Platte County R-3 School District

Platte County High School Wilson Auditorium
House Lighting Replacement

Request for Proposal (RFP)

January 2, 2020

THIS PAGE LEFT BLANK INTENTIONALLY

Table of Contents

Table of Contents	3
Notice to Bidders	4
Instructions to Bidders	5 - 6
Prevailing Wage Determination 008100	2 pages
EXHIBT A – PROPOSAL FORM	3 pages
EXHIBIT B – E-VERIFY FORM	1 page
EXHIBIT C - STATEMENT OF BIDDERS QUALIFICATIONS	2 pages
EXHIBIT D – ELECTRICAL LIGHTING PLANS	4 pages
EXHIBIT E – ELECTRICAL SPECIFICATIONS	114 pages

Notice to Bidders

The Platte County R-3 School District wishes to obtain bids for the removal and replacement of existing house lighting as shown on the attached drawings.

The Platte County R-3 School District will receive sealed proposals from Bidders **until Thursday, February 6, 2020, at 2 p.m.**, at which time, the bids received will be opened. The Platte County R-3 School District reserves the right to reject any or all bids and to waive informalities or irregularities in bids.

Each sealed bid shall contain Bid Proposal, e-Verify and Bidders Qualification; forms for each are attached to this RFP.

Bids shall be in sealed envelopes labeled:

Platte County R-3 School District
Wilson Auditorium House Lighting Replacement
Mr. Jay Harris
Executive Director of Operations
Platte County R-3 School District
998 Platte Falls Road
Platte City, MO 64079

Bids received after the time and date above specified shall be returned, unopened, to the Bidder.

Any questions related to this RFP or bid requirements, please contact:

Mr. Jay Harris
816.858.5420
harrisj@platteco.k12.mo.us

Instructions to Bidders

PROPOSALS: All proposals must be made on the forms provided herein. All proposals must be legibly written. No alterations in proposals or in the printed forms will be acceptable unless each alteration is signed by the Bidder. No alterations or physical changes shall be made by anyone, in any bid, after its submission by the Bidder.

SIGNATURE OF BIDDERS: Each Bidder shall sign a proposal, using the customary name under which the Bidder does business, utilizing the customary signatures of an authorized representative, and providing a full business address, including identity of any registered or local agent.

WITHDRAWAL OF BID: A Bidder may withdraw its proposal at any time prior to the expiration of the time and date during which proposals may be submitted, by written request submitted by the Bidder to the Platte County R-3 School District. A Bidder may correct any mistakes in its bid by submitting a written request to the Platte County R-3 School District, provided the written request is made and the bid is corrected and resubmitted prior to the expiration of the time and date during which proposals may be submitted.

BID PROPOSAL INSTRUCTIONS: A Bidder shall submit a completed Bid Proposal Form. Each project is identified on the Bid Proposal Form.

INSURANCE: Contractor shall provide certificates of insurance and renewals thereof on standard ACORD forms. This inclusion shall not make the Platte County R-3 School District a partner or joint venture with the Contractor in its operations hereunder. The School District shall be notified by receipt of written notice from the insurer at least thirty (30) days prior to material modification or cancellation of any policy listed in the certificate.

Contractor will provide the School District with proof of liability insurance in the minimum amount of $1,000,000.00 listing Platte County R-3 Schools as additionally insured.

Contractors will also provide proof of Worker's Compensation insurance in the minimum amount of $500,000.00 listing Platte County R-3 Schools as additionally insured.

EXCEPTIONS: The bidder shall furnish a statement on company letterhead giving a complete description of any exception to the terms, conditions, and specifications. Failure to furnish the statement will mean that the bidder agrees to meet all requirements of the Request for Proposal.

RESPONSIBILITY OF CONTRACTOR: The Contractor shall furnish all labor, transportation, tools, equipment, machinery, and all suitable appliances, requisite for execution of this agreement and shall be solely answerable for the same and for the safe, proper, and lawful construction, maintenance, and use thereof. Contractor shall be solely answerable for all damage to any Platte County R-3 School District property, to other contractors or other employees of the School District, to the neighboring premises, or to

any private or personal property, due to improper, illegal, or negligent conduct of itself or its subcontractors, employees, or agents in and about said work, or in the execution of the work covered by this agreement, or any extra work undertaken as herein provided.

Contractor shall not assign this agreement. The agreement will be terminated in the event the contractor sells the business. The School District reserves the right to continue with the new owner or select another contractor.

RELATIONS WITH OTHER CONTRACTORS: The Contractor shall cooperate with all other contractors who may be performing work on behalf of the School District, and workers who may be employed by the School District, on any work in the vicinity of the work to be done under this agreement, and the Contractor shall so conduct its operations as to interfere to the least possible extent with the work of such contractors or workers.

PROTECTION OF PUBLIC AND PRIVATE PROPERTY: The Contractor shall assume full responsibility for the protection of all public and private property, structures, sewers, and utilities, both above and below ground, along, beneath, above, across or near the site or sites of the work being performed under this agreement, or which are in any manner affected by the prosecution of the work or the transportation of men or materials in connection therewith.

COMPLIANCE WITH O.S.H.A. REGULATIONS: The Contractor shall comply with all regulations of the Occupational Safety and Health Administration (OSHA) and hold the School District and its representatives harmless from all actions resulting from the Contractor's failure to comply with said regulations, orders and citations.

VERBAL STATEMENTS NOT BINDING: It is understood and agreed that the written terms and provisions of this agreement shall supersede all prior verbal statements of any and every official and/or other representative of the School District, and such statements shall not be effective or be construed as entering into, or forming a part of, or altering in any way whatsoever, the written agreement.

PAYMENTS: Payment shall be made to the Contractor upon completion of the work.

COMPLETION: The Platte County R-3 School District wishes to have this lighting work done by Friday, August 7, 2020.

TERMINATION: Platte County R-3 School District reserves the right to terminate the agreement without notice for just cause which may include but not limited to some of the following: unauthorized staff of the contractor (sex offenders, convicted felons, etc.); weapons on school property; inappropriate behavior with students or staff; use of alcohol, tobacco or drugs on school property; use of unauthorized sub-contractors or 1099 employees; use of illegal alien employees; lapse of insurance coverage; failure to complete work as specified; poor quality of work; damage to school district property; etc.

SECTION 008100

PREVAILING WAGE DETERMINATION

PART 1 - GENERAL

1.1 This Project is contracted under the requirements of Missouri Prevailing Wage Law. This Section includes general information and forms for convenience. Detailed requirements, information, forms, and assistance may be obtained by contacting the following:

1. Missouri Department of Labor and Industrial Relations
   Division of Labor Standards
   Prevailing Wage Section
   PO Box 449
   Jefferson City, MO 65102-0449
   Phone: 573-751-3403
   Fax: 573-751-3721
   Email: prevailingwage@labor.mo.gov
   Website: www.labor.mo.gov/ls/prevailingwage

B. Prevailing Hourly Rate of Wages: Not less than the prevailing hourly rate of wages, as set out in the wage order attached, must be paid to all workers performing work under this Contract.

1. Contractor shall forfeit a penalty to the contracting public body of $100 per day (or portion of a day) for each worker that is paid less than the prevailing rate for any work done under this Contract by the Contractor or by any Subcontractor.
2. Submit certified copies of Contractor's and subcontractor's payrolls to contracting public body on a weekly basis.

C. Safety Training Program: All on-site employees, including those of Contractor and subcontractors, are required to complete the ten-hour safety training program required under Section 292.675 RSMo, if they have not previously completed the program and have documentation of having done so.

1. Contractor shall forfeit a penalty to the contracting public body of $2500 plus an additional $100 for each employee, including those of subcontractors, for each calendar day, or portion thereof, such employee is employed without the required training.

D. Construction Transient Employers: Every transient employer, as defined in section 285.230 RSMo, must post in a prominent and easily accessible place at the site, a clearly legible copy of the notices listed below. Any transient employer failing to comply with these requirements shall, under section 285.234 RSMo, be liable for a penalty of $500 per day until notices are posted as required by the statute:

1. The notice of registration for employer withholding issued to such transient employer by the director of revenue.
2. Proof of coverage for workers' compensation insurance or self-insurance signed by transient employer and verified by the Department of Revenue through records of the Division of Workers' Compensation.
3. The notice of registration for unemployment insurance to such transient employer by the Division of Employment Security.

E. Posting of Wage Rates: While work under this Contract is being performed, a legible list of all prevailing wage rates must remain posted in a prominent and easily accessible location at the site by the Contractor and each subcontractor on the project. Such notice shall remain posted during the full time that any worker is employed on the project.

F. Project Notification - Contractor Information Notification: Before performing any Work, submit a completed PW-2 Form "Prevailing Wage Project Notification - Contractor Information Notification,"

available at www.labor.mo.gov/ls/prevailingwage under “Forms,” to The Division of Labor Standards (DLS).

G. Project Completion Notification – Affidavit of Compliance: Before final payment will be made, the Contractor shall file a fully executed affidavit, PW-4 Form “Affidavit – Compliance with the Prevailing Wage Law”, available at www.labor.mo.gov/ls/prevailingwage under “Forms,” to The Division of Labor Standards (DLS).

H. Monthly Applications for Payment: Pursuant to prevailing wage laws, an Affidavit of Compliance (Form PW-4) must be filed with the District before payment will be approved. The District will withhold and retain any amounts due as a result of any violation of the prevailing wage law prior to making payment with any contractor. Include Affidavit of Compliance with each application for payment.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 008100

PROPOSAL FORM – EXHIBIT 'A'

Bid to:

Platte County R-3 School District
Attn: Mr. Jay Harris
998 Platte Falls Road
Platte City, MO 64079

Place of Bid Opening:

Platte County R-3 School District – District Education Center
Board of Education Room
998 Platte Falls Road
Platte City, MO 64079

Bid for:
Wilson Auditorium House Lighting Replacement
Platte City, MO 64079

Date and Time for Receipt of Bids:
Thursday, February 6, 2020, 2:00 p.m. (Local Time)

We, the undersigned Bidder, hereby submit our Proposal on the General Contract for the **Platte County R-3 School District – Wilson Auditorium House Lighting Replacement**, which includes; all electrical work listed below.

Name of Bidder:_____

Address of Bidder:_____

_____

Telephone Number:_____ Fax Number:_____

1. THE SITE AND THE DOCUMENTS

We have carefully examined the site and all conditions affecting the work.

We have carefully examined the following documents:

We the undersigned, having examined the Contract Documents listed below and the site of the proposed Work and being familiar with all conditions affecting the construction of the Project, here by propose and agree to provide and furnish all labor, material, equipment, supervision and other items necessary to perform and complete, in a workmanlike manner, all Work required by the contract Documents, at the prices stated below. Stated sums include fees, insurance, payroll taxes, and all other charges applicable to materials, appliances, labor and all charges that may be levied. This Bid excludes sales tax.

(a) Prevailing Wage Determination
(b) E-Verify
(c) Technical Specifications
(d) Drawings

In the following proposal, the amounts shall be shown in both words and figures. In case of discrepancy between the word and the figures, the words shall govern. Owner intends to award the Contract to a single Bidder.

2. THE AMOUNT OF THE BASE BID

We propose to furnish all materials and labor for the **replacement of the house lighting** called for by the above Documents for the Base Bid work for the total sum of:

_____Dollars and Cents

($_____).

3. CHANGES IN THE WORK

Changes in the Work shall be as established in the Contract Documents. The following fees shall be used for Lump Sum pricing and actual cost pricing of additions and deletions to that work included in the Bid, namely:

Overhead & Profit
Not to Exceed

A.	To Contractor for work performed by his/her own forces.	10%
B.	To Contractor for work performed by other than his/her own forces.	5%
C.	To Subcontractor for work performed by his/her own forces.	10%
D.	To Subcontractor for work performed by other than his/her own forces.	5%

4. COMPLETION OF THE WORK

If we are notified of the acceptance of the Base Bid of this Proposal within thirty (30) days after the above date, we agree to execute a Contract for the above Work, for the above stated compensation and agree to guarantee the Substantial Completion and completion of all punch list work as listed hereinafter:

Substantial Completion Date: August 7, 2020.

The Undersigned hereby agrees to commence work under the Contract within seven (7) days after the date of a "Notice to Proceed", unless otherwise stipulated in that notice.

5. PERFORMANCE BOND AND PAYMENT BOND

We, the undersigned, agree to furnish to the Owner a Performance Bond and Payment Bond in the amount of 100 percent of the Contract Sum. Form of the Bond shall be AIA Document A312 from the American Institute of Architects, as modified by Owner.

6. ACKNOWLEDGEMENT AND SEAL

We, the undersigned, acknowledge and agree that the Owner reserves the right to waive any informalities in any Bid and to reject any or all Bids.

The undersigned Bidder, on behalf of itself and all sub-bidders, releases the Owner, Architect, and other Bidders from any claim arising out of or relating to the acceptance, non-acceptance, or rejection of the undersigned's or any other Bidder's Bid, including without limitation, Bids of it's sub-bidders on this Project.

NOTE: If the Contractor is a Corporation, Proposal must be signed by an authorized officer, showing his/her title.

Yours very truly,

Corporate Seal (Below)

_____

FIRM

_____

_____

_____

ADDRESS

TELEPHONE:_____

FAX:_____

BY:_____

TITLE:_____

STATE OF INCORPORATION:_____

FIN _____ or SSN _____

Notary Seal (Below)

_____

Notary Public

Subscribed and sworn to before me within and for

STATE OF _____

COUNTY OF _____

On this _____ Day of _____, 20_____

My Commission Expires:_____

END OF PROPOSAL FORM

STATE OF MISSOURI

COUNTY OF PLATTE

AFFIDAVIT

Before me, the undersigned authority, personally appeared _____, who, being by me duly sworn, deposed as follows:

My name is _____, I am of sound mind, capable of making this affidavit, and personally acquainted with the facts herein stated:

1. I am an officer/agent of _____(company name)_____ and have the authority to make these affirmations.

2. _____(company name)_____ has enrolled and participates in a federal work authorization program with respect to the employees working in connection with _____ _____(company name's)___ contract with the Platte County School District. Such participation is confirmed by the following documentation attached hereto: _____(list documentation provided by company)_____.

3. _____(company name)_____ does not knowingly employ any person who is an unauthorized alien in connection with the contracted services for the _____ School District.

_____
Affiant

In witness whereof I have hereunto subscribed by name and affixed my official seal this _____ day of _____, 20____.

(Seal)

_____
Notary Public

My Commission Expires:

_____

EXHIBIT 'C'

STATEMENT OF BIDDER'S QUALIFICATIONS

Each bidder for the work included in the specifications and bid documents shall submit with their bid the data requested in the following information. This data must be included in and made a part of each bid document and be contained in the sealed envelope. Failure to comply with this instruction may be regarded as justification for rejecting the contractor's bid.

Name of Bidder: _____

Business Address: _____

When Organized: _____

Date Incorporated: _____

Number of years engaged in conducting business under present firm name: _____

If you have operated business under a different name, please give name and location.

_____
_____
_____

Have you ever failed to complete any work awarded to your company? If so, where and why?

_____
_____
_____

Have you ever defaulted on a contract? If so, where and why?

_____
_____
_____

List any school district, government entity or tax-based organizations you work for currently, or have worked for in the past three (3) years. Please include name of organization, point of contact and contact information.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Name, address and telephone number of at least three references who are familiar with the job performance of your company on similar size jobs:

Reference 1: _____

Reference 2: _____

Reference 3: _____

ELECTRICAL SYMBOLS

THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED.

V3.00

STANDARD MOUNTING HEIGHTS

AUDIBLE APPLIANCES (CENTERLINE)	84"
ALARMS	48"
ANNUNCIATOR PANELS (DISPLAY)	60"
CONTROLS (TOP OF DEVICE)	48"
EXIT SIGNS (WALL MOUNTED)	80"
FIRE ALARM ANNUNCIATOR PANEL (DISPLAY)	60"
FIRE ALARM BELL (EXTERIOR) (CENTERLINE)	120"
FIRE ALARM CONTROL PANEL/UNIT (DISPLAY)	60"
INTERCOM (AFEA ONLY)	36"
INTERCOMS (TOP OF DEVICE)	48"
PULL STATIONS (TOP OF DEVICE)	48"
PHOTOCELLS	144"
RECEPTACLES	16"
RECEPTACLES (EXTERIOR)	24"
RECEPTACLES (GARAGES)	24"
RECEPTACLES (POOLS)	27"
RECEPTACLES (ABOVE COUNTER)	+6" ABOVE BACKSPLASH/COUNTER, 40" MAX
RECEPTACLES IN EQUIPMENT ROOMS	44"
REMOTE INDICATING LIGHT (EQUIPMENT ROOMS)	48"
REMOTE INDICATING LIGHT (FINISHED AREAS)	CEILING
SAFETY SWITCHES (TOP OF DEVICE)	48"
STARTERS (TOP OF DEVICE)	48"
SWITCHES (TOP OF DEVICE)	44"
TELEPHONE, DATA OUTLETS	SAME AS ADJACENT DEVICE, UNO
TELEPHONE TERMINAL BOARD (BOTTOM)	6"
TELEVISION OUTLETS	REFER TO ARCH DRAWINGS
VISIBLE APPLIANCES (CENTERLINE)	84"

INSTALL OUTLET BOXES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE, OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS, ARE AFF OR AFG TO BOTTOM OF OUTLET BOX, UNO. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.

ABBREVIATIONS

AF	AMPERE FUSE SIZE
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AS	AMPERE SWITCH SIZE
AT	AMPERE TRIP SETTING
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIO VISUAL
BAS	BUILDING AUTOMATION SYSTEM
BKR	BREAKER
C	CONDUIT
CAT	CATEGORY
CATV	CABLE TELEVISION SYSTEM
CCTV	CLOSED CIRCUIT TELEVISION
CD	CANDELA
CKT	CIRCUIT
CODE	APPLICABLE CODE ADOPTED BY JURISDICTION
CT	CURRENT TRANSFORMER
CTR	CENTER
CVD	CUMULATIVE VOLTAGE DROP
D/DEMO	DEMOLITION
DPDT	DOUBLE-POLE, DOUBLE-THROW
DPST	DOUBLE-POLE, SINGLE-THROW
E/ETR/EX	EXISTING TO REMAIN
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EM	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
ELV	ELECTRONIC LOW-VOLTAGE
EWC	ELECTRIC WATER COOLER
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FCA	FAULT CURRENT AMPS AVAILABLE
FCU	FAN COIL UNIT
FF	FINISHED FLOOR
FLA	FULL LOAD AMPS
FLR	FLOOR
GC	GENERAL CONTRACTOR
GEC	GROUNDING ELECTRODE CONDUCTOR
GES	GROUNDING ELECTRODE SYSTEM
GFR	GROUND FAULT RELAY
G	GROUND
IG	ISOLATED GROUND
ISC	SHORT CIRCUIT CURRENT
JB/J-BOX	JUNCTION BOX
LF	LINEAR FEET
LRA	LOCKED ROTOR AMPS
LTG/LTS	LIGHTING/LIGHTS
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MLV	MAGNETIC LOW-VOLTAGE
MOCP	MAXIMUM OVERCURRENT PROTECTION
MTD	MOUNTED
N/A	NOT APPLICABLE
NF	NON-FUSED
NL	NIGHT LIGHT (24HR ON)
NRTL	NATIONALLY RECOGNIZED TESTING LABORATORY (CSA,ETL,NSF,UL)
NTS	NOT TO SCALE
OS	OCCUPANCY SENSOR
P	POLE
PART	PARTIAL CIRCUIT
PH/Ø	PHASE
PNL	PANEL
PNLBD	PANELBOARD
PROVIDE	FURNISH AND INSTALL
PT	POTENTIAL TRANSFORMER
QTY	QUANTITY
R/REL	RELOCATE
RCPT	RECEPTACLE
RLA	RUNNING LOAD AMPS
RTU	ROOFTOP UNIT
SCCR	SHORT-CIRCUIT CURRENT RATING
SD	SMOKE DUCT DETECTOR
SF	SQUARE FEET
SPDT	SINGLE-POLE, DOUBLE-THROW
SPST	SINGLE-POLE, SINGLE-THROW
SSBJ	SUPPLY-SIDE BONDING JUMPER
ST	SHUNT TRIP
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TBD	TO BE DETERMINED
TGB	TELECOMMUNICATIONS GROUND BUS BAR
TL	TWISTLOCK
TMGB	TELECOMMUNICATIONS MAIN GROUND BUS BAR
TX/XFMR	TRANSFORMER
TYP	TYPICAL
U/F	UNDERFLOOR
U/G	UNDERGROUND
U/S	UNDERSLAB
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
VD	VOLTAGE DROP
VFD	VARIABLE FREQUENCY DRIVE
VS	VACANCY SENSOR
W	WIRE
W/	WITH
WP	WEATHER PROOF
WR	WEATHER RESISTANT
WT	WATERTIGHT
XP	EXPLOSION-PROOF

LINETYPE LEGEND

THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.

EXISTING ——— NEW ———
DEMOLISH - - - - FUTURE — — —

ANNOTATION

- MECHANICAL OR FIRE PROTECTION PLAN NOTE CALLOUT
- PLUMBING PLAN NOTE CALLOUT
- ELECTRICAL OR FIRE ALARM PLAN NOTE CALLOUT
- TECHNOLOGY PLAN CALLOUT
- PLUMBING EQUIPMENT DESIGNATION. (CONTRACTOR FURNISHED AND INSTALLED). REFER TO PLUMBING FIXTURE OR EQUIPMENT SCHEDULES
- EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED)
- CU 1 — MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)
- CONNECTION POINT OF NEW WORK TO EXISTING
- 1 / E1 — DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER
- 1 / E1 — SECTION CUT DESIGNATION

CIRCUITING & WIRING

- 7 5 3 [R-#] P1 OR P1-3,5,7 — HOMERUN TO PANELBOARD. INFORMATION AT ARROWS ARE CIRCUIT NUMBERS AND PANELBOARD FOR TERMINATION. REFER TO PANELBOARD SCHEDULES FOR BRANCH CIRCUIT CONDUCTOR SIZES. — INDICATES RELAY NUMBER
- CIRCUIT CONTINUATION OR PARTIAL CIRCUIT
- CONDUIT CONCEALED
- CONDUIT CONCEALED (EMERGENCY)
- CONDUIT IN/UNDER FLOOR/GROUND CONSTRUCTION
- EXPOSED CONDUIT
- EXPOSED CONDUIT (EMERGENCY)
- FLEXIBLE CONDUIT
- LOW VOLTAGE CABLE (NOT ROUTED IN CONDUIT)
- CONDUIT TURNING DOWN
- CONDUIT TURNING UP
- CONNECTION POINT OR EQUIPMENT TERMINATION
- EQUIPMENT TERMINATION

CONDUCTOR TICK MARK LEGEND

WHERE TICK MARKS ARE SHOWN, THE FOLLOWING SHALL GOVERN:

- SWITCHED HOT (PHASE) CONDUCTORS (SHOWN TRAILING NEUTRAL)
- NEUTRAL (GROUNDED) CONDUCTOR
- UNSWITCHED HOT (PHASE) CONDUCTORS (SHOWN LEADING NEUTRAL)
- NOTE: HASH MARKS INDICATE QUANTITY OF CONDUCTORS
- EQUIPMENT GROUNDING CONDUCTOR IN CONDUIT (GREEN INSULATION OR BARE)
- ISOLATED GROUNDING CONDUCTOR IN CONDUIT (GREEN INSULATION WITH YELLOW TRACER)

BRANCH CIRCUIT CONDUCTOR TABLE

WHERE TICK MARKS ARE NOT SHOWN, THE FOLLOWING SHALL GOVERN:

# OF POLES	HOT (PHASE)*	NEUTRAL (GROUNDED)**	GROUNDING***
1P	(1)	(1) UNO	(1)
2P	(2)	(1) UNO	(1)
3P	(3)	(1) UNO	(1)

* PROVIDE ADDITIONAL CONDUCTORS THROUGH ENTIRE CIRCUIT (SWITCHED, UNSWITCHED/EM, ETC.) AS INDICATED THROUGHOUT CONSTRUCTION DOCUMENTS AND AS REQUIRED FOR A COMPLETE AND WORKING SYSTEM.

