "Wing Nut".
- E. Tape shall be "Scotch" No. 33 for indoor and No. 88 for outdoor.
- F. Where connection is made to any terminal of more than 30 amperes capacity and where connectors larger than No. 10 are connected to any terminal, suitable copper terminal lugs shall be bolted to the conductors..
- G. Where multiple connections are made to the same terminal, individual lugs for each conductor shall be used.
- H. Each conduit shall have a minimum of two (2) wires pulled in unless that particular conduit is noted or specified as being empty.
- I. Conductors for lighting and receptacle circuits shall have color coded jacket. All wires shall be color coded (all wire color coded, with same color connected to same ungrounded phase throughout the installation) with type, size, make and voltage marked on it.
- J. Branch circuit wiring which supplies more than one fluorescent fixture through the wireway of other fixtures shall be rated at 105 C.
- K. Conductors are to be stranded copper.. Conductors No. 6 and smaller shall be type "THHN" or "THWN", No. 4 and larger shall be type "THHN" or "THWN". Conductor sizes No. 4 and smaller shall be 98% conductivity copper. All conductor sizes shown on plans are copper. Approved conductor manufacturers are as follows: General Cable, Essex, Rome, Triangle or Southwire.
- L. All low voltage wiring installed as described herein for connection by other trades or by separate contractors shall have 15' of excess wire left at end unless otherwise noted on drawings. All low voltage wiring in projection booth wireway shall have 600V insulation. All low voltage wiring not in conduit shall be plenum rated.
- M. All conductors are shown on the drawings and sized based on copper. At the contractor's option, aluminum (ampacity equal to or greater than the specified copper, 75 degrees C) may be used for main feeders (only): from the transformer to MSB, from MSB to the 'DH_' panels. All connections for aluminum feeders shall be made with hydraulically pressed crimp lugs or sleeves. The contractor shall submit shop drawings showing the proposed feeder changes using aluminum showing the over-current protection, the specified copper conduit and conduit, the requested aluminum conductors and conduit, and the crimp connectors.
- N. Shared neutrals shall not be used.

2.10 OUTLET BOXES

- A. At all outlets for lighting fixtures, wall switches, wall receptacles, telephone, etc., galvanized steel boxes as hereinafter specified shall be used.
- B. Outlet boxes for fixtures and devices shall be securely attached to the building construction, using wood screws for wood construction, bolts for steel construction, and expansion bolts for masonry or concrete construction.
- C. Boxes in tile or masonry constructions shall be secured in place with cement mortar.

- D. Ceiling outlets flush in furred acoustical tile ceiling construction for surface or pendant mounted lighting fixtures shall be 4" square or octagonal pressed steel boxes supported from the building structure independent of the ceiling construction.
- E. All outlet boxes (EXCEPT IN THE DEMISING (separating walls between two auditoriums) AND THE FRONT WALLS IN AUDITORIUMS AND ON THE AUDITORIUM WALL IN THE PROJECTION BOOTH) shall be flush mounted within the wall regardless of wall construction, unless they are specifically shown as being used with exposed conduit. Boxes and conduit on the demising and front walls of auditoriums shall be surface mounted.
- F. Where outlet boxes are used to support lighting fixtures, the outlet box shall be firmly anchored to the structural members of the building.
- G. Outlet boxes and covers shall be of such form and dimensions as to be adapted to their specific usage, location, and size and number of conduits connecting thereto.
- H. Where devices are indicated at same location, mount in combined sectional gang boxes.
- I. Covers shall be installed on all junction boxes, capped outlets and all outlets not indicated as containing wiring devices or lighting fixtures. Covers for outlets in walls shall match cover specified for wall switches and receptacles.
- J. Outlet boxes in conduit work exposed to the weather and for vapor tight lighting fixtures and devices shall be of cast corrosion resistant type.
- K. Stamped steel outlet boxes shall be manufactured by Appleton Electric Company, Raco Manufacturing Company, or Steel City Electric Company.
- L. All outlet boxes surface mounted on the side or rear walls of the auditoriums shall be 1-1/2" depth (shallow), except for the j-boxes serving the fire alarm speaker/strobes which shall be standard depth, 2-1/8" deep.