** REFER TO SPECIFICATIONS FOR LIMITATIONS ON SHARING NEUTRAL (GROUNDED) CONDUCTORS. DO NOT CIRCUIT AS A MULTI-WIRE BRANCH CIRCUIT, UNO.

*** PROVIDE ADDITIONAL ISOLATED GROUNDING CONDUCTORS WHERE INDICATED.

REFER TO SPECIFICATIONS, PLANS, NOTES, WIRING AND CONTROL DIAGRAMS FOR ADDITIONAL CIRCUITING REQUIREMENTS.

LIGHTING

- LIGHT FIXTURE
  - a = LOWER CASE LETTER IS SWITCH IDENTIFIER
  - A = UPPER CASE LETTER INDICATES LIGHT FIXTURE TYPE
  - ⊥ = WALL MOUNT
  - 〉 = ARROW INDICATES AIMING DIRECTION
- LIGHT FIXTURE CIRCUITED AS A NIGHT LIGHT (NL)
- EMERGENCY LIGHT FIXTURE WITH EMERGENCY LIGHTING BATTERY PACK OR CONNECTED TO EMERGENCY SOURCE
- NIGHT LIGHT/EMERGENCY LIGHT FIXTURE WITH EMERGENCY BATTERY PACK OR CONNECTED TO EMERGENCY SOURCE
- LIGHT FIXTURE WITH DUAL BALLASTS CIRCUITED SEPARATELY (SHADING IMPLIES EMERGENCY LIGHT FIXTURE)
- [#] LIGHTING TRACK (# INDICATES RELAY NUMBER)
- MIRROR LIGHTS
- EXTERIOR PARKING LOT LIGHT FIXTURE
- EXTERIOR PEDESTRIAN POST TOP LIGHT FIXTURE
- EXTERIOR LIT BOLLARD LIGHT FIXTURE
- EXIT SIGN - CEILING / WALL MOUNTED, ARROWS AS INDICATED, FACE HATCHED
- EMERGENCY LIGHTING UNIT EQUIPMENT WITH BATTERY PACK - CEILING/WALL MOUNTED
- AFEA (AREA FOR EVACUATION ASSISTANCE) SIGN - CEILING/WALL MOUNTED, ARROWS AS INDICATED

REFER TO LIGHT FIXTURE SCHEDULE FOR MORE INFORMATION.

POWER EQUIPMENT

- ELECTRICAL PANELBOARD (SURFACE OR FLUSH MOUNT)
- ELECTRICAL CABINET (SURFACE OR FLUSH MOUNT), TYPE AS NOTED
- PLYWOOD TERMINAL BOARD FOR TELEPHONE SYSTEM, UNO. SIZE AS NOTED
- SWITCHBOARD OR MOTOR CONTROL CENTER ON HOUSEKEEPING PAD
- ELECTRICAL DISTRIBUTION PANELBOARD
- TRANSFORMER
- 200/3/150/3R — DISCONNECT SWITCH - "200/3/150/3R" DENOTES AMPERES/POLE/FUSE/NEMA ENCLOSURE RATING, NF= NON-FUSED, CB= CIRCUIT BREAKER (200/3/CB), NO VALUE (200/3/150) FOR NEMA ENCLOSURE MEANS STANDARD NEMA 1 RATING
- 30/3/15/1/3R — COMBINATION DISCONNECT (SAFETY) SWITCH AND MOTOR STARTER "30/3/15/1/3R" DENOTES AMPERES/POLE/FUSE/NEMA STARTER SIZE/NEMA ENCLOSURE RATING. NF= NON-FUSED, CB= CIRCUIT BREAKER (30/3/CB/1), NO VALUE (200/3/150/1) FOR NEMA ENCLOSURE MEANS STANDARD NEMA 1 ENCLOSURE RATING
- 2 — MAGNETIC MOTOR STARTER, NEMA SIZE AS NOTED. 3-POLE, UNO
- VFD — VARIABLE FREQUENCY DRIVE
- INDICATING LIGHT
- EMERGENCY POWER OFF BUTTON
- STOP-START PUSH BUTTON CONTROL STATION
- HAND-OFF-AUTO PUSH BUTTON CONTROL STATION
- MUSHROOM-TYPE PUSH BUTTON
- OVERHEAD PADDLE FAN

BOXES, LIGHTING CONTROL & WIRING DEVICES

$# — SWITCH LETTER DESIGNATIONS AS FOLLOWS:
- BLANK = SINGLE POLE
- 2 = TWO POLE
- 3 = THREE-WAY
- 4 = FOUR-WAY
- D = DIMMER
- F = FAN SPEED CONTROL
- FH = FRACTIONAL HORSEPOWER MANUAL CONTROLLER
- IH = INTEGRAL HORSEPOWER MANUAL CONTROLLER
- K = KEYED
- LV# = LOW VOLTAGE / DIGITAL
- M = MANUAL MOTOR STARTER DISCONNECT
- OS# = OCCUPANCY SENSOR
- P = SPST PILOT LIGHT
- WP = WEATHER PROOF
- # = REFER TO LIGHTING CONTROL DEVICE SCHEDULE

- ALC — AUTOMATIC LOAD CONTROL RELAY
- BTS — BRANCH CIRCUIT TRANSFER SWITCH
- CEILING / WALL MOUNTED OCCUPANCY SENSOR (# INDICATES TYPE PER SCHEDULE)
  - CORNER 90 DEGREE SENSING
  - ONE-DIRECTION SENSING, CEILING/WALL MOUNT
  - CEILING MOUNT, TWO-DIRECTION SENSING
  - CEILING MOUNT, FOUR-DIRECTION SENSING
- C# — CONTACTOR (SIZE, COIL VOLTAGE AND NUMBER OF POLES AS INDICATED)
- CL## — TRACK-MOUNTED CURRENT LIMITER (## INDICATES AMPERAGE)
- D# — DAYLIGHT SENSOR (# INDICATES TYPE PER SCHEDULE)
- LC — LIGHTING CONTROLS PROCESSOR AND/OR EQUIPMENT
- P# — POWER PACK (# INDICATES TYPE PER SCHEDULE)
- PS# — PHOTOELECTRIC SWITCH
- R## — ROOM CONTROLLER (# INDICATES TYPE PER SCHEDULE)
- TS# — TIME SWITCH
- SIMPLEX RECEPTACLE - NEMA 5-20R, UNO
- DUPLEX RECEPTACLE - NEMA 5-20R, UNO
- DOUBLE DUPLEX RECEPTACLE - NEMA 5-20R, UNO
- SPECIAL RECEPTACLE - NEMA TYPE AS NOTED
- TWIST-LOCK TYPE RECEPTACLE
- G — BLANK FACE GFCI FEED THROUGH DEVICE
- OR GFCI — GFCI TYPE RECEPTACLE*
- OR IG — ISOLATED GROUND TYPE RECEPTACLE*
- OR EM — EMERGENCY RECEPTACLE*
- RECEPTACLE INSTALLED ABOVE COUNTER OR BACKSPLASH*
- RECEPTACLE INSTALLED IN CEILING*
- RECEPTACLE INSTALLED IN FLOOR*
- RECEPTACLE INSTALLED VIA DROP CORD*

— ADDITIONAL RECEPTACLE LETTER DESIGNATIONS AS FOLLOWS:
- C = AUTOMATICALLY CONTROLLED
- CH = CLOCK HANGER TYPE
- G = RCPT PROTECTED BY GFCI CIRCUIT BREAKER OR UPSTREAM GFCI DEVICE
- H = HORIZONTALLY MOUNTED
- S = MANUALLY SWITCHED
- SP / TVSS = SURGE PROTECTION
- TR = TAMPER RESISTANT
- TV = TELEVISION
- USB = USB/DUPLEX
- WP = WEATHER PROOF COVER
- WR = WEATHER RESISTANT

- MULTI-OUTLET ASSEMBLY
- TELEPHONE OUTLET
- DATA OUTLET
- MULTI-SERVICE OUTLET; TELEPHONE AND DATA
  - ABOVE COUNTER, TYP
  - WALL, TYP
  - FLOOR, TYP
- A — MULTI-SERVICE POWER POLE WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS
- A — MULTI-SERVICE FLOOR BOX WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS
- A — POKE THROUGH, A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS
- T — THERMOSTAT
- J — CEILING/FLOOR MOUNT JUNCTION/OUTLET BOX
- J — WALL MOUNT JUNCTION/OUTLET BOX

* SYMBOL DEMONSTRATED WITH DUPLEX RECEPTACLE, WHEN USED IN COMBINATION WITH OTHER DEVICES MEANING IS SIMILAR FOR THOSE DEVICE TYPES.

REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR MORE INFORMATION.

ELECTRICAL ONE-LINE & RISER DIAGRAM

- ##A 3P — SWITCH (RATING AS INDICATED)
- ##A 3P — DRAWOUT CIRCUIT BREAKER (RATINGS AS INDICATED)
- ##AS 3P ##AF — FUSED SWITCH (RATING, POLES AND FUSE TYPE AS INDICATED)
- ##AS 3P ##AF FUSE TYPE NEMA # — COMBINATION FUSED SWITCH/STARTER AND STARTER SIZE
- ##A 3P — CIRCUIT BREAKER (RATINGS AS INDICATED)
- ##A 3P NEMA # — COMBINATION CIRCUIT BREAKER/STARTER AND STARTER SIZE
- PANELBOARD, SINGLE OR MULTI-SECTION (REFER TO SCHEDULES)
- ISOLATED POWER PANELBOARD W/ INTEGRAL TRANSFORMER (REFER TO SCHEDULES)
- TX# — TRANSFORMER (TYPE AND RATINGS AS INDICATED)
- TX# — SHIELDED TRANSFORMER (TYPE AND RATINGS AS INDICATED)
- ATS# ##A — AUTOMATIC TRANSFER SWITCH (RATINGS AS INDICATED)
- ATS# (W/BYPASS) ##A — AUTOMATIC TRANSFER SWITCH WITH BYPASS (RATINGS AS INDICATED)
- ## KW GENERATOR 480Y/277V, 3Ø, 4W ##A, 3P M/G — GENERATOR (RATINGS AS INDICATED)
  - NON-SEPARATELY DERIVED SOURCE OR SEPARATELY DERIVED SOURCE
- MDP SWITCHBOARD ELEC ROOM ### AMPS 480Y/277V 3Ø 4W — SWITCHGEAR, SWITCHBOARD AND/OR DISTRIBUTION PANELBOARD (TYPE, RATING, DEVICES AND ACCESSORIES AS INDICATED)
- DIGITAL VM AM — COMBINATION DIGITAL VOLT METER/AMMETER
- ### — CIRCUIT IDENTIFICATION (REFER TO CIRCUIT SCHEDULE)
- GFR — GROUND FAULT RELAY
- PFR — PHASE FAILURE RELAY
- KK# — KIRK-KEY INTERLOCK (# INDICATES KEY PAIR)
- ST — SHUNT TRIP
- AM — AMMETER (RANGE AS SPECIFIED OR REQUIRED)
- VM — VOLTMETER (RANGE AS SPECIFIED OR REQUIRED)
- UTILITY METER M — UTILITY METER (AS REQUIRED BY UTILITY)
- AS — AMMETER SWITCH
- VS — VOLTMETER SWITCH
- WH D 15 — WATT-HOUR METER, "D" DENOTES DEMAND REGISTER, "15" DENOTES MINUTES OF DEMAND INTERVAL
- CURRENT TRANSFORMER RATING AS SPECIFIED OR REQUIRED
- POTENTIAL TRANSFORMER RATING AS SPECIFIED OR REQUIRED
- SPD — SURGE-PROTECTIVE DEVICE
- GROUND CONNECTION
- GROUND CONNECTION WITH TEST WELL
- GROUND ROD
- LIGHTNING ARRESTER
- CAPACITOR
- CONTACT (OPEN OR CLOSED)
- HEATER
- HP — MOTOR
- ## — BLOCK LOAD KW OR KVA
- ✕F# ✕FP# — FAULT POINT REFERENCED IN SHORT CIRCUIT CURRENT AND VOLTAGE DROP SPREADSHEET

GENERAL DEMOLITION NOTES:

1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE FACILITY. REVIEW GENERAL NOTES, SPECIFICATIONS AND OTHER TRADE DRAWINGS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER OR OWNER, AS DEFINED IN THE CONSTRUCTION DOCUMENTS, OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.
2. EXISTING CONDITIONS WERE TAKEN FROM EXISTING DRAWINGS AND SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS.
3. COORDINATE NEW WORK AND DEMOLITION WITH OTHER TRADES AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
4. OWNER RETAINS RIGHTS OF SALVAGE FOR FIXTURES AND EQUIPMENT TO BE REMOVED. COORDINATE WITH THE OWNER MATERIALS TO BE SALVAGED AND THE LOCATION FOR STORAGE; AVOID DAMAGE TO SALVAGED MATERIALS DURING DEMOLITION. REMOVE ALL DEMOLITION MATERIALS FROM SITE INDICATED BY OWNER NOT TO BE SALVAGED.
5. INSPECT EXISTING EQUIPMENT IDENTIFIED TO REMAIN TO VERIFY THAT IT IS OPERATING PROPERLY. NOTIFY OWNER OF DAMAGED AND/OR MALFUNCTIONING COMPONENTS.
6. REMOVE ALL EXISTING WIRING, CABLNG AND CONDUIT SERVING EXISTING ITEMS REMOVED UNDER DEMOLITION BACK TO THE SOURCE SERVING THE ITEMS. WHERE REMOVAL OF EXISTING WIRING INTERRUPTS THE ELECTRICAL CONTINUITY OF CIRCUITS THAT ARE TO REMAIN IN USE, PROVIDE NECESSARY WIRING, RACEWAYS, JUNCTION BOXES AND ADDITIONAL MATERIALS AS REQUIRED TO ENSURE CONTINUED ELECTRICAL CONTINUITY.
7. RELOCATE AND RECONNECT ALL ELECTRICAL FACILITIES THAT MUST BE RELOCATED IN ORDER TO ACCOMPLISH THE REMODELING SHOWN OR DESCRIBED IN THE CONSTRUCTION DOCUMENTS.
8. PATCH ALL FLOOR AND CEILING PENETRATIONS RESULTING FROM REMOVAL OR REROUTING OF RACEWAYS, JUNCTION BOXES, ETC. AS REQUIRED TO MAINTAIN FIRE SEPARATIONS. FINISH PATCHED SURFACES AS REQUIRED TO MATCH EXISTING SURFACE FINISHES.
9. PROVIDE PROTECTION FOR AND AVOID DAMAGE TO EXISTING EQUIPMENT, FIXTURES, DEVICES AND SURFACES TO REMAIN FOR NEW INSTALLATION. REPAIR ALL DAMAGE, INCLUDING DAMAGE TO WALLS, FLOORS OR EQUIPMENT TO MATCH EXISTING FINISHES, AS A RESULT OF DEMOLITION OR CONSTRUCTION AT NO EXTRA COST TO THE OWNER.
10. ALL JUNCTION BOXES AND DEVICES, NEW AND REUSED, SHALL BE RIGIDLY ATTACHED TO STRUCTURE AND ACCESSIBLE.
11. COORDINATE ALL DEMOLITION/PHASING EFFORTS WITH OWNER PRIOR TO CONSTRUCTION. MINIMIZE DISRUPTION OF OPERATION AND PROVIDE OCCUPANT SAFETY. EXCESSIVE NOISE OR VIBRATION SHALL BE PRE-APPROVED AND COORDINATED WITH THE OWNER.
12. COORDINATE WITH OWNER ANY DISRUPTION AND VERIFICATION OF SERVICE WITHIN THE EXISTING BUILDING SO AS TO MINIMIZE THE DISRUPTION OF SERVICE.
13. VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS AND NOTIFY THE ARCHITECT-ENGINEER OF ANY DISCREPANCIES.
14. TURN ALL CIRCUIT BREAKERS LEFT UNUSED BY DEMOLITION, IN EXISTING PANEL BOARDS, TO THE “OFF” POSITION AND LABEL AS “SPARE”, REUSE TO SERVE NEW LOADS, WHERE INDICATED.
15. PATCH AND PAINT ALL WALL AND CEILING PENETRATIONS RESULTING FROM REMOVAL OR REPLACEMENT OF EXISTING LIGHT FIXTURES.

GENERAL ELECTRICAL NOTES:

1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE FACILITY. REVIEW THE GENERAL NOTES AND ALL OTHER TRADE DRAWINGS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER, OR OWNER, AS SPECIFIED, OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.
2. ALL NEW DIVISION 16 WORK SHALL BE ROUTED CONCEALED IN WALLS OR CEILING SPACE WHERE POSSIBLE.
3. COORDINATE ALL LIGHT FIXTURES AND CONDUIT WIRING RUNS WITH STRUCTURAL ELEMENTS. COORDINATE CONDUIT INSTALLATIONS WITH ARCHITECT, STRUCTURAL ENGINEER, STRUCTURAL CONTRACTOR AND GENERAL CONTRACTOR.
4. ALL JUNCTION BOXES AND DEVICES SHALL BE RIGIDLY ATTACHED TO STRUCTURE AND ACCESSIBLE.
5. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF LIGHT FIXTURES. COORDINATE EXACT LOCATIONS OF ALL LIGHT FIXTURES WITH ARCHITECT PRIOR TO ROUGH-IN. REFER TO ARCHITECTURAL DRAWINGS AND CASEWORK DETAILS FOR MOUNTING INFORMATION AND ADDITIONAL REQUIREMENTS.
6. PROVIDE GREEN EQUIPMENT GROUNDING CONDUCTOR SIZED PER NEC FOR ALL LIGHTING CIRCUITS.
7. PROVIDE SEPARATE NEUTRAL CONDUCTOR FOR ALL LIGHTING CIRCUITS.
8. REFER TO E700 FOR LIGHT FIXTURE SCHEDULE AND LIGHTING DETAILS.
9. FINAL COVER PLATE FINISHES WILL BE SELECTED BY ARCHITECT. CONFIRM COVER PLATE FINISHES WITH ARCHITECT DURING SHOP DRAWINGS PROCESS AND PRIOR TO ORDERING.
10. EXISTING EMERGENCY LIGHTING UNITS ARE TO REMAIN.
11. ENSURE THAT THE AUDITORIUM LIGHTING CONTROL SYSTEM IS REPROGRAMMED SUCH THAT NEC MANDATED LIGHT LEVELS FOR NORMAL EGRESS OF 0.2 FC MINIMUM ARE MAINTAINED IN AISLES DURING PERFORMANCES.

HENDERSON ENGINEERS
8345 LENEXA DRIVE, SUITE 300
LENEXA, KS 66214
TEL 913.742.5000 FAX 913.742.5001
WWW.HENDERSONENGINEERS.COM
1950004760
MO. CORPORATE NO. E-556D
EXPIRES 12/31/20

PLATTE COUNTY HIGH SCHOOL
WILSON AUDITORIUM HOUSE LIGHTING
1501 BRANCH STREET
PLATTE CITY, MO 64079

STATE OF MISSOURI
CURTIS A. OLDS
NUMBER PE-2018036640
PROFESSIONAL ENGINEER
CURTIS A. OLDS
LICENSE # PE-2018036640
PROFESSIONAL SEAL
Dec 31 2019

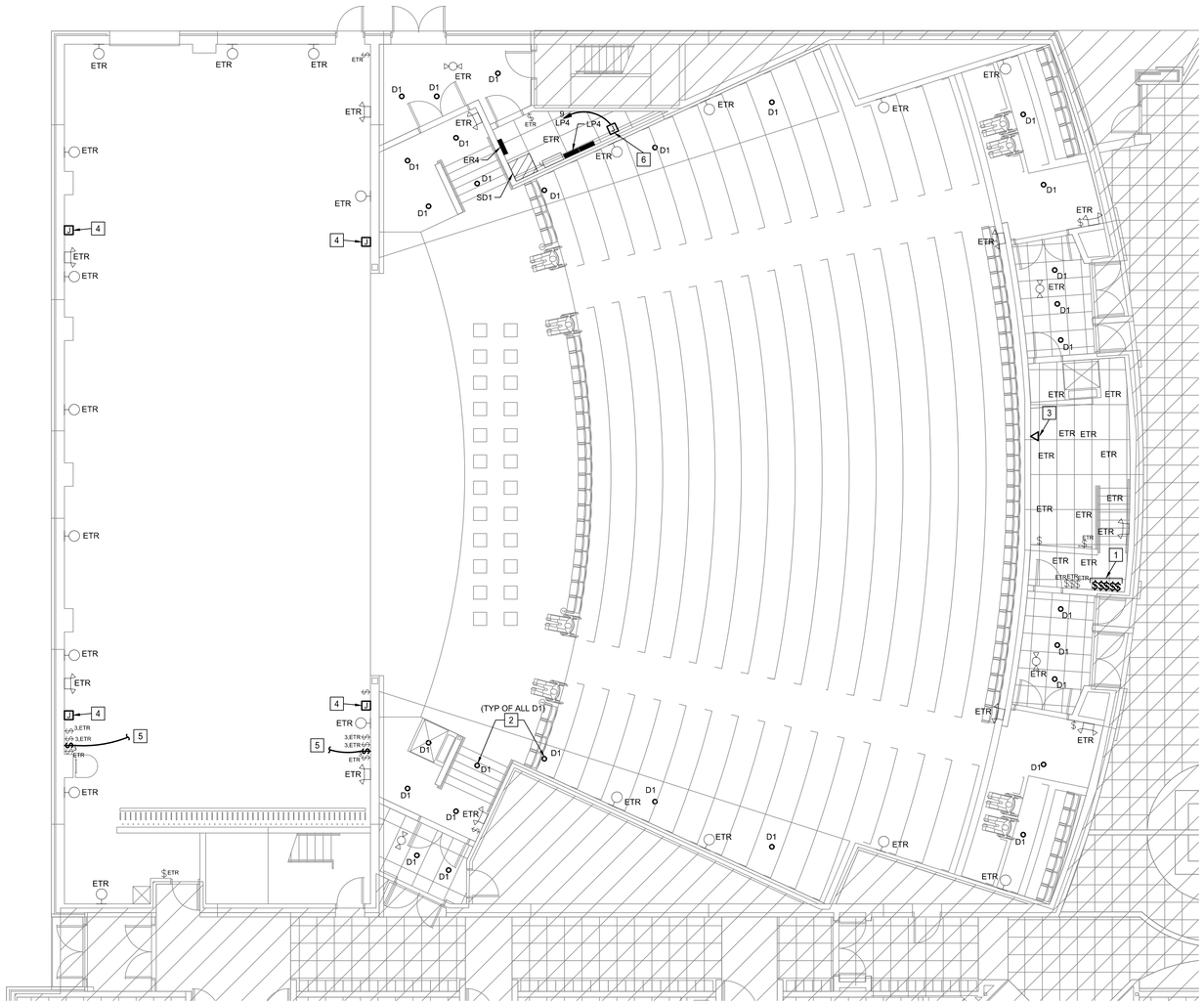
REVISIONS

JOB NO:	1950004760
DATE:	01/02/2020
CHECKED BY:	CAO
DRAWN BY:	LMB

ELECTRICAL DETAILS

E000

CURTIS A. OLDS



1 LIGHTING RCP - LOWER LEVEL AUDITORIUM
SCALE: 1/8"=1'-0"

GENERAL ELECTRICAL NOTES:

1. REFER TO SHEET E000 FOR GENERAL ELECTRICAL NOTES.
2. OWNER RESERVES RIGHT TO SALVAGE FIXTURES THAT ARE TO BE DEMOLISHED OR REMOVED.
3. EXISTING EMERGENCY LIGHTING FIXTURES ARE EXISTING TO REMAIN.

[#] ELECTRICAL PLAN NOTES:

1. DEMOLISH HID FIXTURE CONTROL SWITCHES. REMOVE WIRING. PROVIDE BLANK COVER PLATE.
2. REMOVE EXISTING RECESSED DOWNLIGHT. REPLACE WITH NEW FIXTURE AS SPECIFIED.
3. DATA CONNECTION FOR NETWORKED LIGHTING CONTROL SYSTEM. REFER TO RISER ON E700 FOR MORE INFORMATION.
4. ETC RESPONSE MK2 TWO-PORT GATEWAY. REFER TO RISER ON E700 FOR ADDITIONAL INFORMATION.
5. CONNECT TO SECOND ELECTRIC WORK LIGHT RECEPTACLES SHOWN ON E102.
6. POWER CONNECTION TO NETWORK LIGHTING POE SWITCH. REFER TO RISER ON E700 FOR ADDITIONAL INFORMATION.

ELECTRICAL LOAD SUMMARY: 2,407W REMOVED	
REMOVED: (29) 100W RECESSED INCANDESCENT DOWNLIGHTS	2,900W
ADDED: (29) 17W RECESSED LED DOWNLIGHTS	493W

THEATRICAL SYSTEM INTEGRATOR SHALL:

1. PATCH BOTH EXISTING UNIVERSES OF DMX TO THE ARCHITECTURAL AND THEATRICAL LIGHTING SYSTEMS SUCH THAT THE ADDRESSES FOR EACH FIXTURE ARE IDENTICAL ON BOTH PROCESSORS.

2. REPROGRAM ENTRY STATIONS TO CONTROL NEW HOUSE LIGHTING FIXTURES.

3. REPROGRAM PRESETS AT TOUCHSCREEN CONTROL PANELS IN CONTROL ROOM AND AT STAGE MANAGER'S POSITION ON STAGE.

4. REFER TO SPECIFICATION SECTION 265561 FOR SYSTEM INTEGRATOR REQUIREMENTS.

HENDERSON ENGINEERS
8345 LENEXA DRIVE, SUITE 300
LENEXA, KS 66214
TEL 913.742.5000 FAX 913.742.5001
WWW.HENDERSONENGINEERS.COM
1950004760
MO. CORPORATE NO: E-556D
EXPIRES 12/31/20

PLATTE COUNTY HIGH SCHOOL
WILSON AUDITORIUM HOUSE LIGHTING
1501 BRANCH STREET
PLATTE CITY, MO 64079

STATE OF MISSOURI
CURTIS A. OLDS
NUMBER PE-2018036640
PROFESSIONAL ENGINEER

CURTIS A. OLDS
LICENSE # PE-2018036640
PROFESSIONAL ENGINEER
Dec 31 2019

REVISIONS

JOB NO:	1950004760
DATE:	01/02/2020
CHECKED BY:	CAO
DRAWN BY:	LMB

LIGHTING RCP
LOWER LEVEL
AUDITORIUM

E101

CURTIS A. OLDS

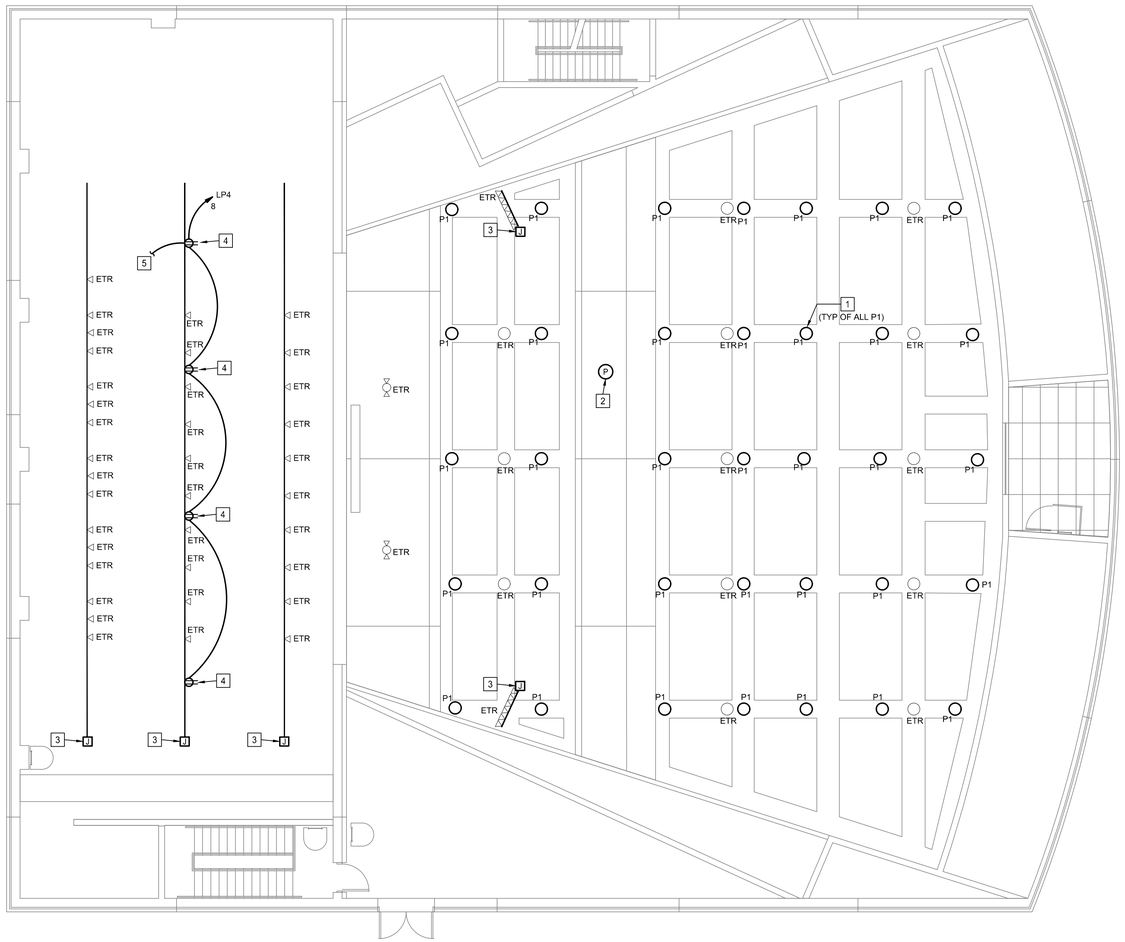
GENERAL ELECTRICAL NOTES:

1. REFER TO SHEET E000 FOR GENERAL ELECTRICAL NOTES.
2. OWNER RESERVES RIGHT TO SALVAGE FIXTURE THAT ARE TO BE DEMOLISHED OR REMOVED.

ELECTRICAL PLAN NOTES:

1. REMOVE EXISTING HOUSE LIGHT CYLINDER. REPLACE WITH NEW FIXTURE AS SPECIFIED. COORDINATE STEM LENGTH IN FIELD. NEW MOUNTING HEIGHTS TO MATCH EXISTING.
2. WIRELESS DMX CONTROLLER TO CONTROL NEW TYPE P1 AND D1 FIXTURES. CONTROLLER SHALL BE CONCEALED AND LOCATED PER MANUFACTURER'S RECOMMENDATIONS.
3. ETC RESPONSE MK2 TWO-PORT GATEWAY. REFER TO RISER ON E700 FOR ADDITIONAL INFORMATION.
4. MOUNT RECEPTACLE TO ELECTRIC FOR WORK LIGHT POWER.
5. REFER TO E101 FOR LOCATIONS OF TOGGLE SWITCHES TO CONTROL WORK LIGHT RECEPTACLES.

ELECTRICAL LOAD SUMMARY: 14,000W REMOVED		
REMOVED:	(35) 500W INCANDESCENT CYLINERS	17,500W
ADDED:	(35) 100W LED LED CYLINDERS	3,500W



1 LIGHTING RCP - UPPER LEVEL AUDITORIUM
SCALE: 1/8"=1'-0"

HENDERSON ENGINEERS
8345 LENEXA DRIVE, SUITE 300
LENEXA, KS 66214
TEL 913.742.5000 FAX 913.742.5001
WWW.HENDERSONENGINEERS.COM
1950004760
MO. CORPORATE NO: E-556D
EXPIRES 12/31/20

PLATTE COUNTY HIGH SCHOOL
WILSON AUDITORIUM HOUSE LIGHTING
1501 BRANCH STREET
PLATTE CITY, MO 64079

STATE OF MISSOURI
CURTIS A. OLDS
NUMBER PE-2018036640
PROFESSIONAL ENGINEER

CURTIS A. OLDS
LICENSE # PE-2018036640
PROFESSIONAL ENGINEER Dec 21 2019

REVISIONS

JOB NO:	1950004760
DATE:	01/02/2020
CHECKED BY:	CAO
DRAWN BY:	LMB

LIGHTING RCP UPPER LEVEL AUDITORIUM

E102

CURTIS A. OLDS

DIMMER RACK: SD1 EXISTING

BUS AMPS: 400A
MAIN SIZE/TYPE: MLO
VOLTS/PHASE: 208Y/120V, 3PH, 4W
SECTION: 1

FED FROM: SWBD-1
AIC RATING: 100,000A/C, FULLY RATED
SERVES: AUDITORIUM
MOUNTING: SURFACE
LOCATION: ELECTRICAL

CKT NO.	DESCRIPTION	VOLTAMPS/PHASE A	B	C	WIRE NO.	BKR AMP	MODULE TYPE	P	P	MODULE TYPE	BKR AMP	WIRE NO	VOLTAMPS/PHASE A	B	C	DESCRIPTION	CKT NO.
	1	CATWALK	1,000			EX	20	EX	1	1	EX	20	EX	1,000			CATWALK	2
	3	CATWALK		1,000		EX	20	EX	1	1	EX	20	EX		1,000		CATWALK	4
	5	CATWALK			1,000	EX	20	EX	1	1	EX	20	EX			1,000	CATWALK	6
	7	CATWALK	1,000			EX	20	EX	1	1	EX	20	EX	1,000			CATWALK	8
	9	CATWALK		1,000		EX	20	EX	1	1	EX	20	EX		1,000		CATWALK	10
	11	CATWALK			1,000	EX	20	EX	1	1	EX	20	EX			1,000	CATWALK	12
	13	CATWALK	1,000			EX	20	EX	1	1	EX	20	EX	1,000			CATWALK	14
	15	CATWALK		1,000		EX	20	EX	1	1	EX	20	EX		1,000		CATWALK	16
	17	CATWALK			1,000	EX	20	EX	1	1	EX	20	EX			1,000	CATWALK	18
	19	CATWALK	1,000			EX	20	EX	1	1	EX	20	EX	1,000			CATWALK	20
	21	1ST ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		1ST ELECTRIC	22
	23	1ST ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	1ST ELECTRIC	24
	25	1ST ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			1ST ELECTRIC	26
	27	1ST ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		1ST ELECTRIC	28
	29	1ST ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	1ST ELECTRIC	30
	31	1ST ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			1ST ELECTRIC	32
	33	1ST ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		1ST ELECTRIC	34
	35	1ST ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	1ST ELECTRIC	36
	37	1ST ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			1ST ELECTRIC	38
	39	1ST ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		1ST ELECTRIC	40
	41	2ND ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	2ND ELECTRIC	42
	43	2ND ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			2ND ELECTRIC	44
	45	2ND ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		2ND ELECTRIC	46
	47	2ND ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	2ND ELECTRIC	48
	49	2ND ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			2ND ELECTRIC	50
	51	2ND ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		2ND ELECTRIC	52
	53	2ND ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	2ND ELECTRIC	54
	55	2ND ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			2ND ELECTRIC	56
	57	2ND ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		2ND ELECTRIC	58
	59	2ND ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	2ND ELECTRIC	60
	61	3RD ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			3RD ELECTRIC	62
	63	3RD ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		3RD ELECTRIC	64
	65	3RD ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	3RD ELECTRIC	66
	67	3RD ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			3RD ELECTRIC	68
	69	3RD ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		3RD ELECTRIC	70
	71	3RD ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	3RD ELECTRIC	72
	73	3RD ELECTRIC	500			EX	20	EX	1	1	EX	20	EX	500			3RD ELECTRIC	74
	75	3RD ELECTRIC		500		EX	20	EX	1	1	EX	20	EX		500		3RD ELECTRIC	76
	77	3RD ELECTRIC			500	EX	20	EX	1	1	EX	20	EX			500	3RD ELECTRIC	78
	79	3RD ELECTRIC	150			EX	20	EX	1	1	EX	20	EX	500			3RD ELECTRIC	80
	81	BOX BOOM (HOUSE LEFT)		150		EX	20	EX	1	1	EX	20	EX		150		BOX BOOM (HOUSE LEFT)	82
	83	BOX BOOM (HOUSE LEFT)			150	EX	20	EX	1	1	EX	20	EX			150	BOX BOOM (HOUSE LEFT)	84
	85	BOX BOOM (HOUSE LEFT)	150			EX	20	EX	1	1	EX	20	EX	150			BOX BOOM (HOUSE LEFT)	86
	87	BOX BOOM (HOUSE LEFT)		150		EX	20	EX	1	1	EX	20	EX		150		BOX BOOM (HOUSE LEFT)	88
	89	BOX BOOM (HOUSE LEFT)			150	EX	20	EX	1	1	EX	20	EX			150	BOX BOOM (HOUSE LEFT)	90
	91	BOX BOOM (HOUSE LEFT)	150			EX	20	EX	1	1	EX	20	EX	150			BOX BOOM (HOUSE LEFT)	92
	93	BOX BOOM (HOUSE RIGHT)		150		EX	20	EX	1	1	EX	20	EX		150		BOX BOOM (HOUSE RIGHT)	94
	95	BOX BOOM (HOUSE RIGHT)			150	EX	20	EX	1	1	EX	20	EX			150	BOX BOOM (HOUSE RIGHT)	96
	97	BOX BOOM (HOUSE RIGHT)	150			EX	20	EX	1	1	EX	20	EX	150			BOX BOOM (HOUSE RIGHT)	98
	99	BOX BOOM (HOUSE RIGHT)		150		EX	20	EX	1	1	EX	20	EX		150		BOX BOOM (HOUSE RIGHT)	100
	101	BOX BOOM (HOUSE RIGHT)			150	EX	20	EX	1	1	EX	20	EX			150	BOX BOOM (HOUSE RIGHT)	102
	103	BOX BOOM (HOUSE RIGHT)	150			EX	20	EX	1	1	EX	20	EX	150			BOX BOOM (HOUSE RIGHT)	104
	105	FLOOR BOX		1,000		EX	20	EX	1	1	EX	20	EX		1,000		FLOOR BOX	106
	107	FLOOR BOX			1,000	EX	20	EX	1	1	EX	20	EX			1,000	FLOOR BOX	108
	109	FLOOR BOX	1,000			EX	20	EX	1	1	EX	20	EX	1,000			FLOOR BOX	110
	111	FLOOR BOX		1,000		EX	20	EX	1	1	EX	20	EX		1,000		FLOOR BOX	112
	113	FLOOR BOX			1,000	EX	20	EX	1	1	EX	20	EX			1,000	FLOOR BOX	114
	115	FLOOR BOX	1,000			EX	20	EX	1	1	EX	20	EX	1,000			FLOOR BOX	116
	117	FLOOR BOX		1,000		EX	20	EX	1	1	EX	20	EX		1,000		FLOOR BOX	118
	119	FLOOR BOX			1,000	EX	20	EX	1	1	EX	20	EX			1,000	FLOOR BOX	120
	121	FLOOR BOX	1,000			EX	20	EX	1	1	EX	20	EX	1,000			FLOOR BOX	122
	123	FLOOR BOX		1,000		EX	20	EX	1	1	EX	20	EX		1,000		FLOOR BOX	124
	125	FLOOR BOX			1,000	EX	20	EX	1	1	EX	20	EX			1,000	FLOOR BOX	126
	127	FLOOR BOX	1,000			EX	20	EX	1	1	EX	20	EX	1,000			FLOOR BOX	128
	129	SPOTLIGHT BOOTH OUTLET		1,000		EX	20	EX	1	1	EX	20	EX		1,000		SPOTLIGHT BOOTH OUTLET	130
	131	SPOTLIGHT BOOTH OUTLET			1,000	EX	20	EX	1	1	EX	20	EX			1,000	SPOTLIGHT BOOTH OUTLET	132
	133	SPOTLIGHT BOOTH OUTLET	1,000			EX	20	EX	1	1	EX	20	EX	1,000			SPOTLIGHT BOOTH OUTLET	134
	135	SPOTLIGHT BOOTH OUTLET		1,000		EX	20	EX	1	1	EX	20	EX		1,000		SPOTLIGHT BOOTH OUTLET	136
	137	EQUIPPED SPACE							1	1							EQUIPPED SPACE	138
	139	EQUIPPED SPACE							1	1							EQUIPPED SPACE	140
	141	EQUIPPED SPACE							1	1							EQUIPPED SPACE	142
	143	EQUIPPED SPACE							1	1							EQUIPPED SPACE	144
	145	EQUIPPED SPACE							1	1							EQUIPPED SPACE	146
	147	EQUIPPED SPACE							1	1							EQUIPPED SPACE	148
	149	EQUIPPED SPACE							1	1							EQUIPPED SPACE	150
	151	EQUIPPED SPACE							1	1							EQUIPPED SPACE	152
	153	EQUIPPED SPACE							1	1							EQUIPPED SPACE	154
	155	EQUIPPED SPACE							1	1							EQUIPPED SPACE	156
	157	EQUIPPED SPACE							1	1							EQUIPPED SPACE	158
	159	EQUIPPED SPACE							1	1							EQUIPPED SPACE	160
	161	EQUIPPED SPACE							1	1							EQUIPPED SPACE	162
	163	EQUIPPED SPACE							1	1							EQUIPPED SPACE	164
	165	EQUIPPED SPACE							1	1							EQUIPPED SPACE	166
	167	EQUIPPED SPACE							1	1							EQUIPPED SPACE	168
	169	EQUIPPED SPACE							1	1							EQUIPPED SPACE	170
	171	EQUIPPED SPACE							1	1							EQUIPPED SPACE	172
NM	173	HOUSE LIGHTS			330	EX	20	CPM	1	1	CPM	20	EX			220	HOUSE LIGHTS	174 NM
NM	175	HOUSE LIGHTS	330			EX	20	CPM	1	1	EX	20	EX	220			HOUSE LIGHTS	176
NM	177	HOUSE LIGHTS		330		EX	20	CPM	1	1	CPM	20	EX		220		HOUSE LIGHTS	178 NM
NM	179	HOUSE LIGHTS			330	EX	20	CPM	1	1	CPM	20	EX			220	HOUSE LIGHTS	180 NM
NM	181	HOUSE LIGHTS	330			EX	20	CPM	1	1	CPM	20	EX	220			HOUSE LIGHTS	182 NM
NM	183	HOUSE LIGHTS		330		EX	20	CPM	1	1	CPM	20	EX		220		HOUSE LIGHTS	184 NM
NM	185	HOUSE LIGHTS			330	EX	20	CPM	1	1	CPM	20	EX			220	HOUSE LIGHTS	186 NM
NM	187	HOUSE LIGHTS	330			EX	20	CPM	1	1	CPM	20	EX	220			HOUSE LIGHTS	188 NM
NM	189	HOUSE LIGHTS		330		EX	20	CPM	1	1	CPM	20	EX		220		HOUSE LIGHTS	190 NM
NM	191	HOUSE LIGHTS			330	EX	20	CPM	1	1	CPM	20	EX			220	HOUSE LIGHTS	192 NM
		SUBTOTAL	8,950	8,450	8,450									9,300	8,450	8,450	SUBTOTAL	

		LOAD	CONN. VA	DF
TOTAL PHASE A - VA	18,250			
AMPS	152			
TOTAL PHASE B - VA	16,900	MISC EQUIP		1.00
AMPS	141	LIGHTING	90,750	1.25
TOTAL PHASE C - VA	16,900	RECEPTACLES		1.0/5
AMPS	141	SIGN/DISPLAY		1.25
TOTAL PNLBD - VA	52,050	SHOWWINDOW		1.25
AMPS	144	LTG TRACK		1.00

TOTAL DEMAND: 113,438 VA / 315 A

PANELBOARD NOTES

NM - PROVIDE NEW MODULE IN EXISTING DIMMER RACK

MODULE TYPE ABBREVIATIONS:

CPM - CONSTANT POWER MODULE FOR NEW WIRELESS DMX CONTROLLED FIXTURES.

LIGHT FIXTURE SCHEDULE

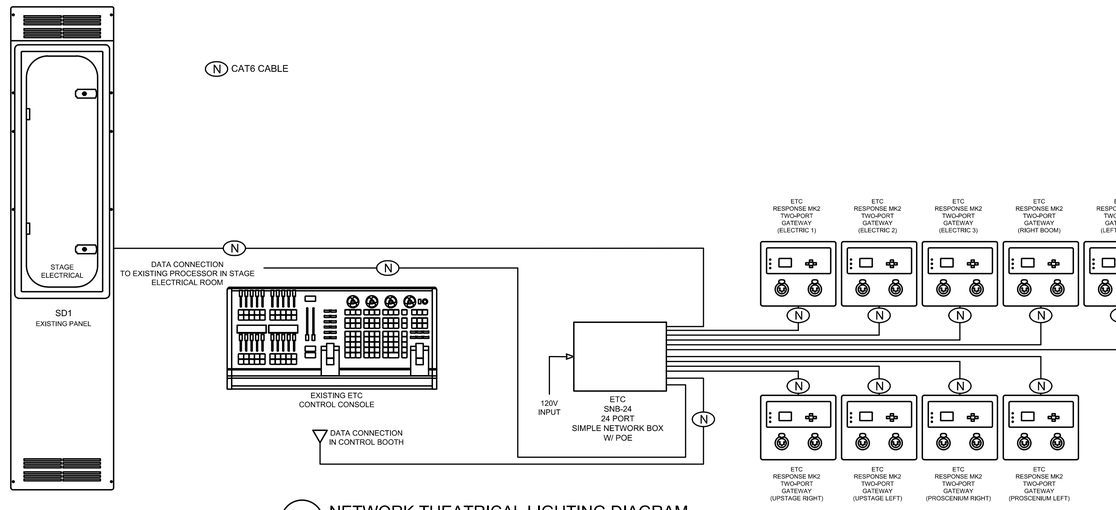
TYPE	MANUFACTURER/MODEL #	LAMPS NO.	LAMPS TYPE	LAMPS VOLT	INPUT WATTS	INPUT VA	DESCRIPTION	NOTES
D1	ETC #ARCP1F3050WF	-	LED PER MANUFACTURER 90 CRI, 3000K 2300 LUMENS 60,000 HOURS	120	20	22	NOMINAL 6" DIAMETER RECESSED DOWNLIGHT. DIE-CAST HOUSING AND HEAT SINK. WHITE FINISH WITH FIXED MOUNTING. PROVIDE WITH WIRELESS DMX RECEIVER AND FADE TO WARM DIMMING OPTION. 50-DEGREE OPTIC.	1,2
P1	ETC #ARCP4R-F-3-37-WH	-	LED PER MANUFACTURER 90 CRI, 3000K 7835 LUMENS 60,000 HOURS	120	100	110	NOMINAL 7.89" DIAMETER PENDANT LED CYLINDER. ALUMINUM AND STEEL CONSTRUCTION. WHITE POLYESTER POWDER COAT FINISH. 37-DEGREE BEAM-ANGLE. PROVIDE WITH ETC WIRELESS DMX RECEIVER AND FADE TO WARM DIMMING OPTION.	1,2

GENERAL NOTES:

A. ANY PROPRIETARY, SOLE-SOURCED LIGHT FIXTURE LISTED IN THE LIGHT FIXTURE SCHEDULE SHALL BE UNIT PRICED ONLY. NO PACKAGING OR LOT PRICING OF THESE LIGHT FIXTURES SHALL BE ALLOWED. UNIT PRICES SHALL BE CLEARLY IDENTIFIED ON THE BID FORM.
B. REPRESENTATIVE AGENTS SHALL BE ALLOWED TO OFFER MINI-LOT PRICING (MLP) FOR LIGHT FIXTURES SPECIFIED IN 265100 AND 265600 ONLY. REFER TO SPECIFICATION 265100 FOR DEFINITION, TERMS AND LIMITATIONS OF MLP.
C. VERIFY CEILING CONDITIONS AND COORDINATE LIGHT FIXTURE MOUNTING HARDWARE AND TRIMS NEEDED TO SUIT CEILING CONDITIONS PRIOR TO ORDERING.
D. VERIFY QUANTITIES, MODEL NUMBERS AND DESCRIPTIONS WITH MANUFACTURER PRIOR TO PLACING ORDER.
D. CATALOG NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND CATALOG NUMBERS ONLY. FIRST READ THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS IN CONJUNCTION WITH THE CATALOG NUMBER TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURES LISTED ARE THE BASIS FOR THE DESIGN.
E. CONTRACTOR SHALL PROVIDE ALL LIGHT FIXTURES UNLESS NOTED OTHERWISE.
F. FOR DIMMABLE LIGHT FIXTURES. REFER TO DIVISION 26 SPECIFICATIONS FOR MORE INFORMATION REGARDING CONTROL WIRING AND COMPATIBILITY.