2.11 LOCATIONS OF OUTLETS AND FIXTURES

- A. Approximate locations of outlets are shown on drawings. Exact locations shall be determined at building. Electrical drawings show relative outlet locations only. Determine exact locations by Architectural drawings, dimensions and building conditions. All outlets shall be accurately set according to Architect's direction.
- B. Center outlets occurring in Architectural features accurately in same. Space wall switch outlets equal distance from all door trim. The right is reserved to change the exact location of any outlet, light fixture or J-box up to 20 feet in any room before it is permanently installed without additional cost.
- C. Concealed J-Boxes shall have access doors installed.

2.12 WALL SWITCH

- A. Provide wall switches where shown on drawings. Install 42" above finished floor to center line or as required to meet ADA unless otherwise noted.
- B. Switches shall be Hubbell #1121 or equal switches manufactured by Arrow-Hart, Pass and Seymour, or Eagle.
- C. See 2.14 for colors.
- D. Where more than one switch is shown, mount in gang under gang type plates, except that emergency switches shall not be ganged with normal duty switches.
- E. Screw firmly to box. Do not depend on plates to pull the boxes tight.
- F. Occupancy switches are to be Legrand watt-stopper, model #DW-100 dual technology, color to match the other devices in the room. Occupancy switches are to be installed in all storage rooms, janitor's closets, and offices.

2.13 WALL RECEPTACLES

- A. Provide receptacles where shown on drawings. Install 18" A.F.F. to center line unless otherwise noted.

- B. Receptacles shall be Hubbell #5362 or equal receptacles as manufactured by Arrow-Hart, General Electric, or Leviton.
- C. See 2.14 for colors.
- D. Receptacles in each auditorium shall be black (with black cover plates), 20 amp, Hubbell #5362BLB or equal.
- E. IG receptacles to be the same color as the remaining receptacles in the area, but with an orange dot or triangle.

2.14 DEVICE PLATES and COLORS:

- A. Install device plates on wall switches and receptacles.
- B. Device plates shall be of standard size and match the color and finish of the switches and receptacles.
- C. For areas designated by Architect as unfinished locations or surface mount, install galvanized steel plates of design to fit outlets.
- D. Where more than one device is mounted at same location, install gang type plates.
- E. Device covers in the concession or food areas shall be stainless steel.
- F. In public spaces and auditoriums: black devices and black cover plates.
- G. In concession and scullery: gray device and stainless steel cover plates.
- H. In offices and projection booth, ivory or white device and matching cover plate.
- I. IG receptacles to be the same color as the remaining devices in the space, but with an orange dot or triangle designating IG.

2.15 MOTOR AND APPARATUS WIRING

- A. Other trades will furnish and install all motors indicated on drawings. The electrical Sub-contractor shall provide all line voltage wiring to the motors as well as starters and overload protection/safety switches.
- B. All motor sizes and locations indicated are approximate; make connections to equipment as actually installed. Before installing wire and conduit, check the nameplate data against information shown on drawings and call attention of Architect or Engineer to any discrepancies discovered.
- C. Furnish and install all power wiring for heating and air conditioning equipment, according to wiring diagrams furnished by heating and air conditioning contractors.
- D. Motor power wiring, for the purpose of this specification, is defined as those conductors necessary between the energy source and the motor to conduct the electrical energy. All other wiring, such as for remote push button station, firestats or aquastats, for use with magnetic starters, all thermostats (low or line voltage), all wiring to or from all heating and air conditioning control panels, except the primary power source, pneumatic-electric switches or relays, interlock wiring, etc., is defined as control wiring, and is included in this section of the specifications.
- E. Make flexible conduit connection to each motor.
- F. Furnish and install disconnect switches and starters where required.
- G. Wire and connect all electrically operated equipment requiring line voltage connections.
- H. Thermal overload protection provided for single phase motors by manual switches with overload units rated as required by specific motor to be served. Manufactured by Cutler-Hammer, General Electric, or Square with NEMA Type 1 enclosure.
- I. Furnish and install local disconnect switches for all signs and equipment, as required by the local authorities or as shown on the drawings.