NOTES:

1. CATALOG NUMBER REPRESENTS MANUFACTURER LISTED FIRST. OTHER MANUFACTURERS LISTED ARE CONSIDERED EQUIVALENT FOR SUBSTITUTION.
2. CONTRACTOR SHALL SUPPLY A COMPLETE AND OPERATIONAL SYSTEM TO COMPLY WITH DESIGN INTENT THAT IS COMPATIBLE WITH THE EXISTING ETC LIGHTING CONTROL SYSTEM IN THE SPACE.



1 NETWORK THEATRICAL LIGHTING DIAGRAM
SCALE: NTS

PANELBOARD: LP4 (EXISTING)

BUS AMPS: 225A
MAIN SIZE/TYPE: MLO
VOLTS/PHASE: 208Y/120V, 3PH-, 4W
SECTION: 1

FED FROM: SWBD-1
A/C RATING: 10000 FULLY RATED
SERVES: AUDITORIUM
MOUNTING: SURFACE
LOCATION: ELECTRICAL ROOM #105
EQUIPMENT GROUND BUS

CKT NO.	DESCRIPTION	VOLTAMPS/PHASE A	B	C	WIRE NO.	BKR AMP	P	P	BKR AMP	WIRE NO.	VOLTAMPS/PHASE A	B	C	DESCRIPTION	CKT NO.
	1	RCPT - AUDITORIUM/CONTROL	540			EX	20	1	1	20	EX	540			RCPT - ELECTRICAL RM	2
	3	RCPT - STAGE		540		EX	20	1	1	20	EX		540		RCPT - STORAGE	4
	5	RCPT - MECH LEVEL 2			540	EX	20	1	1	20	EX			1,000	RCPT - FOLLOWSPOT 2	6
	7	RCPT - FOLLOWSPOT 1	1,000			EX	20	1	1	20	10	1,200			2ND ELECTRIC WORK LTS	8 R
R	9	NETWORK LIGHTING RACK		1,000		12	20	1	1	20					SPARE	10
	11	RCPT - CONTROL ROOM 1			540	EX	20	2	1	20	EX			540	RCPT - CONTROL ROOM 2	12
	13	ECH-1	1,000			EX	20	2	1	20	EX	1,200			1ST ELECTRIC WORK LTS	14
	15			1,000					1	20					SPARE	16
	17	FCU-1			750	EX	20	1	1	20	EX			1,500	LEVEL 2 MECH UNIT HEATER	18
	19	3RD ELECTRIC WORK LTS	1,500			EX	20	1	1	20	EX	1,200			LTG - EAST STAIR/LOADING	20
	21	WHEEL CHAIR LIFT		1,200		EX	20	1	1	20	EX		1,200		LTG - WEST STAIRS	22
	23	SPARE					20	1	1	20	EX			1,000	LTG - FOLLOW SPOT	24
	25	RCPT - CATWALK	540			EX	20	1	1	20	EX	1,500			LTG - HID 1	26
	27	STAND POWER LIGHT 1		500		EX	20	1	1	20	EX		1,500		LTG - HID 2	28
	29	STAND POWER LIGHT 2			500	EX	20	1	1	20	EX			1,500	LTG - HID 3	30
	31	PROJECTOR SCREEN	500			EX	20	1	1	20	EX	1,500			LTG - HID 4	32
	33	LTG - CATWALK		1,200		EX	20	1	1	20	EX		1,500		LTG - HID 5	34
	35	LTG - STAGE 1			1,200	EX	20	1	1	20	EX			500	LTG - T-BAR INDEX	36
	37	AISLE LIGHTING	1,200			EX	20	1				500				38
	39	LTG - STAGE 2		1,200		EX	20	1	3	20	EX		500		OVERHEAD DOOR	40
	41	LTG - CONTROL ROOM			1,200	EX	20	1						500		42
	43	SPARE					20	1	1	20					SPARE	44
	45	RCPT - CATWALK/COM 1		540		EX	20	1	1	20	EX		540		RCPT - 2ND ELECTRIC 1	46
	47	RCPT - CATWALK/COM 2			540	EX	20	1	1	20	EX			540	RCPT - 2ND ELECTRIC 2	48
	49	RCPT - CATWALK/COM 3	540			EX	20	1	1	20	EX	540			RCPT - 2ND ELECTRIC 3	50
	51	RCPT - CATWALK/COM 4		540		EX	20	1	1	20	EX				SPARE	52
	53	RCPT - 1ST ELECTRIC 1			540	EX	20	1	1	20	EX		540		RCPT - 3RD ELECTRIC 1	54
	55	RCPT - 1ST ELECTRIC 2	540			EX	20	1	1	20	EX	540			RCPT - 3RD ELECTRIC 2	56
	57	RCPT - 1ST ELECTRIC 3		540		EX	20	1	1	20	EX		540		RCPT - 3RD ELECTRIC 3	58
	59	SPARE					20	1	1	20	EX			500	UPPER MECHANICAL - CR1L	60
	61	SPARE					20	1	1	15					SPARE	62
	63	RCPT - ELECTRICAL ROOM		180		EX	15	1	1	15					SPARE	64
	65	DIMMER CONTROL ER-4			500	EX	15	1	1	20					SPARE	66
	67	EQUIPPED SPACE							1	20					SPARE	68
	69	EQUIPPED SPACE							1	1					EQUIPPED SPACE	70
	71	EQUIPPED SPACE							1	1					EQUIPPED SPACE	72
	73	EQUIPPED SPACE							1	1					EQUIPPED SPACE	74
	75	EQUIPPED SPACE							1	1					EQUIPPED SPACE	76
	77	EQUIPPED SPACE							1	1					EQUIPPED SPACE	78
	79	EQUIPPED SPACE							1	1					EQUIPPED SPACE	80
	81	EQUIPPED SPACE							1	1					EQUIPPED SPACE	82
	83	EQUIPPED SPACE							1	1					EQUIPPED SPACE	84
		SUBTOTAL	7,360	8,440	6,310							8,720	6,320	8,120	SUBTOTAL	

		LOAD	CONN. VA	DF
TOTAL PHASE A - VA	16,080	COOLING		0
AMPS	134	HEATING	3,500	1.00
TOTAL PHASE B - VA	14,760	LIGHTING	22,800	1.25
AMPS	123	RECEPTACLES	13,220	1.0/5
TOTAL PHASE C - VA	14,400	MOTORS	1,350	1.00
AMPS	120	SUPP HEAT		1.00
TOTAL PNLBD - VA	45,270	MISC EQUIP	4,000	1.00
AMPS	126			

LOAD	CONN. VA	DF
REFRIG		1.00
SIGN/DISP		1.25
KITCHEN		1.00
EXISTING		1.00
LRG MOTOR		1.25
SHOWWINDOW		1.25
LTG TRACK		1.00

TOTAL DEMAND: 49,460 VA / 137 A

PANELBOARD NOTES

EX - EXISTING
R - REUSE EXISTG CKT BKR AND REVISE CKTG FOR LOAD
FEED THRU CONNECTION: #4/0

HENDERSON ENGINEERS
8345 LENEXA DRIVE, SUITE 300
LENEXA, KS 66214
TEL 913.742.5000 FAX 913.742.5001
WWW.HENDERSONENGINEERS.COM
1950004760
MO. CORPORATE NO: E-556D
EXPIRES 12/31/20

PLATTE COUNTY HIGH SCHOOL
WILSON AUDITORIUM HOUSE LIGHTING

1501 BRANCH STREET
PLATTE CITY, MO 64079

STATE OF MISSOURI
CURTIS A. OLDS
NUMBER PE-2010036640
PROFESSIONAL ENGINEER

CURTIS A. OLDS
LICENSE # PE-2010036640
PROFESSIONAL ENGINEER
DATE: 01/21/2019

REVISIONS

JOB NO:	1950004760
DATE:	01/02/2020
CHECKED BY:	CAO
DRAWN BY:	LMB

LIGHT FIXTURE SCHEDULES

E700

CURTIS A. OLDS

SECTION 00420
FORM OF AGREEMENT

PART 1 - GENERAL

1.1 FORM OF AGREEMENT

A. The Agreement that will be executed by the successful Contractor and Owner consists of the following:

1. AIA Document A107-2004 as amended by Owner
2. The Additions and Deletions Reports for the above.

B. The individual Documents that will comprise the Agreement between Owner and the Contractor are contained on the pages following this Specification Section.

1.2 LIEN WAIVERS

A. Partial and Final Waiver and Release of Lien forms to be utilized by the Contractor and Contractor's subcontractors and suppliers are contained in the pages following this Specification Section.

B. See Specification Section 01200 for Contractor's requirements related to transmission of Partial and Final Waiver and Release of Liens to Owner.

1.3 OTHER FORMS

A. The Request for Information (RFI) to be utilized by the Contractor are contained in the pages following this Specification Section.

B. See Specification Section 01200 for Contractor's requirements for the use of and transmission of RFIs.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 00420

SECTION 01200
CONTRACT SUPPLEMENTAL CONDITIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work Sequence, Schedule for Completion and Penalties.

B. Contractor's Construction Schedule

C. Substantial Completion.

D. Final Completion.

E. Application for Progress Payments.

F. Application for Final Payment.

G. Changes and Clarifications to the Work

H. Contractors Administrative Responsibilities.

I. Project Safety Requirements.

J. Warranties.

K. Demolition and Repairs.

L. Temporary Utilities.

M. Assignment of the Work.

N. Manufacturer's Directions.

O. Storage of Materials.

P. Use of the Site.

Q. Measurements.

R. Occupancy.

S. Construction by Others.

T. Runways and Drop Cloths.

U. Special Working Conditions.

V. Documents at the Site.

W. Record Documents.

X. Project Manual.

Y. Correction of the Work.

Z. Hazardous Materials.

1.2 WORKING SEQUENCE, SCHEDULE FOR COMPLETION AND PENALTIES

A. Contractor and all Subcontractors, and Suppliers shall furnish sufficient forces, construction tools and equipment, and shall work such hours as may be required to insure the execution of the Work in accordance with the Project Milestone Schedule, the Project phasing, the allowable

working hours and the allowable disruptions to Owner's normal use of the facility stated in the Contract Documents. If in the opinion of Owner, the Contractor is not making sufficient progress towards meeting these requirements, the Contractor shall take such steps as may be necessary to improve the progress. Should the Owner deem it necessary to meet these requirements, Owner will require the Contractor to increase the level of staffing, the number of shifts, overtime work and additional days of work including holidays, Saturdays and Sundays, in addition to other measures as necessary all without additional payments to the Contractor.

B. Owner has the authority to call a progress meeting at the job site at any time. The Contractor's Project Manager is required to attend all such meetings. It is the Owner's intent to hold regular meetings through the course of the Project. Scheduling of these meetings shall be established by Owner prior to the start of the Work.

C. Substantial Completion shall be achieved per the schedule below. Refer to the Project Milestone Schedule included in these Specifications for additional Project schedule information.

Start Date	Substantial Completion Date
Per Owner Notice to Proceed	***8/7/2020***

D. Penalties associated with failure to meet Substantial Completion date will be incurred starting with the calendar day following the Substantial Completion date listed above and accrue each calendar day until Substantial Completion is achieved. Substantial Completion is defined in these Specifications. Owner will assess the Contractor the penalty amounts listed by deducting the total penalty amount from any amounts due to the Contractor by Owner.

E. If the Contractor incurs a delay due to factors beyond their, their Subcontractors, and their Suppliers control, the Contractor shall submit a claim to Owner, within three (3) weekdays after such occurrence, requesting additional time to achieve Substantial Completion. Failure to submit a claim within the required time will result in a rejection of the claim by Owner.

F. If a Proposal Request for additional work will require the Contractor additional time to achieve Substantial Completion, the Contractor shall submit with the reply to the Proposal Request a claim for additional time to Owner. The Contractor shall include in the request for additional time sufficient information to demonstrate the cause and to what extent the change will delay obtaining Substantial Completion of the Contract.

G. The determination that delays have occurred beyond the Contractor's control does not automatically mean an extension of time will be granted. The Contractor must substantiate the delay by indicating suspended Work activities on the critical path of the Contractor's Construction Schedule.

H. Determination of the date of achievement of Substantial Completion by the Contractor shall be solely the responsibility of Owner.

1.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor shall, within 7 calendar days after receipt of notice to proceed, submit to Owner the Contractor's construction schedule for the Work. The Contractor's construction schedule shall:

1. Demonstrate compliance with Project Milestone Schedule; Project phasing requirements; and Project allowable disruption to Owner's normal use of the facility.
2. Include scheduled deliveries of Owner provided equipment and material.

3. Include scheduled deliveries of Contractor provided equipment critical to the Project schedule.
4. Include activities and schedule of Contractor's subcontractors.
5. Be prepared, in sufficient detail, to allow review and approval by the Construction Manager.

B. Contractor's construction schedule shall be periodically updated to reflect current conditions when directed by Owner and when Project schedule is altered as allowed by Owner.

1.4 SUBSTANTIAL COMPLETION

A. Substantial Completion as used in the Contract Documents and body of these Specifications shall be defined as follows:

1. House lighting system is installed, commissioned, and operational.
2. Owner training has been completed.

1.5 FINAL COMPLETION

A. Final Completion as used in the Contract Documents and body of these Specifications shall be defined as follows:

1. Substantial completion achieved.
2. All required tagging, labeling complete and signs installed.
3. All electrical directories complete.
4. All construction materials and tools removed from the site and site turned over to Owner "broom clean".
5. All punch list inspection items completed and approved by Owner.
6. All inspections and tests required by authorities having jurisdiction completed and approved and submitted to Owner.
7. All items required to be included with application for final payment delivered to Owner.
8. Record drawings delivered to Owner.
9. Owner training schedule established and agreed to by Owner.
10. Operation and Maintenance Manuals delivered to Owner.

1.6 APPLICATION FOR PROGRESS PAYMENTS

A. At a time consistent with the requirements of this Section and the Form of Agreement between Owner and Contractor, or as mutually agreed to by the Contractor and Owner, Contractor shall submit a properly executed and notarized Application for Payment.

B. The amount shown on the Application for Payment shall be established by the value of work completed as stipulated in the Form of Agreement between Owner and Contractor.

C. The form of application for payment shall be the 1992 edition of AIA Document G702 "Application and Certificate for Payment" and the 1992 edition of AIA Document G703 "Continuation Sheet".

1. Include with Application for Payment a completed Schedule of Values indicating percent of work completed for each item in the Schedule of Values.
2. Schedule of Values shall provide a detailed breakdown of the Work. Breakdown shall include itemization of all major trades by major segments of the Work and large equipment and material quantities.
    a. Submit Schedule of Values to Owner for approval a minimum of 14 days prior to submitting first Application for Payment. Revise schedule of values as directed by the Owner and resubmit.
    b. Update schedule of values to reflect all approved changes in the Work.

3. Materials and equipment shall not be included with Application for Payment until materials and equipment have been delivered to the site. Application for payment shall not include materials and equipment stored off-site.

D. Owner will not process Contractors 1st application for payment until Contractor has provided Owner all required submittals and all required submittals have been approved by Owner.

E. Contractors executed and notarized partial or final lien waivers using the forms included in Division 0 shall be submitted with all applications for payment.

F. Partial or final lien waivers properly executed and notarized by each of the Contractors subcontractors and suppliers shall be submitted with each application for payment.

1. Submit lien waivers for each of Contractors subcontractors and suppliers where total subcontracted amount is $5,000 or greater.

G. Contractor warrants that title to all work covered by an application for payment will pass to the Owner at the time of payment.

H. Contractor warrants all work for which payment has been received from Owner shall, to the best of the Contractor's knowledge, be free and clear of any liens, claims, security interests or encumbrances.

I. Payments by Owner to the Contractor do not constitute acceptance by Owner of any portion of the Work.

1.7 APPLICATION FOR FINAL PAYMENT

A. Submit Final Application for Payment following the procedures specified for progress payments and per the following:

B. Complete the following prior to submitting Application for Final Payment.

1. All work defined as being required to be completed per these Specifications.
2. Forward to Owner all written Warranties provided by the equipment and material manufacturers and suppliers.
3. Forward to Owner copies of Record Drawings, and Operation and Maintenance Manuals.
4. Deliver to location designated by Owner all extra stock and spare parts required by this Contract. Forward acknowledgement of receipt of same to Owner that includes Owner's signature.
5. Prepare and deliver other documents identified in Section 01220 "Contract Closeout".
6. Complete all other requirements to be completed prior to submitting Application for Final Payment identified elsewhere in the Contract Documents.

C. Include the following with Application for Final Payment.

1. Written confirmation, signed by Owner, of completion of Owner training or a written agreement detailing times and dates that the Owner training will be performed.

1.8 CLARIFICATIONS AND CHANGES TO THE WORK

A. Request for Information (RFI)

1. If during the performance of the Work clarification of the Contract Documents is required, Contractor shall request such clarification from Owner utilizing the Request for Information (RFI) form included in these Specifications. Owner shall provide written response to all RFIs and return to the Contractor for distribution to all Contractor's subcontractors.
2. Owner responses to Contractor's RFI's are not authorization to proceed with any work which in the Contractor's opinion requires additional compensation or change to the Project

Schedule. If additional compensation or time is required, the Contractor shall immediately submit a Change Order Request to Owner.

B. Proposal Request (PR)

1. Should the Owner contemplate making a change in the Work, Owner will issue a Proposal Request (PR) to the Contractor. If the changes described in the proposal request impact project cost and/or time, the Contractor shall prepare a proposal for submission to Owner. The Contractor's proposal shall include a detailed itemization of costs listing individual material and equipment unit costs and quantities; labor hours and hourly rates for each trade and Contractor and subcontractor mark-ups. Itemization shall include both adds and deducts. The same level of detailed itemization of cost required of the Contractor shall be required of Contractor's subcontractors when subcontractors represents 20% or more of the total cost of the Proposal Request. Owner will review the cost documentation to determine if a Change Order will be issued. Contractor shall not proceed with additional work until authorization has been received in writing from Owner. No additional amount will be paid for preparation or submittal of proposals in this form or for re-submittal should the breakdown or other documentation be considered inadequate by the Owner.
2. The following maximum increases in cost (mark-up) shall be allowed in establishing the total cost of additions and deletions to the scope of the Project:

		Fee not to Exceed
a.	To Contractor for work by Contractor's own forces.	10%
b.	To Contractor for work performed by other than Contractor's own forces.	5%
c.	To Subcontractor for work performed by Subcontractor's own forces.	10%
d.	To Subcontractor for work performed by other than Subcontractor's own forces.	5%

3. The above percentages will not be allowed on insurance premiums, taxes or fees. The above percentages include and shall represent all the cost of compiling the general requirements, all supervision and all overhead and profit associated with changes in the scope of the Project.
4. Contractor's response to a Proposal Request shall clearly quantify any change in Contract time that will result if Contractor's response is accepted by Owner. Contractor shall furnish sufficient documentation for changes to the Contract Time to allow review by Owner.
5. Contractor shall provide individual itemized costs and effects on Contract time where a Proposal Request includes multiple changes to the work.

C. Change Order (CO)

1. If the Owner determines that a Proposal Request (PR) or Contractor's Change Order Request will be accepted, Owner will prepare a Change Order (CO) form which will describe the change or changes, will refer to the Owner's Proposal Request or Contractor's Change Order Request, and will be signed by Owner and Contractor. No work associated with any Change Order is authorized nor will payments be made without a fully executed written Change Order Form.
2. When authorized in writing and in advance by Owner, time and material accounting of a change in work may be used. The Contractor shall maintain an accurate account of labor

and material involved in the change. Such time and material records shall be forwarded to Owner, on a daily or weekly basis, per the Owner's direction, for verification prior to Contractor including the change in the Application for Payment. Notify Owner when work on the change is to start and when it has been completed. To receive full recognition, labor assigned to the changes must, insofar as possible, work continuously on the change, rather than interchanging between contract work and the work associated with the change performed using time and material accounting.

D. Construction Change Directive (CCD)

1. A Construction Change Directive is a written order signed by Owner directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.
2. A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.
3. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise Owner of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.
4. A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
5. If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by Owner on the basis of reasonable expenditures and costs of those performing the Work attributable to the change, including, in case of an increase in the contract sum, a reasonable allowance for overhead and profit. In such case the Contractor shall keep and present, in such form as Owner may prescribe, an itemized accounting together with appropriate supporting data.

1.9 CONTRACTORS ADMINISTRATIVE RESPONSIBILITIES

A. Contractor shall utilize a full time, on-site Project Superintendent, under direct employment of the Contractor, to oversee and coordinate all aspects of the Work required by this Contract.

1. The Project Superintendent shall have full authority to make decisions for and to act on the behalf of the Contractor without requiring notice to or approval of any of the employees or agents of the Contractor.
2. Contractor's Project Superintendent shall have a minimum five (5) years experience in the type of work required by this Contract.
3. Project Superintendent shall be on-site at all times during which work is being performed by the Contractor or their Subcontractors.
4. Project Superintendent shall be responsible for coordinating all work, schedules and utility interruptions with the Owner's representative.
5. Project Superintendent shall serve as the primary point of contact between Owner and Contractor's Subcontractors, equipment Suppliers and the Owner's representative.
6. Project Superintendent shall conduct all construction meetings required by these Specifications.
7. Project Superintendent shall complete and submit to Owner a Daily Work Report using the form included in Division 0.

B. Contractor shall be responsible for all scheduling of and coordination with all Subcontractors and material Suppliers, including those directly contracted with the Owner, to ensure timely

sequencing of the Work, to minimize any disruption to utilities and to the Owner's normal use of the facility; and to ensure work is completed according to the Project Milestone Schedule.

C. Contractor shall coordinate all work involving Facility utility services and associated local utility companies, to ensure timely sequencing of the work and to minimize interruptions of normal utility service. All fees and costs assessed by the utilities shall be paid by the Contractor and shall be considered work required by the Contract.

D. Contractor shall be responsible for obtaining approval of all authorities having jurisdiction as described in these Specifications.

E. Contractor shall coordinate the start-up of all system, sub-systems and equipment. Contractor shall require and schedule the attendance of all Subcontractors performing work related to systems and equipment start-up. Contractor shall notify the Owner a minimum 72 hours in advance of all system and equipment start-up.

1.10 PROJECT SAFETY REQUIREMENTS

A. All parties involved with this Project are and shall be committed to maintaining a safe worksite and integrating safety into all construction and construction related activities.

B. It shall be the Contractor’s responsibility to identify and comply with all applicable provisions of federal, state and municipal safety laws, regulations, and building codes as they apply to the Work required by this Contract. Contractor shall be responsible for the safety of the Contractor’s employees, agents, suppliers and Subcontractors.

C. Prior to beginning any on-site activities the Contractor shall develop a Project specific written Safety Program. The Safety Program shall:

1. Identify the Contractor’s standard safety policies, procedures and employee training.
2. Identify hazards specific to the Work required by this Project, such as crane use, open shafts, excavation, fall protection and confined spaces; and the procedures and policies that will be used to protect workers and the public.
3. Identify hazards specific to the Work required by this Project that may pose risks to the Owner’s employees, agents, and the public; and the procedures and policies that will be used to notify and protect the Owner’s employees, agents, and the public.
4. Establish schedule of weekly “toolbox” safety meetings and identify personnel that will conduct the meetings. Owner’s personnel will also attend the weekly meetings.
5. Identify the Contractor’s employee that will be responsible for maintaining a safe worksite and enforcing Contractor’s general and Project specific safety policies and procedures.
6. Address other topics that may be requested by the Owner.

D. Project Safety Program shall be submitted to the Owner prior to the Contractor beginning any on-site activities.

1. A sample job hazard analysis is included at the end of this Specification Section.

E. Contractor shall provide, at Owner’s request, a copy of the topics addressed during the weekly safety meeting and a list of the meeting attendees.

F. The Owner may, at the Owner’s sole discretion, require the Contractor to submit written incident reports to the Owner, using a format acceptable to the Owner. Reporting requirements may include any of the following:

1. Injury accidents.
2. “Near Miss” incidents.
3. Non-injury accidents involving damage to property, materials or equipment.

G. Contractor shall periodically perform inspections of all areas of the Project site to verify safety policies and procedures are fully in place and to identify and remedy any unsafe conditions, construction methods or other hazards. Frequency of inspections shall be as needed to maintain a safe worksite.

1.11 WARRANTIES

A. Project Warranty:

1. The Contractor shall provide a one year warranty for all materials, equipment, and labor furnished by the Contractor under this Contract. Contractor's warranty shall include all materials, parts, labor and all other costs necessary to honor the warranty. Contractor warrants that the Work is free from defects in material and workmanship, complies with the Contract Documents and is 100 percent complete including all remedies to the Work identified by Owner.

B. Other Warranties:

1. Disclaimers and Limitations: Any of the Contractor's Equipment Manufacturers, Materials Supplier's or Subcontractor's disclaimers and limitations on product or installation warranties not in compliance with specified Project Warranty do not relieve the Contractor from providing the specified Project Warranty.

C. Warranty Requirements:

1. Related Damages and Losses: When required to be corrected under the Project warranty, Contractor shall remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

D. Commencement of Warranty Period:

1. Warranty period shall commence at time Final Completion is achieved as defined in these Specifications and as determined by Owner.
2. Owner shall issue in writing to Contractor warranty start and end dates.

1.12 DEMOLITION AND REPAIRS

A. All equipment and material removed during the performance of the Work shall be presented to the Owner. Equipment and material accepted by the Owner shall be delivered to a location on the site designated by the Owner. All equipment and material not accepted by the Owner shall be deemed property of the Contractor, shall be promptly removed from the site, and shall be legally disposed of by the Contractor.

B. Contractor shall be responsible for removal and reinstallation of all existing building structure, fixtures, finishes, and other building components (i.e., ceiling, walls, light fixtures, roofing, windows and doors, etc.) required to perform the Work.

C. Contractor shall repair all building structure, improvements, permanent and moveable fixtures and finishes including paving and landscaping damaged as a result of Work performed under this Contract using skilled tradesmen and materials matching existing structure, improvements, fixtures and finishes. All repairs shall be completed to the satisfaction of the Owner.

1.13 TEMPORARY UTILITIES

A. Temporary Electric Power: Electric power for equipment and power tools may run from Owner's existing service. Contractor to provide all materials and labor necessary to connect to

existing service. Location of connection to existing service is to be at Owner's convenience and direction.

B. Temporary Water: Water will be provided by Owner from Owner's existing service. Location of connection is to be at Owner's convenience and direction.

C. Sanitary Agreements: Owner will allow workmen to use only those toilets, sinks and drinking fountains in the existing Facility designated by the Owner.

1.14 ASSIGNMENT OF THE WORK

A. The division of the body of the Specifications into various sections or headings and the assignment of the Work to individual drawings and the use of drawing numbers and titles has been arranged for clarity in the delineation of the various parts of the whole work. It is not the intent of each Specification Section, each Drawing nor each drawing number or title to develop any secondary responsibilities for the satisfactory completion of the Work; nor is the assignment by Owner of any parts of the Work to any specific trade or craft to be inferred from the Specifications or the Drawings. Contractor is fully responsible for providing all work required by this Contract.

1.15 MANUFACTURER'S DIRECTIONS

A. All Manufacturer's materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as recommended by the Manufacturer unless otherwise specifically directed by Owner or specified herein.

1.16 STORAGE OF MATERIALS

A. All materials delivered to the job shall be stored so as to keep them in first class condition and free from deterioration. Equipment and material shall be stored as recommended by the manufacturer. Steel shall be stored on racks at least 6 inches from the ground, and shall be protected from the weather. In general, material deliveries shall be coordinated with the progression of work to avoid prolonged storage of materials or equipment at job site. On-site storage of equipment, materials and tools shall be only in locations and for durations identified by the Owner.

1.17 USE OF THE SITE

A. Rubble, trash, demolished or removed materials and equipment shall not be stored on the site or left unattended and shall be disposed of daily in a manner approved by the Owner.

B. Contractor's and subcontractor's employees shall park personal and company vehicles only in the locations designated by the Owner.

1.18 MEASUREMENTS

A. Before ordering any materials or equipment or doing any work, the Contractor shall verify all measurements at the site and shall be responsible for the correctness of same. No extra charge shall be allowed on account of the differences between actual measurements and those indicated on the Drawings.

1.19 OCCUPANCY

A. All areas of building shall remain occupied by the Owner during the performance of the Work except those specific areas where work is actually being performed as identified by the Contract Documents. Contractor shall notify Owner 7 days in advance of need to interrupt Owner's normal occupancy and use of areas involved in this Contract, or any other areas within the Facility, and shall perform the work in such a manner to minimize all such interruptions.

B. Occupancy or use of a portion or portions of the Work by the Owner shall not constitute acceptance of Work not complying with the Contract Documents.

1.20 CONSTRUCTION BY OTHERS

A. Owner reserves the right to perform construction and construction related work at the site with their own forces and with other contractors.

B. Contractor shall fully cooperate with the Owner so that neither the Contractor’s work nor work performed by the Owner is adversely affected. Cooperation shall include coordination, exchange of information, attending meetings and efforts as necessary by both the Contractor and the Owner’s employees and contractors.

C. Contractor shall not restrict the Owner and their Subcontractor’s access to or use of the site, nor inhibit in any way their ability to meet their contractual obligations.

1.21 RUNWAYS AND DROP CLOTHS

A. Whenever Contractor's performance of the Work requires them to work in proximity to or in direct contact with any finishes, furnishing or furniture, Contractor shall protect such finished work using the best possible practices.

1.22 SPECIAL WORKING CONDITIONS

A. The Contractor will recognize the presence of employees, visitors and other members of the public at the site and shall employ adequate precautions to protect the employees, visitors and the public from all hazards associated with the Work and to protect the Work from damage. "Spotters" shall be utilized when equipment is being installed or removed.

B. Contractor’s materials, tools, equipment and construction apparatus shall not be left unlocked or unprotected. Contractor's workmen shall be instructed to keep small tools in their personal possession or observation at all times. Neither the Owner nor the Construction Manager assume responsibility for the Contractor’s materials, tools, equipment or construction apparatus used or stored at the site.

C. The Owner's building engineering staff and administrators shall be consulted as to any hazards particular to this site, this facility and the Work. Contractor shall comply with all directions given by the Owner and the Owner’s designated representatives.

D. No firearms or other weapons, explosives, intoxicating beverages or narcotics shall be carried on, or used on the Owner's property. Contractors and all Subcontractors shall adhere to Owner’s tobacco use policy.

E. There shall be no fraternization with visitors or employees on the job.

F. Contractor shall recognize the fact that most employees of the Owner are non-union personnel and that such fact shall not be considered as excuse for delay in the Work. Contractor, its agent, Subcontractors, employees and Suppliers shall not interfere in any manner with the labor

relations between Owner and its employees. In no case will any responsibility of the Contractor to employ union labor be extended to Owner, nor will the work performed by Owner's employees, whether union or non-union, be interfered with by Contractor, its employees, Subcontractors, agents or suppliers.

G. The Contractor shall be responsible for informing all of their personnel and employees, Subcontractors, Suppliers and related employees of the "Special Working Conditions".

1.23 DOCUMENT AT THE SITE

A. Contractor shall maintain at the site one record set of the Drawings, Specifications, Addenda, Change Orders, RFIs, and all approved submittals. Contractor shall continuously update and mark these documents to reflect actual installed condition and locations (both horizontally and vertically) and all approved changes issued by Owner.

B. These documents maintained at the site shall become the basis of the Contractor’s preparation of the Project Record Drawings and Project Manual.

1.24 RECORD DOCUMENTS

A. Prepare "as-built" record documents for all mechanical, fire protection, medical gas, plumbing and electrical systems. Record drawings shall be provided using AutoCAD (most current version). Provide both hard copies and electronic copies on CDROM’s as part of record Drawings. Record Drawings shall be updated shop drawings or Drawings issued for Bid and shall include:

1. Record Drawings shall represent actual installed condition of all work.
2. Ductwork mains and branches, type, size, location, and elevation for both exterior and interior; locations of fire, smoke, combination fire/smoke, balancing, backdraft and other types of dampers or louvers, and other control devices; filters; grilles and diffusers with airflow rates and devices requiring periodic maintenance or repair, turning vanes, access doors, air terminal units and all other devices located in or connected to ductwork systems.
3. Mains and branches of all piping systems, type, size, locations and elevation with valves and control devices located and numbered to match valve schedule, with items requiring maintenance located (i.e., traps, strainers, expansion compensators, mixing valves, etc.). Indicate actual inverts and locations of all underground piping.
4. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
5. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

B. Owner will provide Contractor with AutoCAD Drawing files for use by the Contractor in maintaining, preparing and submitting final Record Drawings.

1.25 PROJECT MANUAL

A. Assemble and submit at completion of the Project, a Project manual that includes at a minimum all of the following:

1. All RFI’s with Owner’s responses.
2. Copies of all approved submittals, including all shop Drawings.
3. Copies of all test reports.
4. Copies of all reports by inspectors representing authorities having jurisdiction. Include initial and final reports and any Contractor responses to same.
5. Copies of all system, equipment, etc. start-up reports.

6. Other information that may be useful or required by Owner necessary to document the work performed under this contract.

1.26 CORRECTION OF THE WORK

A. Contractor shall correct any Work rejected by Owner for failure to comply with the Contract Documents, whether discovered before or after the Work has been covered by subsequent Work, whether or not inspected by Owner and whether or not the Work has been determined to be substantially or finally complete.

B. Contractor shall bear the full cost of correcting the Work to bring the Work into compliance with the Contract Documents. Cost of correction shall include all costs associated with:

1. Uncovering and recovering the Work.
2. Recovering and replacing the non conforming Work
3. Any re-inspections, acceptances, certifications and approvals required by authorities having jurisdiction and by the Contract Documents.
4. Revisions to Record Documents.

1.27 HAZARDOUS MATERIALS

A. Contractor shall comply with the Contract Documents and all laws, standards and handling criteria regarding hazardous materials, substances and wastes, including asbestos, lead-based paints, petroleum products, mold, radon and polychlorinated biphenyl (PCB) in performing the Work. No hazardous materials shall be brought onto the Project site or otherwise incorporated into the Work by any of the Contractor parties. In the event hazardous materials are encountered that are not addressed in the Contract Documents, Contractor shall immediately (1) stop Work in the affected area, (2) report the condition to the Owner both verbally and in writing and (3) take all reasonable precautions to prevent or contain the movement, spread or disturbance of the suspected hazardous materials and to protect all persons and property. Once the Owner has investigated and, if necessary, properly remediated, abated or contained the suspected hazardous material, Work in the affected area shall resume. Provided the Contractor fulfills its obligations herein, The Contract Time shall be extended appropriately by Change Order.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01200

SECTION 01220
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for Contract closeout and related matters.

B. All documents described in this Section of the Specifications shall be submitted to the Owner prior to Owner making final payment to Contractor.

1.2 CLEAN UP

A. At the completion of work, remove all temporary facilities, unused materials, tools, equipment, trash and debris from the site. Leave the site clean, neat and ready for full and normal use by the Owner.

1.3 OPERATION AND MAINTENANCE MANUALS

A. Submit Operation and Maintenance Manuals to Owner for approval. Organize operating and maintenance data into suitable sets of manageable size. Bind and properly index data in individual heavy-duty, 3-ring, vinyl covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Control and wiring diagrams.
5. Recommended "turn around" cycles.
6. Inspection and Maintenance procedures.
7. Shop Drawings and Product Data.
8. One copy of all submittals and "As Built" Drawings.

1.4 FINAL INSPECTION REPORT

A. Submit to Owner a report detailing actions taken by Contractor as a result of Owner’s final project inspection. Contractors report shall detail action taken for each individual item included in Owner’s final inspection report. Include a copy of Owner's inspection report with Owners signature verifying completion of remedial actions with Contractor’s submission.

1.5 OTHER DOCUMENTS

A. See Section 01200 for other documents to be submitted with Application for Final Payment. Documents identified in Section 01200 include:

1. Record Drawings.
2. Project Manual.
3. Lien Waivers.
4. Owner Training Verification.
5. Extra Stock and Spare Parts.
6. Project and Other Warranties.

END OF SECTION 01220

SECTION 01330
PERMITS, REGULATIONS AND TAXES

PART 1 - GENERAL

1.1 CONTRACTORS RESPONSIBILITIES

A. The Contractor shall be responsible for obtaining and paying for any and all permits, licenses, plan reviews, inspections, etc, including building permits, required by all authorities having jurisdiction over the Work required by this Contract.

B. Contractor shall arrange and pay for any and all inspections required by non-governing authorities having jurisdiction over the Work, including any utility companies, as required by the Work.

C. Owner is a not for profit entity and such is not subject to sales and similar taxes. Contractor shall not be required to make such tax payments for this project. Successful bidder will be provided with proof of Owners tax exempt status prior to award of the Contract.

D. All work shall be in full compliance with the building codes, ordinances and regulations adopted by all governing bodies having jurisdiction over the Work required by this Contract.

1. The Contractor shall promptly notify Owner if the Contractor observes that any portions of the Contract Documents are at variance with the codes, ordinances and regulations governing the Work. Owner shall take such actions necessary to bring the Work into compliance.

E. Contractor shall, after obtaining approval of submittals from Owner, forward any and all required information to any authority having jurisdiction, including but not limited to local and State Fire Marshals, as required to obtain approval of same.

F. The Contractor and all Subcontractors performing work under this Contract shall fully comply with the provisions of the Federal Occupational Safety and Health Act and the rules and regulations promulgated pursuant to this Act.

G. Contractor shall comply with or warrant:

1. Contractor represents and warrants that neither it nor any of the other Contractor Parties will employ or use any individual to perform Work who is not legally authorized to work in the United States in the capacity required to perform such Work. Contractor further certifies that all employees and other individuals performing Work are legally authorized to work in the United States in the capacity required to perform the Work and will provide upon request written documentation to support such certification. Contractor shall indemnify, hold harmless and, if the Owner elects, defend Owner from and against all claims, damages, losses and expenses arising out of any alleged failure of Contractor to comply with its warranties, representations, and certifications under this paragraph.
2. Contractor shall maintain, preserve and make available to Owner for at least six years after final payment, records of all costs incurred by Contractor arising out of or relating to the Work, including invoices, vouchers, checks, receipts, time sheets, accounts, cost reports, contracts, inspections, tests, lien waivers and releases. Upon reasonable notice, Owner shall have the right to audit all of the Contractor's books and records with respect to the Project.

PART 2 - SUBCONTRACT AGREEMENTS

A. Contractor agrees to include all the provisions contained in Specification Section 01330 in each of its agreements with all subcontractors for work or services to be performed for the Project.

PART 3 - PRODUCTS

(NOT USED)

PART 4 - EXECUTION

(NOT USED)

END OF SECTION 01330

SECTION 01340
TESTS AND INSPECTIONS

PART 1 - GENERAL

1.1 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall arrange for and pay for all tests, inspections and approvals, associated with the Work, required by the Contract Documents, by laws, or by any authorities having jurisdiction over the Work.

B. All required tests and inspections shall be scheduled and obtained by the Contractor matching the sequence of the Work to ensure Work is completed per the Project Milestone Schedule.

C. Contractor shall forward to Owner all certificates or notices of all tests and inspections, including the results of tests and inspections, issued by the entities performing the tests and inspections. Where such entities do not issue certificates and/or results of tests and inspections, Contractor shall provide a written report to Owner detailing:

1. Date and time of test or inspection.
2. System or equipment tested or inspected.
3. Entity performing test or inspection, including contact name and contact information.
4. Results of test or inspection.
5. Any remedial actions identified by the entity performing the test or inspection.

D. Contractor shall perform all remedial actions identified by the entity performing the test and/or inspection; and shall perform any other work required to obtain the approval of the entity performing the test and/or inspection. No additional payments shall be made to the Contractor, nor shall any extensions to the Project Milestone Schedule be granted where required remedial actions are Work required by the Contract Documents.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - PART 3 – EXECUTION

(NOT USED)

END OF SECTION 01340

SECTION 01420
SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of Work.

1. See individual specification sections for submittal requirement specific to each product, material, equipment or service required by the Work.
2. Contractor shall, prior to forwarding a submittal, review each submittal to ensure the information required to be included in the submittal (as identified in each specific section) is in fact included.
3. Submittals that do not include all required information (as identified in each specification section) will be returned to the Contractor without review.

1.2 SUBMITTAL PROCEDURES

A. Engineer will provide Contractor with a project submittal log identifying all submittals required to be furnished by the Contractor to Engineer and Owner.

1. Engineer will maintain Project Submittal Log to reflect current status of all submittals required to be furnished by the Contractor. Contractor may request a copy of the Project Submittal Log at any time during the project.

B. All submittals shall be forwarded to the Engineer electronically using read only PDF files. Large submittals shall utilize multiple PDF files with each individual PDF file being clearly named (describing contents of file) and limited to a maximum file size of 8 MB.

1. Each submittal shall include an Owner transmittal cover sheet. Owner will provide Contractor with a master transmittal cover sheet.
2. Submittals shall be emailed to: Ciarra.king@hendersonengineers.com
3. Email Subject Line: Wilson Auditorium House Lighting Replacement

C. Processing: Allow sufficient review time so that the Project will not be delayed as a result of the time required to process submittals, including time for required re-submittals.

1. Allow 7 calendar days for Engineer's MEP submittal review. Allow additional time if processing must be delayed to permit coordination with subsequent and related submittals.
2. No extension of Contract Time will be authorized due to Contractor's failure to transmit submittals to Engineer sufficiently in advance of the Contractor's need for approved submittals based on the Contractor's Project Schedule.

D. Clearly mark each submittal to show applicable choices, options and accessories provided. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the information applicable to the product or material supplied. Submittals not marked to show applicable choices will be returned for revision. Include the following information with each submittal where applicable. See each Section of these Specifications for additional information to be included with each submittal.

1. Manufacturer's printed installation and application recommendations.
2. Compliance with specified trade association's standards.
3. Compliance with specified testing agencies, Codes and Standards requirements.

E. Contractors Review: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents prior to forwarding to Owner. Note any corrections and required field dimensions on body of submittal.

F. Approval Stamp: Stamp each submittal with a Contractor's approval stamp. Include Project name and location, submittal number, Specification Section number and title, name of reviewer, date of Contractor's approval and statement certifying that submittal has been reviewed, checked and approved by the Contractor for compliance with the Contract Documents.

G. Organize and forward submittals to Engineer by individual Specification Section. Provide a minimum of one submittal per Specification Section.

1.3 ENGINEER'S ACTION

A. Engineer will review each submittal, will revise submittal as required to comply with the Contract Documents and will mark with Action Stamp.

B. Engineer will return reviewed submittal electronically using the same file format as used by Contractor.

C. Action Stamp: Each submittal will be stamped with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. "1" – Approved: When submittal is marked "Approved" that part of the Work covered by the submittal process may proceed.
2. "2" – Approved as Corrected: When submittal is marked "Approved as Corrected", that part of the Work covered by the submittal may proceed provided all submittal review notes are fully complied with, without exception.
3. "3" – Revise and Resubmit: When submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery or any other activity. Prepare a NEW submittal in accordance with all submittal review notes and specified requirements; resubmit without delay.
4. "4" – Rejected: Where submittal is marked "Rejected", submittal has been rejected without review for compliance with specifications. Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery or any other activity. Prepare a NEW submittal showing full compliance with the specified requirements; resubmit without delay. Contractor shall perform no portion of the Work that requires the Contractor to obtain approved submittals until such approval has been obtained from Owner.
5. "5" – Not Reviewed: Where submittal is marked "Not Reviewed". Submittal will be returned with an explanation as to why the submittal was not reviewed.
6. "6" – For Information Only: Where submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "For Information Only". Resubmittal is not required.
7. "7" – See Attached Review by Others: Submittal was reviewed by an Owner retained consultant. Follow the submittal actions directed by the consultant.

D. Review of submittals shall be for compliance with Drawings, schedules, Specifications and design intent. Approval of a submittal or any portion of a submittal shall not be interpreted as approval of the following information included in the submittal:

1. Quantities (i.e. number, lengths, volumes, square feet, weights, etc.)
2. Dimensional compatibility with installed locations.
3. Methods of factory and/or field assembly.
4. Transport, storage, rigging, installation, start-up and testing methods.
5. Warranties in conflict with specified warranties.
6. Payment terms in conflict with specified terms.

E. Contractor's first Pay Application will not be processed until all required submittals have been received and approved by Engineer and Owner.

1.4 SUBMITTALS TO AUTHORITIES HAVING JURISDICTION

A. Contractor shall be responsible for preparing and submitting calculations, shop drawings, product data and all other required documents to all authorities whose approval must be obtained to perform and accept the Work.

B. Format and number of copies shall be as required by reviewing authorities. Engine shall be provided with one copy of all such submissions concurrent with submission to reviewing authority.

C. Contractor shall provide the Engineer one copy of all approved submissions (with proof of reviewing authority's approval). Contractor shall provide the Owner with one copy of all field inspection and field test reports issued by the reviewing authorities.

D. Documents required by paragraphs A, B and C above shall be included in the Project Manual detailed in Section 01200.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION 01420

SECTION 01530
WORKING HOURS, UTILITY INTERRUPTIONS AND PROJECT PHASING

PART 1 - GENERAL

1.1 BASIS OF BID

A. Contractor shall prepare the bid and execute the Work based on conducting all work to be performed at the site only during the allowable working hours specified in this Specification Section and detailed elsewhere in the Contract Documents.

B. Contractor shall prepare the bid and execute the Work requiring utility interruptions per the requirement of this Specification Section and detailed elsewhere in the Contract Documents.

C. Contractor shall prepare the bid and execute the Work utilizing the Project Phasing requirements of this Specification Section and detailed elsewhere in the Contract Documents.

1.2 ALLOWABLE WORKING HOURS

A. Allowable Working Hours: Allowable working hours shall be defined as those hours during which Contractors, material Suppliers, technicians, and startup personnel may have access to various interior and exterior areas at the site for the purpose of performing all work required by this Contract.

B. Normal Business Hours: 6:30am to 4:30pm; Monday through Friday. Not all work required to complete the Project can be performed during normal business hours. Work required to be performed outside normal business hours is identified later in this Specification Section.

C. Application: All work performed at the site, both within the Facility and exterior to the Facility, by the Contractor, by all Contractor's Subcontractors and by all other Contractor's Partners shall be performed only during the specified allowable working hours.

D. Verification of allowable working hours shall be the responsibility of the Contractor prior to the start of any work required by this Contract. Verification shall include the following:

1. Contractor shall meet with Owner's representative to detail the type of work to be performed in each area where work will be performed within and exterior to the facility.
2. Contractor shall obtain, from Owner's representative, Owner's normal occupancy and utilization schedules for all areas within the Facility that will be affected by work required by this contract.
3. Contractor shall then establish allowable working hours, for each type of work in each individual area in which work is to be performed. All allowable working hours shall be approved by Owner.
4. Contractor shall prepare a written description of allowable working hours for each type of work in each individual area in which work is to be performed. Written description shall be distributed to all Subcontractors, all other Contractor's Parties, to the Owner.

E. In general, Owner will allow the Contractor to perform work in the following areas during normal business hours, if work performed by the Contractor does not adversely affect in any manner Owner's normal use of the Facility, nor create objectionable noise, dust or other disturbances.

1. Mechanical and electrical rooms.
2. Exterior to the Facility excluding work associated with exterior equipment such as rooftop air handlers, cooling towers, utility services, roadways, parking lots, etc.
3. Other areas specifically as identified by the Owner.

F. Owner reserves the right to require Contractor to immediately cease any work in any location should said work produce noise, dust, fumes or in any other manner interfere with Owner's

normal or required use of the Facility; or creates any unacceptable interruption in the normal operation of any mechanical, electrical, plumbing or fire protection and alarm systems or other required systems.

G. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.

H. Contractor shall maintain contingency work plans should Owner be required to alter allowable working hours on short notice or require Contractor to cease work as previously described. Contractor contingency plan shall allow efficient use of their personnel in other areas or perform other portions of the Work when Owner exercises the right to deny Contractor access to specific areas. Additional payment to the Contractor will not be allowed as a result of Owner's denial of access to areas within the Facility.