- 2.16 FUSES
- A. Fuses for motor and transformer circuits shall be Bussmann "Fusetron".
 - B. Fuses for circuits other than motors shall be Bussman class JKS, or as noted on the drawings.
 - C. Equal fuses by General Electric, Littlefuse or Chase Shamut will be acceptable.
 - D. Provide fuses per manufacturer's recommendations in all fusible disconnects serving mechanical equipment.
 - E. Provide 3 spare fuses for each size and type of fuse and a fuse cabinet to be mounted in the main electrical room.
- 2.17 SAFETY SWITCHES (Disconnect Switches)
- A. Provide heavy duty safety switches where indicated on drawings. Switches shall be G. E., Square D, Westinghouse or approved equal, and shall have factory applied gray finish.
 - B. Provide engraved laminate plastic nameplate giving manufacturer's name, type of switch and electrical ratings.
 - C. Where switch is installed remote from equipment wired to, provide etched laminate plastic label on switch cover.
 - D. Provide NEMA-3R enclosures for switches mounted exterior of building exposed to weather.
 - E. Safety switches for air conditioning equipment shall be fused.
- 2.18 LIGHTING FIXTURES
- A. The light fixtures and lamps shall be furnished and installed according to fixture schedule as indicated on the drawings.
 - B. All fixtures shall be properly polarized. Connect shell of lamp holder to neutral conductor.
 - C. Grounding of light fixtures shall comply fully with National Electrical Code Sections 410-91 through 410-96.
 - D. All fluorescent fixtures to have Osram System 32 (or equal), electronic ballasts and GMF/HLR fusing. Ballasts shall be high power factor. Lamps shall be matched with the ballast and shall be high efficiency, T-8.
 - E. Recessed fixtures shall be coordinated to match the construction into which they are installed, i.e., lay-in, gyp board, rated ceilings, insulation, etc.
 - F. Each recessed lighting fixture shall have a trim to match the type of ceiling (plaster, grid, exposed panel, etc.) in which it is being installed, regardless of catalog number.
 - G. The contractor shall be responsible for confirming all ceiling types before ordering lighting fixtures shipped to the job.
 - H. Each lighting fixture recessed in a plastered ceiling of any type shall have a plaster frame.
 - I. Each lighting outlet on the drawings is lettered. The letter indicates the type of fixture on the fixture schedule.
 - J. The contractor shall provide a lighting fixture at each outlet shown on the drawings. The fixture installed shall be the type indicated or specified. Ballast voltage shall match outlet voltage.
 - K. All lighting fixtures shall be supported from the building structure. Attach downlight support channels and layin fixtures to suspension Tees with clips (4 per fixture). The contractor shall coordinate this requirement with the ceiling trades. The number, type, and gauge of support wires shall be as required by the governing authorities.
 - L. Light fixture submittal shall clearly indicate the lamp type and ballast (if applicable.)
 - M. Light fixtures in one hour ceilings shall have gyp board enclosures to satisfy U.L.
 - O. The locations (and quantities) of the light fixtures in the auditoriums shown on the electrical drawings are to be used (as opposed to the architectural reflected ceiling plan).