I. Contractor's and Subcontractor's personnel may, at the Owners discretion, be allowed access to the area within the Facility during times other than during specified allowable working hours to perform the following:

1. Taking of measurement, inventory, etc., as required to order product and materials and to shop fabricate items for field installation.
2. Making general observations related to scheduling of work and product and material deliveries.
3. Receiving products and materials that cannot be delivered during allowable working hours.
4. Owner will require Contractors to immediately cease work associated with items 1, 2 and 3 above should said work produce noise, dust, fumes or interfere in any way with Owner's normal and required use of the Facility.
5. All work listed for items 1 through 4 above shall be scheduled in advance with the Owner.

J. Delivery of material and products shall be scheduled to occur during normal business hours. Where deliveries cannot occur during allowable working hours, Contractor shall coordinate delivery times and location with Owner, a minimum of 72 hours in advance of delivery. Owner shall identify allowable areas of on-site temporary storage and allowable maximum storage period. Materials and products shall be set in final installed location only during allowable working hours.

1.3 UTILITY INTERRUPTIONS

A. Definition: Utility interruptions shall be defined as any disruption to the normal operation of the following MEP systems caused by the Contractor in order to perform the work required by this contract.

1. HVAC Systems:
   - ***a.*** Heating
   - ***b.*** Cooling
   - ***c.*** Airflow
   - ***d.*** Exhaust
   - ***e.*** Temperature control systems
2. Plumbing Systems:
   - ***a.*** Domestic cold and hot water
   - ***b.*** Sanitary drainage
   - ***c.*** Storm drainage
   - ***d.*** Fire protection
   - ***e.*** Natural gas
3. Electrical Systems:
   - ***a.*** Normal and emergency power
   - ***b.*** Lighting
   - ***c.*** Phone/data/communications

d. Local and facility P/A
e. Security
f. Cable and satellite television
g. Fire detection
h. Fire annunciation

B. All disruptions of utility services shall be performed only during hours specified later in this Specification Section or where not specified only during hours identified by the Owner. Contractor shall establish allowable time periods for utility interruptions using methods similar to that described for establishing allowable working hours (Section 1.2).

C. All interruptions shall be as short in duration as possible. Any service interrupted shall be restored to full operation as soon as practical and at a minimum shall be restored to full operation a minimum of 2 hours prior to Owner occupancy or normal use of space or system affected by interruption.

D. All interruptions shall be scheduled with Owner a minimum of 7 days in advance of interruption.

E. Contractor shall schedule the work in such a manner as to minimize the number of utility interruptions required to perform the Work.

1.4 SPECIAL WORKING HOURS

A. No Work in project scope is identified as requiring special working hours.

1.5 DRAWINGS AND SPECIFICATIONS

A. Additional requirements for project phasing, allowable working hours and utility interruptions may be identified in other Sections of these Specifications and on the Drawings.

END OF SECTION 01530

SECTION 01600
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.2 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of the Work.

B. Patching: Restoration and repair work required to restore surfaces to original conditions after installation of the Work.

1.3 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational and Miscellaneous Elements: Do not cut and patch elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Visual Requirements: Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

D. Rated Construction: Cut and patch existing elements that are fire and/or smoke rated using methods and materials that maintain the existing rating and that are approved by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials and that are approved in advance by the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas using methods approved by the Owner.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction and subsequently patch as required to restore surfaces to their original condition.

B. Noise and Dust Generating Operations: Coordinate noise and dust generating operations with the Owner and Owners Facility Specific Procedures (01510) to minimize disturbance to normal operations. Noise and dust generating operations may be required to be conducted at other than normal working hours.

C. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer, and comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Proceed with patching after construction operations requiring cutting are complete.

D. Patching: Patch construction by filling, repairing, refinishing, closing up and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible or required, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in new space. Provide an even surface of uniform finish, color, texture and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
b. Perform work to maintain existing fire and smoke ratings.

4. Ceilings: Patch, repair or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
6. Rated Construction: Where cutting and patching rated construction fully restore fire and/or smoke rating of existing construction using only materials and methods acceptable to authorities having jurisdiction. Obtain and pay for any required inspections after completion of restoration.

END OF SECTION 01600

CONTRACTOR'S AFFIDAVIT AND FINAL WAIVER AND RELEASE OF LIEN

A. OWNER: _____

B. CONTRACTOR: _____

C. PAYER: Platte County R-III School District

D. PROJECT: Wilson Auditorium House Lighting Replacement

E. ADDRESS: _____

_____

_____

F. APPLICATION FOR PAYMENT NUMBER: _____

G. AMOUNT OF FINAL PAYMENT: _____

For and in consideration of the payments made by Owner to the Contractor or to any subcontractor, materialman or supplier of the Contractor, for labor and employed in and/or materials furnished for the construction of the above referenced Project, the Contractor hereby certifies as follows:

1. Upon receipt of the sum specified in Item G. above, the Contractor certifies that it has received payment in full for all sums due and payable under the contract described herein, as amended by all change orders and other amendments, if any (collectively, the "Contract"), and all sums due for all materials furnished to and/or for all Work performed and labor and services furnished in the construction of the Project, and the Contractor hereby affirms that there will be no outstanding claims against the Contractor and/or its sureties in connection with this Project.

2. Contingent upon receipt of the sum specified in item G., the Contractor does hereby waive, release and quit claim in favor of the Owner of the Project, each and every party acquiring title to and/or making a loan on the Project, and the title company or companies examining and/or insuring title to the Project and any and all of their successors and assignees, all rights of the Contractor to assert any lien upon the land and improvements comprising the Project, by virtue of any law in the jurisdiction in which the land and improvements are situate or any amendment of said law, regarding the rights of a contractor, subcontractor, laborer, supplier, or materialman to assert a lien or claim against the Project.

3. Contingent upon receipt of the sum specified in Item G., the Contractor does hereby forever release, waive, and discharge the Project and the Owner of the Project, from any and all causes of action, suits, debts, accounts, damages, liens, encumbrances, judgments, claims, and demands whatsoever, in law or equity which the Contractor and/or its successors and/or assignees ever had, now have, or ever will have against the Owner of the Project, by reason of the Contract and/or the performance of Work and/or the furnishing of labor, services and materials relating to the construction of the Project; and the Contractor hereby agrees to indemnify and hold the above parties harmless from any and all damages, costs, expenses, demands, suits, and legal fees, directly or indirectly relating to or arising out of any claim or lien by any party relating to that which was paid or performed or should have been performed by or for the Contractor in connection with the Project or under the terms of the Contract.

4. The Contractor has not and will not assign any claim against the Owner of the Project, nor any lien or right to perfect a lien against the Project, and the Contractor has the right, power, and authority to execute this Affidavit, Final Waiver and Release.

5. Contingent upon receipt of the sum specified in Item G., the Contractor agrees that all laborers and all subcontractors employed by it, and all other laborers, trade contractors and subcontractors and sub-subcontractors of every tier and all suppliers or materialmen who have furnished Work, labor, materials or services in connection with the Project will be paid in full and that none of such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers, materialmen, or other claimant will have any claim, demand or lien against the Project, and the Contractor hereby agrees to hold the Project and the Owner of the Project harmless from any such claim, demand or lien.

6. No security interest has been given or executed by the Contractor for or in connection with any materials, appliances, machinery, fixtures, or furnishings placed upon or installed in the Project.

This Affidavit, Waiver and Release shall be an independent agreement and covenant and shall operate and be effective with respect to Work and labor done and materials furnished under any supplemental contract or contracts, whether oral or written, for extra or additional work on the Project and for any further work done or materials furnished at any time with respect to the Project subsequent to the execution hereof.

IN WITNESS WHEREOF, this Final Release of Lien has been executed this _____ day of _____, 20___.

WITNESS

_____

_____ By:_____

_____ Its:_____

Subscribed and sworn to before me this _____ day of_____, 20___.

_____
(Notary Public)

My Commission Expires:_____

(Notarial Seal)

CONTRACTOR'S PARTIAL WAIVER AND RELEASE OF LIEN

A. OWNER: Platte County R-III School District

B. CONTRACTOR: _____

C. PAYER: Platte County R-III School District

D. PROJECT: Wilson Auditorium House Lighting Replacement

E. ADDRESS: _____

_____

_____

F. APPLICATION FOR PAYMENT NUMBER: _____

G. AMOUNT OF PAYMENT: _____

For and in consideration of the payment to be made by Owner to the Contractor in the amount set forth in Item H. above, which payment is for Work, labor and services and/or materials furnished for the construction of the above referenced Project, the Contractor hereby certifies as follows:

1. The Contractor hereby waives, releases and quit claims in favor of the Owner of the Project, each and every party acquiring title to and/or making a loan on the Project, and the title company or companies examining and/or insuring title to the Project and any and all of their successors and assignees, all rights of the Contractor to assert a lien upon the land and improvements comprising the Project, but only to the extent of sums actually received for Work, labor, services and materials furnished through _____, plus the sum paid as set forth in item G above.

2. The Contractor has not assigned any lien or right to perfect a lien against the Project, and the Contractor has the right, power and authority to execute this document.

3. The Contractor warrants that all laborers and all subcontractors employed by the Contractor, and all other laborers, trade contractors and sub-subcontractors of every tier and all suppliers or materialmen who have furnished work, labor, materials or services incorporated into the Project and any lien or bond claimant relating to the Work, labor, materials or services of any such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers or materialmen furnished in connection with the Project, have been paid their respective portion of all prior payments and that none of such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers, materialmen, or other claimants have any claim of lien against the Project through the _ _____ day of _____,20___.

4. No security interest has been given or executed by the Contractor for or in connection with any materials, appliances, machinery, fixtures, or furnishings placed upon or installed in the Project.

IN WITNESS WHEREOF, this Partial Release of Lien has been executed this _____ day of_ _____, 20___.

WITNESSES

_____

_____ By:_____

_____ Its:_____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
(Notary Public)

My Commission Expires:_____

(Notarial Seal)

DOCUMENT 000105 – CERTIFICATIONS AND SEALS

Electrical Engineer:

I hereby state that the Specifications intended to be authenticated by my seal are limited to Specification Sections listed below

Division 26 Sections: 260010, 260500, 260519, 260526, 260529, 260533, 265100, 265561

I hereby disclaim any responsibility for all other specifications, drawings estimates, reports, or other documents or instruments relating to or intended to be used for any part or parts of the architectural or engineering project or survey.

Curtis A. Olds.

License No. PE-2018036640

Dec 31 2019

TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL SPECIFICATION

260010 GENERAL ELECTRICAL REQUIREMENTS
260500 COMMON WORK RESULTS FOR ELECTRICAL
260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260529 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
265100 INTERIOR LIGHTING
265561 THEATRICAL LIGHTING

END OF DIVISION 26 TABLE OF CONTENTS

SECTION 260010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and to all following sections within Division 26.

1.2 SECTION INCLUDES

A. This Division requires providing complete functioning systems, and each element thereof, as specified, indicated, or reasonably inferred, on the Drawings and in these Specifications, including every article, device, or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include, but are not limited to, materials, labor, supervision, supplies, tools, equipment, transportation and utilities.

B. Division 26 of these Specifications, and Drawings numbered with prefixes E, generally describe these systems, but the scope of the electrical work includes all such work indicated in all of the Contract Documents, including, but not limited to: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.

C. Drawings are graphic representations of the Work upon which the Contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They also convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, outlets and circuits without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the Drawings as a guide when laying out the Work and to verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

D. Specifications define the qualitative requirements for products, materials, and workmanship upon which the Contract is based.

1.3 DEFINITIONS

A. Whenever used in these Specifications or Drawings, the following terms shall have the indicated meanings:

1. Furnish: "To supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations."

2. Install: "To perform all operations at the project site, including, but not limited to, and as required: unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

3. Provide: "To furnish and install complete, and ready for the intended use."

4. Furnished by Owner (or Owner-Furnished) or Furnished by Others: "An item furnished by the Owner or under other Divisions or Contracts, and installed under the requirements of this Division, complete, and ready for the intended use, including all items and services incidental to the Work necessary for proper installation and operation. Include the installation under the warranty required by this Division.

5. Engineer: Where referenced in this Division, “Engineer” is the Engineer of Record and the Design Professional for the Work under this Division.

    a. A Consultant to, and an authorized representative of, the Owner, as defined in the General and/or Supplementary Conditions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to, the “Owner”.

6. Contract Administrator: Where referenced in this Division, “Contract Administrator” is the primary liaison between the Owner and the Contractor. Specifically, for this project this is “the Engineer”.

7. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

8. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ, and standards that meet the specified criteria.

9. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

    a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

    b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

10. Value Engineering: A systematic method to improve the “value” of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.

B. The terms "approved equal", “equivalent”, or "equal" are used synonymously and shall mean “accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified”. The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

C. Manufacturers: The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety.

1.4 REFERENCE STANDARDS

A. Execute all work in accordance with, and comply at a minimum with, National Fire Protection Association (NFPA) codes, state and local building codes, and all other applicable codes and ordinances in force, governing the particular class of work involved, for performance, workmanship, equipment, and materials. Additionally, comply with rules and regulations of public utilities and municipal departments affected by connection of services. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most

stringent. Wherever requirements of these Specifications, Drawings, or both, exceed those of the above items, the requirements of these Specifications, Drawings, or both, shall govern. Code compliance, at a minimum, is mandatory. Construe nothing in these Construction Documents as permitting work not in compliance, at a minimum, with these codes. Bring all conflicts observed between codes, ordinances, rules, regulations and these documents to the Contract Administrator's and Engineer's attention in sufficient time, prior to the opening of bids, to prepare the Supplementary Drawings and Specifications Addenda required to resolve the conflict.

B. If the conflict is not reported timely, prior to the opening of bids, resolve the conflict and provide the installation in accordance with the governing codes and to the satisfaction of the Contract Administrator and Engineer, without additional compensation. Contractor will be held responsible for any violation of the law.

C. Obtain timely inspections by the constituted authorities having jurisdiction; and, upon final completion of the Work, obtain and deliver to the Owner executed final certificates of acceptance from these authorities having jurisdiction.

D. All material, manufacturing methods, handling, dimensions, methods of installation, and test procedures shall conform to industry standards, acts, and codes, including, but not limited to the following, except where these Drawings and Specifications exceed them:

IBC International Building Code
ADA Americans with Disabilities Act
AEIC Association of Edison Illuminating Companies
ANSI American National Standards Institute
ASTM American Society of Testing Materials
AWS American Welding Society
AWWA American Water Works Association
CSA/USA Canadian Standards Association/USA
ICEA Insulated Conductors Engineers Association
IEEE Institute of Electrical and Electronics Engineers
IES Illuminating Engineering Society
NBFU National Board of Fire Underwriters
NEC National Electrical Code, NFPA 70
NECA National Electrical Contractors Association
NEMA National Electrical Manufactures' Association
NETA InterNational Electrical Testing Association
NFPA National Fire Protection Association
OSHA Occupational Safety and Health Act
UL Underwriter's Laboratories

E. Comply with rules and regulations of public utilities and municipal departments affected by connections of services.

F. Perform all electrical work in compliance with applicable safety regulations, including OSHA regulations. All safety lights, guards, and warning signs required for the performance of the electrical work shall be provided by the Contractor.

G. Obtain and pay for all permits, licenses and fees that are required by the governing authorities for the performance of the electrical work.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with other divisions for electrical work included in them but not listed in Division 26 or indicated on electrical Drawings.

B. Visit the site and ascertain the conditions to be encountered in installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provisions for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, and incorrect or faulty installation

of any of the Work under this Division or for additional compensation for any work covered by this Division.

C. Refer to Drawings and divisions of the other trades and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. Make all offsets required to clear equipment, beams and other structural members, and to facilitate concealing conduit in the manner anticipated in the design.

D. Provide materials with trim that will fit properly the types of ceiling, wall, or floor finishes actually installed.

E. Maintain an electrical foreman on the jobsite at all times to coordinate this work with other trades so that various components of the electrical systems is installed at the proper time, fits the available space, and allows proper service access to all equipment. Carry on the Work in such a manner that the Work of the other trades will not be handicapped, hindered, or delayed at any time.

F. Work of this Division shall progress according to the "Construction Schedule" as described in Division 01 and as approved by the Contract Administrator. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of all schedule dates.

1.6 MEASUREMENTS AND LAYOUTS

A. The Drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the Work. Figured dimensions take precedence to scaled dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. Correct, at no additional costs to the Owner, errors that could have been avoided by proper checking and inspection.

1.7 SUBMITTALS

A. Refer to Division 01 and General Conditions for submittal requirements, in addition to requirements specified herein.

B. Submittals and shop drawings shall not contain Henderson Engineer’s firm name or logo, nor shall they contain the Henderson Engineer’s seal and signature. They shall not be copies of Henderson Engineer’s work product. If the Contractor desires to use elements of such product, the license agreement for transfer of information at the end of this section must be used.

C. Assemble and submit for review manufacturer product literature for material and equipment to be furnished and/or installed under this Division. Literature shall include shop drawings, manufacturer product data, performance sheets, samples, and other submittals required by this Division. Provide the number of submittals required by Division 1; if hard-copy sets are provided, submit a minimum of seven (7) sets. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

D. Separate submittals according to individual specification sections. Only resubmit those sections requested for resubmittal.

E. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed. Illegible submittals will be rejected and returned without review.

F. Refer to individual sections for additional submittal requirements.

G. Transmit submittals as early as required to support the project schedule. Allow two weeks for Engineer review time, plus to/from mailing time via the Contract Administrator, plus a

duplication of this time for resubmittals, if required. Transmit submittals as soon as possible after Notice to Proceed and before electrical construction starts.

H. Before transmitting submittals and material lists, verify that the equipment submitted is mutually compatible with and suitable for the intended use. Verify that the equipment will fit the available space and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location, or configuration, submit a shop drawing showing the proposed layout.

I. Submittals shall contain the following information:

1. The project name.

2. The applicable specification section and paragraph.

3. Equipment identification acronym as used on the drawings.

4. The submittal date.

5. The Contractor's stamp, which shall certify that the stamped drawings have been checked by the Contractor, comply with the Drawings and Specifications, and have been coordinated with other trades.

6. Submittals not so identified will be returned to the Contractor without action.

J. Refer to Division 1 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with this Section and the procedures specified in Division 1. Contractor shall notify the Contract Administrator and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 1, Contractor shall include the website, user name and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the Contractor Administrator's and Engineer's designated representatives. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the submittal.

K. The checking and subsequent acceptance by the Engineer and/or Contract Administrator of submittals shall not relieve responsibility from the Contractor for (1) deviations from the Drawings and Specifications; (2) errors in dimensions, details, sizes of equipment, or quantities; (3) omissions of components or fittings; and (4) not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Contract Administrator prior to implementing any deviation.

1.8 SUBSTITUTIONS

A. Refer to Division 1 and General Conditions for substitutions in addition to requirements specified herein.

B. Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution.

C. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications.

D. Request for Substitution:

1. Complete and send the Substitution Request Form attached at the end of this section for each material, product, equipment, or system that is proposed to be substituted.

2. The burden of proof of the merit of the proposed substitution is upon the proposer.

3. Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following:

   a. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects.

   b. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts.

   c. Proposed substitution has received necessary approvals of the Authorities Having Jurisdiction.

   d. Same warranty will be furnished for proposed substitution as for specified Work.

   e. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby.

   f. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

E. Substitution Consideration:

1. No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation.

2. No substitutions will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids.

3. If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other manner. Verbal approval will not be given.

4. No substitutions will be considered after the Contract is awarded unless specifically provided in the Contract Documents.

1.9 ELECTRONIC DRAWING FILES

A. In preparation of shop drawings or record drawings, Contractor may, at their option, obtain electronic drawing files in AutoCAD or DXF format from the Engineer for a shipping and handling fee of $200 for a drawing set up to 12 sheets and $15 per sheet for each additional sheet.

B. Contractor shall request and complete the Electronic File Release Agreement form from the Engineer. Send the form along with a check made payable to Henderson Engineers, Inc. Contractor shall indicate the desired shipping method and drawing format on the attached form.

C. The following must be received before electronic drawing files will be sent:

1. Engineer’s release agreement form

2. Payment

1.10 QUALITY ASSURANCE

A. Execute all work under this Division in a thorough and professional manner by competent and experienced workmen duly trained to perform the work specified.

B. Install all work in strict conformance with all manufacturers' requirements and recommendations, unless these Documents exceed those requirements. Install all equipment and materials in a neat and professional manner, aligned, leveled, and adjusted for satisfactory operation, in accordance with NECA guidelines.

C. Unless indicated otherwise on the Drawings, provide all material and equipment new, of the best quality and design, free from defects and imperfections and with markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Provide all material and equipment of the same type from the same manufacturer whenever practicable.

D. Unless specified otherwise, manufactured items of the same types specified within this Division shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this Project.

1.11 OPERATION AND MAINTENANCE MANUALS

A. Refer to Division 1 and General Conditions for Operation and Maintenance Manuals in addition to requirements specified herein.

B. Submit manuals prior to requesting the final punch list and before all requests for Substantial Completion.

C. Instruct the Owner's permanent personnel in the proper operation of, startup and shutdown procedures and maintenance of the equipment and components of the systems installed under this Division.

D. Prior to Substantial Completion of the project, furnish to the Contract Administrator, for Engineer’s review, and for the Owner’s use, four (4) copies of Operation and Maintenance Manuals in labeled, hard-back three-ring binders, with cover, binding label, tabbed dividers and plastic insert folders for Record Drawings. Include local contacts, complete with address and telephone number, for equipment, apparatus, and system components furnished and installed under this Division of the specifications.

E. Each manual shall contain equipment data, approved submittals, shop drawings, diagrams, capacities, spare part numbers, manufacturer service and maintenance data, warranties and guarantees.

F. Refer to Division 1 for acceptance of electronic manuals for this project. For electronic manuals, Contractor shall submit the documents in accordance with this Section and the procedures specified in Division 1. Contractor shall notify the Contract Administrator and Engineer that the manuals have been posted. If electronic manual procedures are not defined in Division 1, Contractor shall include the website, user name and password information needed to access the manuals. For manuals sent by e-mail, Contractor shall copy the Contract Administrator’s and Engineer’s designated representatives.

1.12 SPARE PARTS

A. Provide to the Owner the spare parts specified in the individual sections of this Division.

1.13 RECORD DRAWINGS

A. Refer to Division 01 and General Conditions for Record Drawings in addition to requirements specified herein.

B. A set of work prints of the Contract Documents shall be kept on the jobsite during construction for the purpose of noting changes. During the course of construction, the Contractor shall indicate on these Documents changes made from the original Contract Documents. Particular attention shall be paid to those items which need to be located for servicing. Underground utilities shall be located by dimension from column lines.

C. At the completion of the project, the Contractor shall obtain, at their expense, reproducible copies of the final drawings and incorporate changes noted on the jobsite work prints onto

these drawings. These changes shall be done by a skilled drafter. Each sheet shall be marked "Record Drawing", along with the date. These drawings shall be delivered to the Contract Administrator.

1.14 DELIVERY, STORAGE AND HANDLING

A. Refer to Division 01 and General Conditions for Delivery, Storage and Handling in addition to requirements specified herein.

B. Deliver equipment and material to the job site in their original containers with labels intact, fully identified with manufacturer's name, make, model, model number, type, size, capacity and Underwriter's Laboratories, Inc. labels and other pertinent information necessary to identify the item.

C. Deliver, receive, handle and store equipment and materials at the job site in the designated area and in such a manner as to prevent equipment and materials from damage and loss. Store equipment and materials delivered to the site on pallets and cover with waterproof, tear resistant tarp or plastic or as required to keep equipment and materials dry. Follow manufacturer's recommendations, and at all times, take every precaution to properly protect equipment and material from damage, including the erection of temporary shelters to adequately protect equipment and material stored at the Site. Equipment and/or material which becomes rusted or damaged shall be replaced or restored by the Contractor to a condition acceptable to the Contract Administrator.

D. Be responsible for the safe storage of tools, material and equipment.

1.15 WARRANTIES

A. Refer to Division 01 and General Conditions for Warranties in addition to requirements specified herein.

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

C. Warrant each system and each element thereof against all defects due to faulty workmanship, design or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in these Construction Documents or manufacturer’s standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

D. Also warrant the following additional items:

1. All raceways are free from obstructions, holes, crushing, or breaks of any nature.

2. All raceway seals are effective.

3. The entire electrical system is free from all short circuits and unwanted open circuits and grounds.

E. The above warranties shall include labor and material. Make repairs or replacements without any additional costs to the Owner.

F. Perform the remedial work promptly, upon written notice from the Contract Administrator or Owner.

G. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period, each warranty instrument being addressed to the Owner and stating the commencement date and term.

1.16 FIELD CONDITIONS

A. Conditions Affecting Work In Existing Buildings: The following project conditions apply:

1. The Drawings describe the general nature of remodeling to the existing building; however, visit the site prior to submitting bid to determine the nature and extent of work involved.

2. Schedule work in the existing building with the Owner.

3. Perform certain demolition work prior to the remodeling. Perform the demolition that involves electrical systems, Light fixtures, equipment, raceways, equipment supports or foundations and materials.

4. Remove articles that are not required for the new work. Unless otherwise indicated, remove each item removed during this demolition from the premises and dispose in accordance with applicable federal, state and local regulations.

5. Relocate and reconnect electrical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where electrical equipment or materials are removed, cap unused raceways below the floor line or behind the wall line to facilitate restoration of finish.

6. Finish material will be installed under other divisions.

7. Obtain permission from the Contract Administrator for channeling of floors or walls not specifically noted on the Drawings.

8. Protect adjacent materials indicated to remain. For work specific to this Division, install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.

9. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, provide temporary services for affected areas.

B. Use of explosives is not permitted.

C. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits specified by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

PART 2 - PRODUCTS AND MATERIALS

(Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install in accordance with manufacturer’s instructions.

3.2 EXISTING CONDITIONS

A. Existing conditions indicated on the Drawings are taken from the best information available from the Owner, existing record drawings, and from limited, in-situ, visual site observations; and, they are not to be construed as "AS BUILT" conditions. The information is shown to help establish the extent of the new work.

B. Verify all actual existing conditions at the project site and perform the Work as required to meet the existing conditions and the intent of the Work indicated.

3.3 EXISTING UTILITIES

A. Prepare and submit a schedule of anticipated utility outages indicating dates and duration. Schedule

B. Schedule and coordinate with the utility companies, Owner and with the Contract Administrator all connections to, relocation of, or discontinuation of normal utility services from any existing utility line. Include all premium time required for all such work in the bid.

C. Repair all existing utilities damaged due to construction operations to the satisfaction of the Owner or utility companies without additional cost.

D. Do not leave utilities disconnected at the end of a workday or over a weekend unless authorized by representatives of the Owner or Contract Administrator.

E. Make repairs and restoration of utilities before workers leave the project at the end of the workday in which the interruption takes place.

F. Include in bid the cost of furnishing temporary facilities to provide all services during interruption of normal utility service.

3.4 WORK IN EXISTING FACILITIES

A. The Drawings describe the general nature of remodeling to the existing facilities; however, visit the site prior to submitting a bid, to determine the nature and extent of work involved.

B. Schedule work in the existing facility with the Owner.

C. Certain demolition work shall be performed prior to the remodeling. Perform the demolition that involves electrical systems, fixtures, conduit, wiring, equipment, equipment supports or foundations and materials.

D. Remove all of these articles that are not required for the new work. Unless otherwise indicated, each item removed during this demolition shall be removed from the premises and disposed of in accordance with all state and local regulations.

E. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Contract Administrator and the Owner no fewer than 7 days in advance of proposed interruption of electrical service.

2. Do not proceed with interruption of electrical service without Contract Administrator and the Owner’s written permission.

3. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.

F. Relocate and reconnect all electrical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications. Where electrical fixtures or equipment are removed, cap all unused raceways behind the floor line or wall line to facilitate restoration of finish, and, remove all existing wiring from abandoned raceways.

G. Finish materials are specified in other divisions.

H. Where removal of existing wiring interrupts electrical continuity of circuits that are to remain in use, provide necessary wiring, raceways, junction boxes, etc., to ensure continued electrical continuity.

I. Channel walls and floors as required to produce the desired result; however, obtain permission from the Contract Administrator for all channeling not specifically noted on the Drawings.

J. Provide new, typewritten card directory for distribution equipment (including but not limited to load centers, panelboards, switchboards and switchgear) where changes occur under this scope of work. Indicate exact loads served by each existing circuit breaker or switch.

3.5 PERMITS

A. Secure and pay for all permits required in connection with the installation of the Electrical Work. Arrange with the various utility companies for the installation and connection of all required utilities for this facility and pay all charges associated therewith including connection charges and inspection fees, except where these services or fees are designated to be provided by others.

3.6 TEMPORARY ELECTRICAL SERVICE AND WIRING

A. Provide 208Y/120 volt, three-phase, four-wire, temporary electrical service and temporary lighting system to facilitate construction.

B. In existing facilities, with Owner's approval, Contractor may utilize the existing electrical system as the source of temporary power. Coordinate the point of connection and method of connection to the existing system with the Owner's Representative.

C. Work for the temporary power shall consist of all labor and materials, including, but not limited to conduit, wiring, panelboards, fuse blocks, fused disconnecting switches, fuses, pigtails, receptacles, wood panel switch supports, and other miscellaneous materials required to complete the power system.

D. Install all temporary wiring in accordance with applicable codes, and maintain in an OSHA-approved manner.

E. Provide an adequate number of GFCI type power distribution centers, rated 208Y/120V, four-wire, and not less than 60A, with sufficient fuse blocks or breakers for lighting and hand tool circuits, 60A four-wire feeders, all mounted within pre-fabricated enclosures UL listed for this application or on suitable wood panels bolted to columns or upright wood supports as required.

F. Install circuits to points on each level of each building so that service outlets can be reached by a 50-foot extension cord for 120V power and a 100-foot extension cord for 208V power (or as required by OSHA or local authorities).

G. Provide one lighting outlet per 30 linear feet of corridor and at least one light in each room and for every 800 square feet of floor area. Temporary lighting shall comply with OSHA requirements.

H. If additional service is required for cranes, electrical welders or for electric motors over 1/2 HP per unit, such additional service shall become the responsibility of the trade involved.

I. When the permanent wiring for lighting and power is installed, with approval of the Contract Administrator and Owner, the permanent system may be used, provided the Contractor assumes full responsibility for all electrical material, equipment, and devices contained in the systems and provided that roof drainage system and roofing are complete.

J. When directed by the Contract Administrator, remove all temporary services, lighting, wiring and devices from the property.

3.7 SELECTIVE DEMOLITION

A. Refer to Division 01, Division 02, and General Conditions for Selective Demolition requirements in addition to the requirements specified herein.

B. General: Demolish, remove, demount, and disconnect abandoned electrical materials and equipment indicated to be removed and not indicated to be salvaged or saved.

C. Materials and Equipment To Be Salvaged: remove, demount, disconnect existing electrical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.

D. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

E. Electrical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:

1. Inactive and obsolete raceways, fittings, supports and specialties, equipment, wiring, controls, fixtures, and insulation:

a. Raceways and outlets embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Cut embedded raceways to below finished surfaces, seal, and refinish surfaces as specified or as indicated on the Architectural Finish Drawings. Remove materials above accessible ceilings. Cap raceways allowed to remain.

b. Perform cutting and patching required for demolition in accordance with Division 01, General Conditions and "Cutting and Patching" portion of this Section in Division 26.

3.8 ACCESS TO EQUIPMENT

A. Locate all pull boxes, junction boxes and controls so as to provide easy access for operation, service inspection and maintenance. Provide an access door where equipment or devices are located above inaccessible ceilings. Refer to Division 26 Section “Common Work Results for Electrical”.

B. Maintain all code required clearances and clearances required by manufacturers.

3.9 PENETRATIONS

A. Unless otherwise noted as being provided under other divisions, provide sleeves, box frames, or both, for openings in floors, walls, partitions and ceilings for all electrical work that passes through construction. Refer to Division 26 Section “Common Work Results for Electrical”.

B. Provide sleeves, box frames, or both, for all conduit, cable, and busways that pass through masonry, concrete or block walls.

C. The cutting of new and/or existing construction will not be permitted except by written approval of the Contract Administrator.

3.10 CUTTING AND PATCHING

A. Provide all necessary cutting of walls, floors, ceilings and roofs for work under this Division.

B. Cut no structural member without permission from Contract Administrator.

C. Patch around all openings to match adjacent construction.

D. After the final waterproofing membrane has been installed, roofs may be cut only with written permission by the Contract Administrator.

3.11 PAINTING

A. Refer to Division 09 Section “Painting” for painting requirements.

B. Paint exposed ferrous surfaces, including, but not limited to, hangers, equipment stands and supports using materials and methods as specified under individual sections and Division 09 of the Specifications; colors shall be as selected by the Contract Administrator.

C. Re-finish all field-threaded ends of galvanized conduits and field-cut ends of galvanized supports with a cold-galvanizing compound approved for use on conductive surfaces. Follow closely manufacturer’s instructions for pre-cleaning surfaces and application.

D. Factory finishes and shop priming and special finishes are specified in the individual equipment Specification sections.

E. Where factory finishes are provided and no additional field painting is specified, touch up or refinish, as required by, and to the acceptance of, the Contract Administrator, marred or damaged surfaces so as to leave a smooth, uniform finish. If, in the opinion of the Contract Administrator, the finish is too badly damaged to be properly re-finished, replace the damaged equipment or materials at no additional costs to the Owner.

3.12 CLEANING

A. Remove dirt and refuse, resulting from the performance of the Work, from the premises as required to prevent accumulation. Cooperate in maintaining reasonably clean premises at all times.

B. Immediately prior to final inspection, make a final cleanup of dirt and refuse resulting from the Work and assist in making the premises broom clean. Clean all material and equipment installed under this Division.

C. Remove dirt, dust, plaster, stains, and foreign matter from all surfaces.

D. Touch up and restore damaged finishes to their original condition.

3.13 ADJUSTING, ALIGNING AND TESTING

A. Adjust, align and test all electrical equipment furnished and/or installed under this Division.

B. Check motors for alignment with drive and proper rotation, and adjust as required.

C. Check and test protective devices for specified and required application, and adjust as required.

D. Check, test and adjust adjustable parts of all light fixtures and electrical equipment as required to produce the intended performance.

E. Verify that completed wiring system is free from short circuits, unintentional grounds, low insulation impedances, and unintentional open circuits.

F. After completion, perform tests for continuity, unwanted grounds, and insulation resistance in accordance with the requirements of NFPA 70 and NETA.

G. Be responsible for the operation, service and maintenance of all new electrical equipment during construction and prior to acceptance by the Owner of the complete project under this Contract. Maintain all electrical equipment in the best operating condition including proper lubrication.

H. Notify the Contract Administrator immediately of all operational failures caused by defective material, labor or both.

I. Maintain service and equipment for all testing of electrical equipment and systems until all work is approved and accepted by the Owner.

J. Keep a calibrated voltmeter and ammeter (true RMS type) available at all times. Provide service for test readings when and as required.

K. Refer to individual sections for additional and specific requirements.

3.14 START-UP OF SYSTEMS

A. Prior to start-up of electrical systems, check all components and devices, lubricate items appropriately, and tighten all screwed and bolted connections to manufacturers' recommended torque values using appropriate torque tools.

B. Each power, lighting and control circuit shall be energized, tested and proved free of breaks, short-circuits and unwanted grounds.

C. Adjust taps on each transformer for rated secondary voltages.

D. Balance all single phase loads at each panelboard, redistributing branch circuit connections until balance is achieved to plus or minus 10 percent.

E. Replace all burned-out lamps. Replace the lamps of all light fixtures that use incandescent, halogen or quartz lamp sources that are installed as part of the finished building, but are used by the Contractor during construction, with new lamps of appropriate type and wattage prior to turning the facility over to the Owner.

F. After all systems have been inspected and adjusted, confirm all operating features required by the Drawings and Specifications and make final adjustments as necessary.

G. Demonstrate that all equipment and systems perform properly as designed per Drawings and Specifications.

H. At the time of final review and tests of the power and lighting systems, all equipment and system components shall be in place and all connections at panelboards, switches, circuit breakers, and the like, shall be complete. All fuses shall be in place, and all circuits shall be continuous from point of service connections to all switches, receptacles, outlets, and the like.

3.15 TEST REPORTS

A. Perform tests as required by these Specifications and submit the results in the operations and maintenance manuals. The tests shall establish the adequacy, quality, safety, and reliability for each electrical system installed. Notify the Contract Administrator and Engineer two working days prior to each test.

B. For specific testing requirements of special systems, refer to the Specification section that describes that system.

C. Upon completing each test, record the results, date and time of each test and the conditions under which the test was conducted. Submit to the Contract Administrator, for Engineer's review, in duplicate, the test results for the following electrical items:

1. Building service entrance voltage and amperes at each phase.
2. Electrical service grounding conditions and grounding resistance.
3. Proper phasing throughout the entire system.
4. Voltages (phase-to-phase and phase-to-neutral) and amperes at each phase for each panelboard, switchboard, and the like.
5. Phase voltages and amperes at each three-phase motor.
6. Test all wiring devices for electrical continuity and proper polarity of connections.

D. Promptly correct all failures or deficiencies revealed by these tests as determined by the Engineer.

3.16 SUBSTANTIAL COMPLETION REVIEW

A. Prior to requesting a site observation for "CERTIFICATION OF SUBSTANTIAL COMPLETION", complete the following items:

1. Submit complete Operation and Maintenance Data.
2. Submit complete Record Drawings.
3. Perform all required training of Owner's personnel.
4. Turn over all spares and extra materials to the Owner, along with a complete inventory of spares and extra materials being turned over.
5. Perform start-up tests of all systems.
6. Remove all temporary facilities from the site.

7. Comply with all requirements for Substantial Completion in the Division 01 and General Conditions.

B. Request in writing a review for Substantial Completion. Give the Contract Administrator at least seven (7) days notice prior to the review.

C. State in the written request that the Contractor has complied with the requirements for Substantial Completion.

D. Upon receipt of a request for review, the Contract Administrator will either proceed with the review or advise the Contractor of unfilled requirements.

E. If the Contractor requests a site visit for Substantial Completion review prior to completing the above-mentioned items, he shall reimburse the Contract Administrator and Engineer for time and expenses incurred for the visit.

F. Upon completion of the review, the Contract Administrator will prepare a “final list” of outstanding items to be completed or corrected for final acceptance.

G. Omissions on the “final list” shall not relieve the Contractor from the requirements of the Contract Documents.

H. Prior to requesting a final review, submit a copy of the final list of items to be completed or corrected. State in writing that each item has been completed, resolved for acceptance or the reason it has not been completed.

END OF SECTION

SUBSTITUTION REQUEST FORM

To Project Engineer: _____ Request # (GC Determined): _____

Project Name: _____

Project No/Phase: _____ Date: _____

Specification Title: _____

Section Number: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

_____

Manufacturer: _____ Model No.: _____

Address: _____ Phone: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified Work: _____

_____

☐ Point-by-point comparative data attached – REQUIRED BY ENGINEER
Comparative data may include but not be limited to performance, certifications, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements. Include all information necessary for an evaluation.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ Other: _____

Reason for not providing specified item: _____

_____

Similar Installation:
Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain: _____

_____

_____

Substitution Certification Statement:

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner that the:

A. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects.
B. Proposed substitution is consistent with the Contract Documents and will produce indicated results.
C. Proposed substitution does not affect dimensions and functional clearances.
D. Proposed substitution has received necessary approvals of authorities having jurisdiction.
E. Same warranty will be furnished for proposed substitution as for specified Work.
F. Same maintenance service and source of replacement parts, as applicable, is available.
G. Proposed substitution will not adversely affect other trades or delay construction schedule.
H. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

_____	_____	_____
Submitting Contractor	Date	Company

Manufacturer's Certification of Equal Quality:

I _____ represent the manufacturer of the Proposed Substitution item and hereby certify and warrant to Architect, Engineer, and Owner that the function and quality of the Proposed Substitution meets or exceeds the Specified Item.

_____	_____	_____
Manufacturer's Representative	Date	Company

Engineer Review and Recommendation Section

Recommend Acceptance	☐ Yes	☐ No
Additional Comments:	☐ Attached	☐ None

Acceptance Section:

_____	_____	_____
Contractor Acceptance Signature	Date	Company
_____	_____	_____
Owner Acceptance Signature	Date	Company
_____	_____	_____
Architect Acceptance Signature	Date	Company
_____	_____	_____
Engineer Acceptance Signature	Date	Company

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes limited scope general construction materials and methods, electrical equipment coordination, and common electrical installation requirements as follows:

1. Access doors in walls, ceilings, and floors for access to electrical materials and equipment.

2. Sleeves and seals for electrical penetrations.

3. Joint sealers for sealing around electrical materials and equipment, and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.

4. Sealing penetrations through noise critical spaces.

2.1 DEFINITIONS

A. The following abbreviations apply to this and other Sections of these Specifications:

1. AHJ: Authority(ies) having Jurisdiction

2. ATS: Acceptance Testing Specifications

3. EPDM: Ethylene-propylene-diene monomer rubber

4. MC: Metal Clad

5. NBR: Acrylonitrile-butadiene rubber

6. NRTL: Nationally Recognized Testing Laboratory

7. PCF: Pounds per Cubic Foot

B. The following definitions apply to this and other Sections of these Specifications:

1. Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle or switch with termination at an electrical panelboard. Note: Where MC Cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box in an accessible ceiling space immediately above the first load.

3.1 ADMINISTRATIVE REQUIREMENTS

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.

3. To allow right of way for piping, ducts, and other systems installed at required slopes and/or elevations.

4. So connecting raceways, cables, and wireways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

4.1 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section “General Electrical Requirements”:

1. Product data for the following products:

a. Through and membrane penetration firestopping systems.

b. Joint sealers

c. Acoustical sealers

2. Shop drawings for:

a. Detailed fabrication drawings of access panels and doors.

3. Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating and installation drawing for each penetration fire stop system.

a. Where Project conditions require modification to qualified testing and inspecting agency’s illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer’s fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

b. Qualifications data for testing agency.

4. Record Drawings: Submit Record Drawings as required by Division 1 and Division 26

a. Accurately record actual locations of firestopped penetrations and access panel/door locations. Indicate dimensions from fixed structural elements.

5.1 NOISE CRITICAL SPACES

A. Many areas of the building, referred to as "noise-critical spaces", require special attention (special acoustical provisions and restrictions). The table below designates the noise-critical spaces that will require application of sound attenuating measures and acoustical sealants.

1. Drama Theatres

PART 2 - PRODUCTS AND MATERIALS

1.2 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

2.2 ACCESS TO EQUIPMENT

A. Manufacturers:

1. Bar-Co., Inc.
2. Elmdor Stoneman.
3. JL Industries
4. Jay R. Smith Mfg. Co.
5. Karp Associates, Inc.
6. Milcor
7. Nystrom Building Products
8. Wade
9. Zurn

B. Access Doors:

1. Provide access doors for all concealed equipment, except where above lay-in ceilings. Refer to Section “Identification for Electrical Systems” for labeling of access doors.
2. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches, furnished by the respective Contractor or Subcontractor and installed by the General Contractor.
3. Access doors must be of the proper construction for type of construction where installed.
4. The exact location of all access doors shall be verified with the Contract Administrator prior to installation.
5. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.
6. Frames: 16-gauge steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.
    a. For installation in masonry, concrete, ceramic tile, or wood paneling: 1-inch-wide exposed perimeter flange and adjustable metal masonry anchors.
    b. For installation in gypsum wallboard or plaster: perforated flanges with wallboard bead.
    c. For installation in full-bed plaster applications: galvanized, expanded metal lath and exposed casing bead, welded to perimeter of frame.
7. Flush Panel Doors: 14-gauge sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.

a. Fire-Rated Units: Insulated flush panel doors, with continuous piano hinge and self-closing mechanism.

8. Locking Devices: Flush, screwdriver-operated cam locks.

3.2 SLEEVES

A. Steel sleeves for raceways and cables

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends and drip rings.

B. Cast iron wall pipe sleeves for raceways and cables

1. Manufacturers

a. Josam Mfg. Co.

b. Smith (Jay R) Mfg. Co.

c. Tyler Pipe/Wade Div.; Subs of Tyler Corp.

d. Watts Industries, Inc.

e. Zurn Industries, Inc.; Hydromechanics Div.

2. Cast-iron sleeve with integral clamping flange with clamping ring, and nuts for membrane flashing.

a. Underdeck Clamp: Clamping ring with setscrews.

3. Sleeves for rectangular openings: Galvanized sheet steel with minimum 0.052- or 0.138- inch thickness as indicated and of length to suit application.

4. Coordinate sleeve selection and application with selection and application of firestopping to be used.

4.2 SEALANTS

A. JOINT SEALERS

1. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

2. Colors: As selected by the Contract Administrator from manufacturer's standard colors.

3. Elastomeric Joint Sealers: Provide the following types:

a. One-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.

b. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

c. Products: Subject to compliance with requirements, provide one of the following:

1) One-Part, Nonacid-Curing, Silicone Sealant:

a) "Dow Corning 790," Dow Corning Corp.

b) "Dow Corning 795," Dow Corning Corp.

c) "Silglaze N SCS 2801," General Electric Co.

d) "Silpruf SCS 2000," General Electric Co.

e) "864," Pecora Corp.

f) ."Omniseal," Sonneborn Building Products Div

g) "Spectrem 1," Tremco, Inc.

h) "Spectrem 2," Tremco, Inc.

2) One-Part, Mildew-Resistant, Silicone Sealant:

a) "Dow Corning 786," Dow Corning Corp.

b) "Sanitary 1700," General Electric Co.

c) "898 Silicone Sanitary Sealant," Pecora Corp.

d) "OmniPlus," Sonneborn Building Products Div.

e) "Tremsil 600 White," Tremco Corp.

4. Acrylic-Emulsion Sealants: One-part, non-sagging, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications on interior and protected exterior locations involving joint movement of not more than plus or minus 5 percent.

a. Products: Subject to compliance with requirements, provide one of the following:

1) "Chem-Calk 600," Bostik

2) "AC-20," Pecora Corp.

3) "Sonolac," Sonneborn Building Products Div.

4) "Tremflex 834," Tremco, Inc.

B. FIRESTOPPING

1. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, by Underwriters' Laboratories, Inc., or other NRTL acceptable to AHJ.

a. Manufacturers:

1) Hilti, Inc.

2) RectorSeal.

3) Specified Technologies Inc.

4) 3M Corp.

5) United States Gypsum Company.

C. ACOUSTICAL SEALANTS sealants

1. Foam Backer Rod: Closed cell polyethylene suitable for use as a backing for non-hardening sealant.

2. Non-Hardening Penetration Sealant: Non-hardening polysulphide type, Permanently flexible, approved firestop putty may be used in lieu of the sealant on foam rod in noise critical walls that are also fire rated.

3. Packing Material: Mineral fiber; non-combustible; resistant to water, mildew and vermin. Expanding resilient foams manufactured for this purpose are an acceptable alternative only if the material density is at least 15 PCF (40 kg/m3).

PART 3 - EXECUTION

1.3 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Coordinate seals with wall, ceiling, roof or floor materials and rating of the surface (sound, fire, waterproofing, etc.)

C. Comply with NECA 1.

D. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless indicated otherwise.

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

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

G. Right of Way: Yield to raceways and piping systems installed at a required slope.

2.3 ACCESS DOORS

A. Coordinate with architectural finishes to set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.

B. Adjust hardware and panels after installation for proper operation.

C. Label all access doors with a nameplate as described in Division 26 Section "Identification for Electrical Systems".

3.3 SLEEVES AND SLEEVE SEALS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Provide sleeves for required openings in all concrete and masonry construction and fire, smoke, or both, partitions, for all electrical work that passes through such construction. Coordinate with all other trades and divisions to dimension and lay out all such openings.

C. Only those openings specifically indicated on the Architectural or Structural Drawings will be provided under other divisions.

D. Construction in Existing Facilities:

1. Saw cut or core drill existing walls and slabs to install sleeves and sleeve seals in existing facilities. Do not cut or drill any walls or slabs without first coordinating with, and receiving approval from, the Contract Administrator, Owner, or both. Seal sleeves

into concrete walls or slabs with a waterproof non-shrink grout acceptable to the Contract Administrator.

E. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls. Do not cut or core drill new construction without written approval from the Contract Administrator and Structural Engineer.

F. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

G. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.

2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.

H. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

I. Install pipe and rectangular sleeves in above-grade walls and slabs, where penetrations are not subject to hydrostatic water pressures. Ensure that drip ring is fully encased and sealed within the wall or slab.