- P. For each recessed light fixture down the promenade (corridor leading to the auditorium) located 1 ft to 3 ft from the wall, the contractor will leave a service loop of coiled MC cable which will allow the light fixture to be relocated up to four feet in any direction. The contractor is to include the labor and materials to relocate 15% of the aforementioned recessed light fixtures at the Owner's direction to highlight the wall mounted art work.
- O. The lamp supplier will provide 10% spare lamps of each lamp type shortly after the theatre opens.
- P. All lamps are to be either Philips, Osram, or GE. Submit shop drawings for approval.
- Q. All fixtures adjacent to insulation or within a gyp board tent shall be I.C. rated.
- R. The lamp supplier will provide the lamps with the light fixtures. The contractor shall furnish and install all lamps which burn out or fail during the period of construction (until the theatre officially opens for business).
- S. The contractor shall furnish the labor warrantee for all Owner supplied light fixtures during construction and for a period of one year after the theatre opens. This labor warrantee shall apply to the fixture, the fixture installation, and the ballast. The labor and parts warrantee for lamps shall apply only during construction and shall not extend past the opening of the theatre. Any compensation from the fixture manufacturer to the contractor for the replacement of defective fixtures shall be between the contractor and the manufacturer.
- T. The contractor shall receive (and sign), store, inventory the Owner furnished light fixtures and lamps.

2.19 AISLE LIGHT FIXTURES (TYPE 'T' or 'TS', 'TC', or 'TW')

- A. The aisle lighting system shall be furnished and installed as indicated on the Matrix of Responsibility.
- B. The replaceable light type system shall include all necessary extrusions, transformers, wires, fasteners, etc. to form a complete and operating system.
- C. The components of the system shall be as follows:
 - 1) The extrusion shall be rigid vinyl, architectural bronze color, in 10' increments. The profile shall have double wall thickness with weep channels for drainage. The configuration shall be "carpet to edge". The extrusion shall satisfy all ADA requirements.
 - 2) The lens cover shall be polycarbonate with the color (clear, bronze or amber) as specified by the architect.
 - 3) The conductor shall be 2 conductor, 22 gauge stranded wire.
 - 4) The lamps are to be LED, 1.4 watt, 12 volt, at 12" on center.
 - 5) The socket is to have a PF 1 fire rating, polycarbonate, self extinguishing.
 - 6) The transformer shall be a 250 VA Class II transformer (energy limiting with inherent output protection), dual tap, mounted in a 12"x12"x6" enclosure with a 2 amp dimmer installed. The aisle lights shall be powered from the 12volt taps.
- D. The number of transformers and the number of feeds shall be determined by the contractor based on the actual installed length of the track. Each transformer and feed to the track shall serve 80 feet of track.

2.20 LAMPS

- A. The lamp (as indicated on the drawings) supplier shall furnish the initial supply of lamps with the light fixtures. The contractor shall furnish and install all replacement lamps which burn out during the course of construction (until the completion of the punch list).
- B. Lamps shall be as specified in fixture schedule on plans.
- C. Fluorescent lamps shall be T8 as scheduled.
- D. Fluorescent lamps shall be pre-heat, rapid start, cool white unless otherwise noted, with a rated life of 18,000 hours at three hours per start.
- E. Incandescent lamps shall be inside frosted (except as otherwise noted), extended service with a rated life of 2,500 hours.
- F. Reflector lamps (R and PAR) shall have the beam type as called for in the lighting fixture schedule, and shall have a rated life of 2,000 hours.

- G. All lamps are to be either Philips, Osram, or GE. Submit shop drawings for approval.
 - J. The lamp supplier shall furnish 10% spare lamps (10% of each lamp type) to the theatre manager after the completion of the punch list.
- 2.21 GROUND CONNECTIONS
- A. Complete all equipment grounding of all appliances and electrically operated equipment in all areas to meet National Electrical Code and local code requirements.
- 2.22 SYRUP CHASES
- A. All in-ground syrup chases shall be schedule 40 PVC with radius sweeps. For 6" chase sizes, the sweeps shall have an 18" radius.
 - B. All syrup chases located on a floor not on grade shall be 16 gauge galvanized metal with long radius sweeps.
 - 1. The joints on the metal syrup chases shall be sealed with Uni-Weather Mastic sealant.
 - 1. The radius of the 90 degree sweeps shall be 30 inches.
 - 2. The chases shall be as manufactured by AERO Conveying system or equal.
 - 3. The metal syrup chases shall be suspended at no less than 4 feet on center with a loop hanger or Unistrut.
 - 4. The ends of the chase shall be finished with a bell mouth fitting.
- 2.23 EQUIPMENT AND CONTROL WIRING:
- A. Furnish and install all power and control wiring to the exhaust fan(s) serving the popcorn poppers at the concession stand(s) and the toilets.
 - B. Air Conditioning unit control components shall be furnished and installed as shown on the drawings.
 - C. The electrical contractor shall warranty the installation and wiring of the controls for a period of one year. The electrical contractor shall furnish a one year labor warranty for the controls.
 - D. Furnish and install all power and control wiring to all equipment.
 - F. All line and low voltage control items shall be furnished (other than the temperature controls hardware) , installed (all), and connected (all) as part of the work of this section.
- 2.24 MOTORS AND STARTERS
- A. National Electrical Manufacturer's Association Specifications.
 - B. Prime coat and finish coat of gray or black paint at factory.
 - C. If not built into equipment at factory, furnish starters and overload protection devices for all motors. Overload protection devices shall protect all phases of each motor.
 - D. Starters for 3-phase motors 1/2 hp and larger, magnetic type and full overload and under-voltage protection and integral mounted push buttons, or remote control interlocks as required, shall be furnished for all automatically operated fans, blowers, pumps, etc.
 - E. Coordinate with the mechanical drawings for contractor requirements in the applicable starters.
 - F. Starters surface or flush mounted as indicated.
 - G. Starters located exterior to the building shall have NEMA 3R enclosures.
- 2.25 GROUND FAULT SYSTEM REPORT
- A. As required by the national electric code, Article 230-95c, provide a performance test of the ground fault protective equipment.
 - B. The report should indicate the equipment tested, visual and mechanical inspection, and the results of the electrical tests.
 - C. The electrical tests should include the following:
 - 1. System neutral insulation resistance.
 - 2. Pickup current by primary injector at the sensor.

3. Time delay at two points above the pickup current level by injecting current into the sensor.
 4. System operation at 55% of rated voltage to verify system trip at this voltage.
 5. Visually inspect the switchboard neutral bus downstream of neutral disconnect link to verify absence of ground connections.
 6. Measure the system neutral insulation resistance downstream of neutral disconnect link to verify absence of grounds.
- D. Test Result Evaluation:
1. The system neutral insulation resistance should be above 100 ohms, and preferably 1 megohm or better.
 2. The maximum pickup setting of the ground fault protection shall be 1200 amperes, and the maximum time delay shall be one (1) second for ground fault currents equal to or greater than 3000 amperes (NEC 230-95).
 3. The relay pickup current should be within ten percent (10%) of the manufacturer's published time current characteristic curves.
 4. The relay timing should be in accordance with the manufacturer's published time current characteristic curves.
- E. The report shall include initial and final values. The electrical contractor shall make adjustments and repairs to the equipment and the installation in order to meet or exceed the minimum specified test results.
- F. The report shall be signed and sealed by a registered professional engineer of the state in which the project is constructed.
- 2.26 SIGNAGE & EQUIPMENT
- A. Provide disconnecting means in accordance with NEC 600.6.
 - B. All circuits for LED, signage, and neon shall be separate neutrals.
- 2.27 GUARANTY-WARRANTY
- A. The sub-contractor shall furnish a written warranty, countersigned and guaranteed by the General Contractor, stating that all work executed under this section will be free from defects of workmanship and materials for a period of one (1) year from the date of final acceptance.
 - B. The above parties further agree that they will, at their own expense, repair and replace all such defective work and all other work damaged thereby, which becomes defective during the term of the Guaranty-Warranty.

END OF SECTION

SECTION 16400
AUXILIARY ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. All other sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's specifications and drawings for all requirements.

PART 2 - MATERIALS AND METHODS

2.01 TELEPHONE RACEWAY SYSTEM

- A. Provide all empty conduit, outlet boxes, terminal boards, sleeves, etc., as indicated on drawings. Provide raceway system as described on the drawings.
- B. TERMINAL BOARDS: (2) Fire treated 3/4" plywood, 8' x 4', unless indicated otherwise on the drawings, or as directed otherwise by Telephone Company on jobsite. Provide a six outlet plug strip at the base of the plywood. Provide a #10 copper ground bus, bonded to the cold water line.
- C. Telephone service raceway shall be installed underground from property line to building.
- D. Provide service entrance conduit from the main telephone terminal board (located inside) for entrance of underground service feeder from the site service. Refer to drawings for additional requirements.

2.02 THEATER BURGLAR ALARM SYSTEM (WITH DOOR AJAR)

- A. There shall be a complete Burglar Alarm installation with all accessories required for an operating system. System shall include a burglar alarm control panel, annunciators, door switches, infrared detectors, key off switch, outdoor siren, wiring (both low and high voltage), and auto dial out. Refer to the MEP Matrix of Responsibility on sheet MEPO.1 for who furnishes and installs the burglar alarm system. Panel to be Ademco
- B. Annunciators (door ajar panels or key pads) shall be located where shown on the drawings.
- C. Door switches shall be recessed mount magnetic contacts with screw terminals.
- D. Infrared detectors shall be Visonic SR-2000.
- E. Key off switch shall be furnished with control panel.
- F. Wiring shall be in conduit. Wiring size and type shall be as recommended by manufacturer. Neither wiring nor conduits shall penetrate demising walls separating auditoriums.
- G. All zones shall be disarmed during operating hours of the Theater.
- I. System shall be connected to telephone back board. Contractor shall encode message or coded signal as directed by owner so that the message or signal is transmitted to authority as directed by owner.
- J. There shall be three key pad locations: adjacent to customer service and at the manager's count room and at the receiving area.
- K. Locate an outdoor siren on the roof.
- L. Provide telephone auto dial-out feature. The dial-out communicator shall be by Radionics..
- M. The minimum number of zones shall be as follows:

1. Lower Level – Right End
2. Lower Level – Left End
3. Concession Loading Area
4. Mezzanine – Left End
5. Mezzanine – Right End
6. Lobby
7. Roof Hatch
8. Bowling

- O. The shop drawing submittal shall include, but is not limited to:
1. Equipment cut sheets (cad files)
 2. Floor plans on 'D' size sheets showing locations of all devices and conduit runs (electronic DWG format)
 3. Complete sequence of operation in all of the various modes, customized and specific to this project.
- P. All wiring to be plenum cable. Conduit to be used in walls and in areas without ceilings.

2.03 AUDITORIUM SOUND SYSTEM

- A. Contractor to furnish and install all wiring and conduit, and speaker brackets.
- B. Speakers are supplied and installed as indicated on the Matrix of Responsibility.
- C. All wiring not in conduit shall satisfy the requirements of the NEC for flame spread and smoke generation when used in assembly occupancy, or add conduit/J-boxes as required.
- D. Sound conduits shall be routed to maintain 24" minimum separation from power conduits. If the sound conduit crosses power conduit, then the two shall cross at a ninety degree angle.

2.04 FIRE ALARM SYSTEM:

- A. Design, furnish and install, as indicated on the plans and as required by the governing authorities, new fire alarm devices, main panel (as required), remote annunciator, amplifier, and zone selector switch. This is a performance specification. Layout of devices on the drawings is for minimal conformance. Verify local requirements with local authority having jurisdiction and incorporate into the design and bid. The panel shall be UL Listed. The acceptable manufacturer for a new panel is Fire-Lite. No other manufacturers will be considered.
- B. Fire alarm control panel (FACP) shall be a non-coded, addressable, multiple zone unit with emergency battery back-up power supply.
 1. System shall be zoned as stated below or as indicated on the drawings.
 2. Panel shall be equipped to accomplish the functions described on the drawings and to meet the requirements of the governing authorities.
 3. Panel shall be equipped with telephone dial-out communicator.
 4. Panel shall include an amplifier and tape (or digital) backup system for automatic voice evacuation. The amplifier system shall have a single zone (minimum) or the quantity required by the governing authorities. The pre-recorded message shall meet the requirements of the authorities having jurisdiction.
 5. System shall not have proprietary access or software codes.
 6. The fire alarm vender shall submit all passwords with the project shop drawing submittal and shall turn over all passwords to the owner upon completion of the installation (part of the closeout documents.).
 7. The contractor shall furnish and install a complete 24 VDC, UL Listed, FireLite MS9600 Series analog/addressable, UL Listed, multiprocessor-based fire alarm system as specified herein. The system shall include, but not be limited to; all control equipment, voice evacuation panel (with remote microphone), remote annunciator panel, analog sensors, addressable modules, audible and visual notification appliances as appropriate, conduit, wiring, fittings, and all other accessories necessary to provide a complete and operable system.
 8. Any primary or sub-Panel in theatre space to be sized to accommodate 20% future annunciation and initiation points.
 9. Voice evacuation amplifiers, panel capacity to be sized to accommodate 20% future speaker/strobes.
 10. Power supplies and batteries to be sized to accommodate 20% spare capacity.
 11. The fire alarm panel shall be capable of monitoring via the internet.
- C. Peripheral Devices
 1. Manual pull stations shall be FireLite BG12LX Addressable Pull Station double action and shall be constructed of high impact, red lexan with raised white lettering. The break glass rod station shall have a hinged front with key lock. Stations shall be

keyed alike with the fire alarm control panel. When the station is operated, the handle shall lock in a protruding manner to facilitate quick visual identification of the activated station. All pull stations accessible to the public shall be equipped with a Stopper II protective cover (UL Listed as manufactured by Safety Technology International, Inc. 800-888-4784). When the protective cover is lifted, it sounds a piercing, self-contained 120 DB.

2. Area Smoke Detectors
 - a. Furnish and install where indicated on the plans, FireLite SD355 series area smoke detectors. Detectors shall be listed to U.L. standard 268 and shall be documented compatible with the control equipment to which it is connected. The detectors shall obtain their operating power from the fire alarm panel supervised detection loop. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal to be generated at the control panel.
 - b. Remote LED alarm indicators and test switches shall be furnished and installed by the electrical contractor as required by the governing authorities and NFPA-90A.
 - c. The detector to be addressable.
 - d. furnish black covers for detectors located in black ceilings.
3. Automatic Heat Detectors: Automatic heat detectors shall be combination rate-of-rise and fixed-temperature type. When the fixed-temperature portion is activated, the units shall be non-restorable and give visual evidence of such operation. Heat detectors shall be FIRELITE H355 (Addressable thermal sensor, Fixed Temperature or ATD-R, ATD-RL Addressable thermal sensor - Rate of Rise (or equal)).
4. Visual Flashing lamps (Speaker / Strobes): Visual indicating appliances shall be Gentex SSPK and comprised of a Xenon flashtube and be entirely solid state. Strobes shall be wall mounted at 6" below the ceiling or 80" above the floor, which ever is lower. All strobes shall be synchronized. The strobes shall be intergral or separate from the speaker. The speaker shall have 8 OHM impedance, rated for 7 watts and with tap box for 25 volt or 70 volt system. Candela output shall vary to meet ADA and NFPA. Speaker strobes shall be red in color and shall fit on a standard 2-1/8" deep junction box.
7. Door Holders: Magnetic door holders shall have an approximate holding force of 35 pounds. The door portion shall have a stainless steel pivotal mounted armature with shock absorbing nylon bearing. Unit shall be capable of being either surface, flush, semi-flush or floor mounted as required. Door holders shall be UL Listed for their intended purpose. Coordinate with the architect's door hardware and scope.
8. Duct Smoke Detectors: Furnished and installed as indicated on the drawings contractor in the supply and return ducts of all air moving equipment.
 - a. Duct smoke detectors shall be non-addressable, analog interface with the solid state photoelectric type and shall operate on the light scattering photo diode principle.
 - b. The detectors shall be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point.
 - c. No radioactive materials shall be used.
 - d. The remote indication and test switches shall be furnished and installed by the electrical contractor to satisfy all aspects of NFPA90A, including remote LED alarm indicators and test switches.
 - e. The duct detectors shall be externally powered from the air moving equipment (24V from the fire alarm system). The contractor shall disconnect the power from the rooftop units to the detector and wire to the fire alarm system.
 - f. Analog, non-addressable duct smoke detectors shall be located (factory mounted) within the rooftop units.
 - g. Global shut down of the RTUs upon fire alarm will be hardwired by the electrical contractor.
 - h. The fire alarm vender shall test and certify the smoke detectors.
 - i. Contractor shall remove all smoke detector heads in the RTUs if the RTUs are run during construction.
9. Remote alarm digital annunciator shall indicate up to 16 zones. Each zone shall be clearly labeled. There shall also be a remote alarm LED indicator/key test switch at the annunciator. The annunciator and microphone shall be mounted behind a located cabinet (FCRM) with a glass cover. Equal to FIRELITE ANN-80.
10. Two Line Dialer: The dialer shall automatically transmit to the Owner's Central Monitoring Station any control panel off normal condition, including Alarm, Supervisory or trouble conditions.
11. The fire alarm vender shall furnish and install dry contact shut down relays at each projector and at all A/V and multi-media servers. Programmable relay modules shall be FireLite CRF-300. Monitoring modules shall be MDF-300.

12. Voice evac panel to be FireLite ECC-50/100(e) or similar to be compatible with the FireLite panel. Contractor shall furnish additional amplifier modules, quantity as required to meet AHJ volume requirements..
 13. The fire alarm contractor shall furnish and install relays to close the fire smoke dampers upon alarm.
- D. The main annunciator panel for the project is proposed to be located as shown on the drawings.
- E. In the auditoriums, wiring shall be inside conduit, ½" maximum. Outside the auditoriums, if allowed by local codes, wiring shall be plenum except for drops in the wall which shall be conduit.
- E. CENTRAL STATION CONNECTION: All fire protection systems in the project including all signaling devices will be connected into an approved 24 hour central station service. The dial-out signal shall be compatible with the monitoring service or the service designated by the Owner's representative (verify with Theatre Owner prior to release of dial-out communicator). The dial-out communicator shall be compatible with the Theatre Owner's ADT monitoring equipment. The panel shall also be capable of being monitored via the internet.
- F. Contractor's Shop Drawings:
1. Before proceeding with the work, the Contractor shall make complete drawings of the fire alarm system. The shop drawing submittal shall include, but is not limited to:
 - a) Equipment cut sheets.
 - b) Floor plans on 'D' size sheets showing locations of all devices and conduit runs.
 - c) Complete sequence of operation in all of the various modes, customized and specific to this project.
 - d) Battery calculations.
 - e) Voltage drop calculations
 - f) Fire Department approval.
 - g) Email with all of the fire alarm shop drawings in AutoCad DWG format and all of the equipment cut sheets in PDF format.
 - h) One-line riser diagram.
 - i) Passwords
 2. The fire alarm shop drawings are considered a deferred submittal. Drawings shall be made in such scope and detail as to receive approval of the local Fire Prevention Bureau (Fire Marshal), the engineer, and the Landlord's insurance underwriter as well as to indicate all coordination with other work.
 3. The drawings shall be submitted to the engineer for approval prior to submission to the governing authorities.
 4. The drawings shall be prepared and sealed, at a minimum, by either a registered professional engineer (in the same state where the project is located) or a NICET Level III certified technician (or in excess of these requirements as required by the authorities having jurisdiction)
 5. Incomplete submittals shall be rejected.
- 2.05 This design/build performance specification calls for the contractor to provide a complete operating system that satisfies all Governing Authority's (local Fire Marshall, Elevator Inspector, Electrical Inspector, Building Inspector, etc.) requirements. The requirements stated herein and on the drawings are the minimum requirements. The fire alarm contractor shall ascertain all requirements of the governing authorities and include such requirements in his bid. Under this performance specification, there will be no change orders for additional costs related to fire alarm issues.
- 2.06 At the completion of the project, the contractor shall submit a complete set of "as-built" autocad files in dwg format.

END OF SECTION