J. Cut sleeves to length for mounting flush with both surfaces of walls.

K. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed; in which case, size sleeves as recommended by the seal manufacturer.

L. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

M. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint

N. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

O. Above Grade Concrete or Masonry Penetrations

1. Provide sleeves for cables or raceways passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide sleeves as follows:

a. Install schedule 40 galvanized steel pipe for sleeves smaller than 6 inches in diameter.

b. Install galvanized sheet metal for sleeves 6 inches in diameter and larger, thickness shall be 0.138 inches.

c. Install galvanized sheet metal for rectangular sleeves

d. Schedule 40 PVC pipe sleeves are acceptable for use in areas without return air plenums.

2. Seal elevated floor, exterior wall and roof penetrations watertight and weather tight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of ½" of sealant.

P. Interior Penetrations of Non-Fire-Rated Walls: Seal annular space between sleeve and cable or raceway, using joint sealant appropriate for size, depth, and location of joint. Pack with mineral wool and seal both ends with minimum of ½" of sealant.

Q. Inspect installed sleeve and sleeve-seal installations for damage and faulty work. Verify watertight integrity of sleeves and seals installed below grade and above grade where installed to seal against hydrostatic pressure.

4.3 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire/smoke-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

5.3 JOINT SEALERS

A. Preparation for Joint Sealers

1. Clean surfaces of penetrations, sleeves, or both, immediately before applying joint sealers, to comply with recommendations of joint sealer manufacturer.

2. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

B. Application of Joint Sealers

1. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

a. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.

b. Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

2. Tooling: Immediately after sealant application and prior to time shining or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

C. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical raceways penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

6.3 ACOUSTICAL PENETRATIONS

A. Do not allow direct contact of raceways with shaft walls, floor slabs and/or partitions. Sleeve, pack and seal airtight with foam rod, non-hardening sealant and/or packing material, as described herein, for all penetrations by raceway, through surfaces that encompass or are between noise critical spaces. Seal and pack with caulking for the full depth of the penetration all openings around raceways in the structure surrounding the electrical equipment and surrounding noise-critical spaces. This includes all slab penetrations and penetrations of noise critical walls.

B. Where a raceway passes through a wall, ceiling or floor slab of a noise critical space, cast or grout a metal sleeve into the structure. The internal diameter or dimensions of the sleeve shall be 2 inches larger than the external diameter or dimensions of the raceway passing through it. After all of the raceways are installed in that area, check the clearances and

correct, if necessary, to within 1/2-inch. Pack the voids full depth with packing material sealed at both ends, 1-inch deep, with non-hardening sealant backed by foam rod.

END OF SECTION

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Conductors, cables, and cords rated 600V and less.

2. Connectors and terminations rated 600V and less.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements":

1. Product data for the following products:

a. Metal Clad (MC) cable and fittings.

B. Qualification Data: For testing agency.

C. Field Quality-Control Test Reports: From [a qualified testing and inspecting agency engaged by] Contractor.

1.3 ABBREVIATIONS AND DEFINITIONS

A. The following abbreviations apply to this and other Sections of these specifications:

1. MC: Metal Clad

2. NBR: Acrylonitrile-butadiene rubber

B. The following definitions apply to this and other Sections of these Specifications:

1. HOMERUN: That portion of an electrical circuit beginning at a junction box, termination box, receptacle or switch with termination at an electrical panelboard. Note: Where MC Cable is allowed to be utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box in an accessible ceiling space immediately above the first (most upstream) load.

1.4 QUALITY ASSURANCE

A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.

B. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

C. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to AHJ.

2. Marked for intended use.

D. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate electrical testing of electrical items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

2.2 CONDUCTORS AND CABLES

A. General

1. Manufacturers:

a. AFC Cable Systems, Inc.

b. Alan Wire

c. Cerrowire

d. Colonial Wire & Cable

e. Encore Wire Corporation

f. General Cable

g. Northern Cables Inc.

h. Okonite Company

i. Southwire Company

2. Conductor Material: Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL Standards 44 or 83, as applicable; stranded conductor and stranded for all flexible cords, cables, and control wiring][or as noted otherwise below.

3. Conductor Insulation Types: Type THHN/THWN-2 and/or XHHW-2 complying with ICEA S-95-658/NEMA WC70 or as noted otherwise below.

4. Sizes of conductors and cables indicated or specified are American Wire Gage (Brown and Sharpe).

5. Unless indicated otherwise, special purpose conductors and cables, such as low voltage control and shielded instrument wiring, shall be as recommended by the system equipment manufacturer.

6. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

B. Metal Clad Cable, Type MC

1. MC Cable (with insulated green grounding conductor, no bonding conductor):

a. Manufacturers:

1) AFC Cable Systems, Inc (MC Lite)

2) Encore Wire Corporation (MC)

3) Kaf-Tech

4) Southwire Company (Amorlite)

b. 600V, Unjacketed UL Standard 83, UL Standard 1569 for Type MC, UL Standard 1685, Federal Specification A-A59544, IEEE 1202 Vertical Cable Tray Flame Test and the NEC. Type MC Cable shall be listed for use in UL 1, 2, and 3 Hour Through-Penetration Firestop Systems.

c. Armor Assembly: Aluminum interlocked armor (aluminum color).

d. Phase Conductors: Solid soft-drawn copper, THHN-insulated single conductors, color code: ICEA Method 1.

e. Grounding Conductor: Solid soft-drawn copper, THHN/THWN-2 green insulated grounding conductor sized per NEC Table 250.122.

f. Marking: Cable markings shall comply with the requirements on NEC ART. 310.11.

2. MC Cable Fittings:

a. Manufacturer & Model:

1) Arlington (4010 AST snap-in type): (SG38 saddle type)

2) Crouse-Hinds (QLK Quick-Lok Series, Saddle type); ACB Series; set-screw, saddle type)

3) O-Z Gedney (AMC-50 speed-lok, saddle type)

4) Thomas & Betts (XC-730 Series cable-lok, saddle type); 3110 Series Tite-Bite)

b. Fittings used for connecting Type MC cable to boxes, cabinets, or other equipment shall be UL listed and identified for such use with an MCI-A marking on the fitting carton or package.

c. Fittings shall be insulated type not requiring the use of anti-short bushings.

d. Romex style, clamp type fittings are not acceptable.

C. Single Conductors

1. 600V, THHN/THWN-2 and/or XHHW- insulated conductors color-coded as follows:

PHASE	120/240V	240Δ/120V	208Y/120V	480Y/277V
A	Black	Black	Black	Brown
B	Red	Orange	Red	Orange
C	N/A	Red	Blue	Yellow
Neutral	White	White	White	Gray**
Equipment Ground	Green	Green	Green	Green
Isolated Ground	N/A	N/A	Green/Yellow Stripe	N/A

**Except as provided in NFPA 70.

2. Conductors shall not be smaller than No. 12 AWG, except that wiring for signal and pilot control circuits and pre-manufactured whips for light fixtures may be No. 14 AWG.

D. Flexible Cords

1. 600V, multi-conductor (2, 3, or 4 as indicated on the Drawings), oil-resistant black jacket, extra-hard-usage; Type SEO, SO, or STO for indoor dry and damp locations; or as required by the manufacturer of the equipment to which the cords are connected.

E. Control Wiring

1. Unless otherwise noted, all control wiring will be the responsibility of the Section or Division in which the control system is specified.

F. Connectors

1. Manufacturers:

   a. AMP; Tyco

   b. FCI-Burndy

   c. Gould

   d. Ideal Industries, Inc.

   e. Ilsco

   f. NSi Industries, Inc.

   g. O-Z/Gedney

   h. Panduit

   i. Thomas and Betts

   j. 3-M Electrical Products Division

2. Compression connectors for conductors No. 8 AWG and larger: Long-barreled, UL 486-listed, bare copper, circumferential compression type (Burndy "Hylug", or equal), insulated with clamp-on, cold-shrink, or molded covers, or wrapped with multiple over-lapping layers of 3-M Scotch electrical tape.

   a. Termination fittings: 1- or 2-hole pad and inspection port.

3. Mechanical connections for conductors No. 8 AWG and larger: UL-listed, tinned copper dual-rated, mechanical type, insulated with clamp-on, cold-shrink, or molded covers, or wrapped with multiple over-lapping layers of 3-M Scotch electrical tape.

a. Termination fittings: 1-or 2-hole pad and inspection port.

4. Connectors for solid conductors No. 10 AWG and smaller: Insulated winged wire nuts. Color-coded for size, except use green only for grounding connections.

5. Connectors for stranded conductors No. 10 AWG and smaller: Tinned copper, insulated-sleeve, compression type, UL-listed, with wire insulation grip. Terminations: flanged fork tongue type.

6. Connectors and terminations for aluminum conductors and cables No. 1 and larger: UL 486B listed and marked AL7CU for 75 deg C rated conductors and AL9CU for 90 deg C rated conductors.

PART 3 - EXECUTION

3.1 CONDUCTORS AND CABLES

A. General:

1. Unless otherwise indicated on the Drawings on in other Sections, install all conductors in raceway. Install continuous conductors between outlets, devices and boxes without splices or taps. Do not pull connections into raceways. Leave at least 8 inches of conductor at outlets for fixture or device connections.

2. Use manufacturer-approved pulling compound or lubricant where necessary; compound used shall not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

3. Use pulling means, including fish tape, cable, rope, and basket weave conductor/cable grips that will not damage conductors/cables or raceway.

4. Electrical conductor and cable work is schematically represented on the Drawings. Unless otherwise indicated, conductor sizes shown on the Drawings are based on not more than three single current-carrying conductors in a raceway in free air. Current ratings are based on copper at 75 degrees C temperature rating for all power circuits. Modify raceway and conductor sizing as may be necessitated by any deviation from these conditions. Do not decrease the indicated conductor size due to the use of conductors having a temperature rating of 90 degrees C.

5. Conductor sizes shown are minimum based on code requirements, voltage drop, and/or other considerations. Where approved by the Engineer and at no extra cost to the Owner, larger conductor sizes may be installed at Contractor's option in order to utilize stock sizes, provided raceway sizes are increased where necessary to conform with NFPA 70 (determine the effect of the use of larger conductors on the short circuit current ratings of the electrical equipment, and provide increased short circuit current rated equipment as required).

6. Where parallel conductors are shown, install each set of conductors in separate raceways of essentially the same length.

7. Seal around cables penetrating fire-rated elements according to Part 2 of this Section.

8. Identify and color-code conductors and cables according to Part 2 of this Section.

9. Wiring at Outlets: Install conductors at each outlet with at least 6 inches of slack.

10. Common or Shared Neutrals are not allowed unless shown on the plans or specifically noted to be allowed.

11. Multi-wire branch circuits (i.e., shared neutral) shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point the branch circuit originates. Multi-pole breakers or 3 single pole breakers with a handle tie are two example

12. When multiple home runs are combined into a single raceway such that the number of conductors exceeds four (conductor count is made up of any combination of phase and neutral conductors), the following restrictions apply, which are in addition to those in NFPA 70:

    a. Normal or Non-Essential circuits.

        1) Maximum of 16 conductors in a single raceway. For up to eight conductors in a raceway, minimum raceway size: 3/4 inch. For greater than eight conductors, minimum raceway size: 1 inch. Do not install any other type of circuit in this raceway.

        2) The minimum wire size for all conductors in this raceway: No. 10 AWG.

        3) Only 15A and 20A branch circuit homeruns may be combined into one raceway.

13. Where the number of conductors for branch circuits is not shown on the Drawings, determine the number of conductors in accordance with NFPA 70. Provide adequate conductors so as to allow performance of all functions of the device.

14. Provide all conductors with 600V insulation of the following types, unless otherwise noted on the Drawings or in these Specifications:

    a. Wet or dry locations, in raceways:

        1) Service entrance: Type THWN, THHN/THWN-2, or XHHW.

        2) Feeders and branch circuits: Type THWN, THHN/THWN-2, or XHHW.

        3) Conductors No. 6 AWG and smaller: Types THWN or THHN/THWN-2.

B. Metal Clad Type MC Cable:

1. Securing and Supporting:

    a. Support per Art 330 for MC cable

    b. Secure cable within 12 inches of every box or fitting.

    c. Secure/supporting intervals shall not exceed six (6) feet for MC cable.

    d. Utilize steel cable hangers, Arlington SMC series or equivalent, for MC cable support wherever possible so as to provide for cable routing in a neat and workmanship like manner.

2. Type MC cable may only be used:

    a. In lieu of flexible conduit and wiring from light fixtures in accessible ceilings to junction boxes (attached to building structure) above the ceiling. Provide cable whips of sufficient lengths to allow for relocating each light fixture within a 5-

foot radius of its installed location, but not exceeding 6 feet in unsupported lengths.

b. For vertical drops and horizontal wiring in stud walls.

3. MC Cable shall not be used for any use not listed in the paragraph above. Examples of those uses include, but are not limited to:

a. In locations not permitted by the NEC.

b. When specifically not allowed by the local AHJ and/or Owner.

c. Homeruns to panelboards. Note: where metal clad cable is utilized for receptacle, lighting, and/or miscellaneous load branch circuiting, the originating point of the homerun shall be at the first (most upstream) load in the circuit or at a junction box located in the accessible ceiling space immediately above the first (most upstream) load. Reference definitions in this section for definition on “Homerun”.

d. Where exposed to view.

e. Where subject to physical damage.

f. Corrosive or Hazardous locations.

g. Wet locations.

C. Flexible Cords

1. Refer to Division 26 Section, ““Equipment Wiring Systems”, for electrical connections to equipment.

D. Control Wiring

1. Unless otherwise indicated on the Drawings or in other sections, install all control wiring in raceway, regardless of voltage. A qualified Electrician shall install all control wire operating at 120V nominal and above. Control wiring operating at less than 120V (e.g., 12V and 24V) may be installed under the Division furnishing it.

2. Open wiring in air-handling plenums: UL listed and classified for use in air plenums without raceway. Where indicated on the Drawings or specified, and permitted by local codes, only cable for communication or fire alarm systems and low voltage control wiring may be installed without raceways.

E. Connections:

1. Apply a zinc based, anti-oxidizing compound to connections.

2. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

4. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

5. Use only resin pressure splices and splicing kits that totally encapsulate the splice for splices in underground junction boxes. Arrange the splicing kit to minimize the effects of moisture.

6. Connect conductors No. 6 AWG and larger to panelboards and apparatus by means of approved mechanical lugs or compression connectors.

7. Do not use terminals on wiring devices to feed through to the next device.

3.2 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements. Test all wiring prior to energizing to ensure that it is free from unintentional grounds and shorts, is properly phased, and that all connectors are tight.

2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. This Section includes:

1. Grounding Conductors

1.2 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements":

1. Product data for the following products:

a. Mechanical and compression connectors, and exothermic connectors .

B. Qualification Data: For Contractor.

C. Field Quality-Control Test Reports: From Contractor.

1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Record Drawings: Submit Record Drawings as required by Division 01 and Division 26 Section "General Electrical Requirements":

1. Accurately record actual locations of all exterior buried electrodes and all buried ground rings. Indicate dimensions from fixed structural elements.

1.3 DEFINITIONS

A. The following apply to this and other Sections of these Specifications:

1. EMT: Electrical metallic tubing.

2. ENT: Electrical nonmetallic tubing.

3. FMC: Flexible metal conduit.

4. IMC: Intermediate metal conduit.

5. LFMC: Liquidtight flexible metal conduit.

6. LFNC: Liquidtight flexible nonmetallic conduit.

7. RMC: Rigid Metal Conduit

8. GRS: Galvanized Rigid Steel Conduit

9. RAC: Rigid Aluminum Conduit

10. RNC: Rigid nonmetallic conduit.

11. PSF: Pounds per Square Foot

1.4 QUALITY ASSURANCE

A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.

B. Test Equipment Suitability and Calibration: Comply with NETA ATS (current version), "Suitability of Test Equipment" and "Test Instrument Calibration."

C. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

2. Marked for intended use.

3. Comply with UL 467.

D. Comply with NFPA 70.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

2.2 GROUNDING CONDUCTORS AND CONNECTORS:

A. Manufacturers:

1. Apache Grounding/Erico Inc.

2. Boggs, Inc.

3. Chance/Hubbell.

4. Copperweld Corp.

5. Dossert Corp.

6. Erico Inc.; Electrical Products Group.

7. FCI/Burndy Electrical.

8. Galvan Industries, Inc.

9. Harger Lightning Protection, Inc.

10. Hastings Fiber Glass Products, Inc.

11. Heary Brothers Lightning Protection Co.

12. Ideal Industries, Inc.

13. ILSCO.

14. Kearney/Cooper Power Systems.

15. Korns: C. C. Korns Co.; Division of Robroy Industries.
16. Lightning Master Corp.
17. Lyncole XIT Grounding.
18. O-Z/Gedney Co.; a business of the EGS Electrical Group.
19. Panduit, Inc
20. Raco, Inc.; Division of Hubbell.
21. Robbins Lightning, Inc.
22. Salisbury: W. H. Salisbury & Co.
23. Superior Grounding Systems, Inc.
24. Thomas & Betts, Electrical.

2.3 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 Section "Common Work Results for Electrical."
B. Material: Copper.
C. Equipment Grounding Conductors: Insulated with green-colored insulation.
D. Grounding Electrode Conductors: Bare, stranded, unless otherwise indicated.
E. Copper Bonding Conductors: As follows:
   1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
   2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
   3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
   4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (wide and 1/16 inch thick.

2.4 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
B. Bolted Connectors: Bolted-pressure-type connectors
   1. Compression Connectors: Burndy Hyground, or equal, permanent, pure, wrought copper, meeting ASTM 8 1 87, essentially the same as the conductors being connected; clearly and permanently marked with the information listed below:
      a. Company symbol and/or logo.
      b. Catalog number.
      c. Conductors accommodated.
      d. Installation die index number or die catalog number is required.
      e. Underwriters Laboratories “Listing Mark:”.

f. The words “Suitable for Direct Burial” or, where space is limited, “Direct Burial” or “Burial” per UL Standard ANSI/UL467 (latest revision).

2. Cast connectors: copper base alloy according to ASTM B 30 (latest revision).

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

PART 3 - EXECUTION

3.1 GENERAL

A. Examine areas and conditions under which electrical grounding connections are to be made and notify the Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with Work until unsatisfactory conditions have been corrected.

B. Provide all materials, labor and equipment for an electrical grounding system in accordance with applicable portions of the NEC and NECA. Coordinate electrical work as necessary to interface installation of electrical grounding systems with other work.

C. Accomplish grounding and bonding of electrical installations and specific requirements for systems, circuits and equipment required to be grounded for both temporary and permanent construction.

3.2 APPLICATION

A. In branch circuit and feeder raceways, use insulated equipment grounding conductors.

3.3 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and branch circuits.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Bond conductor to heater units, piping, connected equipment, and components. On water heaters, bond metal hot and cold water pipes together, across the heater tank.

3.4 INSTALLATION

A. Grounding Conductors: Where the size of the grounding conductors are not shown, size in accordance with NFPA 70 Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

C. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

D. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

E. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

3.5 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible. Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by the manufacturers for indicated applications. Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, and bonding straps as recommended by the manufacturers for types of service indicated.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Replace welds that are puffed up or that show convex surfaces indicating improper cleaning. Use exothermic welded connections for the following:

1. Connecting conductors together.

2. Connecting conductors to ground rods, except at test wells.

3. Connecting conductors to building steel.

4. Connecting conductors to plates.

C. Compression Fittings: Permanent compression-type fittings may be used for the following rather than exothermic connections:

1. Connecting conductors together.

2. Connecting conductors to building steel.

3. Connecting conductors to ground rods, except at test wells.

D. Mechanical Pressure Fittings: Use bolted mechanical (removable) pressure-type clamps for the following:

1. Connecting conductors to ground rods at test wells.

2. Connecting conductors to pipes.

E. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

F. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances

and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

G. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

H. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

3.6 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

4. Test Values:

a. The resistance between the main grounding electrode and earth ground shall be no greater than 10 ohms.

b. Equipment Rated 500 kVA and Less: 10 ohms.

c. Equipment Rated 500 to 1000 kVA: 5 ohms.

d. Equipment Rated More Than 1000 kVA: 3 ohms.

e. Substations and Pad-Mounted Switching Equipment: 5 ohms.

f. Manhole Grounds: 10 ohms.

5. Perform point–to–point megohmmeter tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.

6. Minimum system neutral–to-ground insulation resistance: one megohm.

7. Investigate point-to-point resistance values that exceed 0.5 ohms.

a. Check for loose connections.

b. Check for absent or broken connections.

c. Check for poor quality welds.

d. Consider other reasons.

END OF SECTION

SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

2. Construction requirements for concrete bases.

1.2 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of fivetimes the applied force.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.

2. Steel slotted channel systems. Include Product Data for components.

3. Nonmetallic slotted channel systems. Include Product Data for components.

4. Equipment supports.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit.

b. Cooper B-Line, Inc.; a division of Cooper Industries.

c. ERICO International Corporation.

d. GS Metals Corp.

e. Thomas & Betts Corporation.

f. Unistrut; Tyco International, Ltd.

g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.

4. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cooper B-Line, Inc.; a division of Cooper Industries.

2) Empire Tool and Manufacturing Co., Inc.

3) Hilti Inc.

4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

5. Toggle Bolts: All-steel springhead type.

6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted [or other]support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.

2. To New Concrete: Bolt to concrete inserts.

3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

4. To Existing Concrete: Expansion anchor fasteners.

5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.

6. To Light Steel: Sheet metal screws.

7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL REQUREMENTS

1.1 SUMMARY

A. This Section includes:

1. Raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Division 01 and Division 26 Section "General Electrical Requirements".

B. Record Drawings: Submit Record Drawings as required by Division 01 and Division 26 Section "General Electrical Requirements":

1. Accurately record actual routing of all exterior buried raceway and all interior raceways three inches and larger. Indicate dimensions from fixed structural elements.

1.3 DEFINITIONS

A. Terminology used in this specification is as defined below:

1. EMT: Electrical Metallic Tubing
2. FMC: Flexible Metal Conduit
3. GRS: Galvanized Rigid Steel Conduit
4. IMC: Intermediate Metal Conduit
5. LFMC: Liquidtight Flexible Metal Conduit
6. LFNC: Liquidtight Flexible Nonmetallic Conduit
7. RAC: Rigid Aluminum Conduit
8. RMC: Rigid Metal Conduit
9. RNC: Rigid Nonmetallic Conduit

1.4 QUALITY ASSURANCE

A. Materials shall be manufactured by companies that have been specializing in the products specified in this Section, for a minimum of 3 years.

B. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to AHJ.
2. Marked for intended use.

C. Comply with NFPA 70.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

2.2 CONDUITS, SURFACE MOUNTED RACEWAYS AND ACCESSORIES

A. Metal Conduit And Tubing

1. Manufacturers:

a. AFC Cable Systems, Inc.

b. Alflex Corporation, a Southwire Company

c. Anamet Electrical, Inc.; Anaconda Metal Hose.

d. Electri-Flex Co.

e. Indalex

f. Manhattan/CDT/Cole-Flex

g. O-Z/Gedney; Unit of General Signal (Fittings)

h. Republic Raceway

i. Tyco International; Allied Tube & Conduit Div.

j. Western Tube and Conduit Corporation

k. Wheatland Tube Co.

2. RMC:

a. GRS: Hot-dip galvanized: ANSI C80.1, UL 6.

b. RAC: ANSI C80.5, UL6A.

3. IMC: ANSI C80.6, UL 1242.

4. Plastic-Coated GRS and Fittings: NEMA RN 1, UL-listed. Coating thickness of 0.04 inches (1mm), minimum.

5. Plastic-Coated IMC and Fittings: NEMA RN 1, UL-listed.

6. EMT and Fittings: ANSI C80.3, UL 797.

a. Fittings: Set-screw or compression type.

7. FMC: Aluminum or Zinc-coated steel: UL 1.

8. LFMC: Flexible steel raceway with PVC jacket: UL 360.

a. Fittings: NEMA FB 1; compatible with raceway and tubing materials.

2.3 BOXES, ENCLOSURES AND CABINETS

A. General

1. Manufacturers:

a. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.

b. Emerson/General Signal; Appleton Electric Company.

c. Erickson Electrical Equipment Co.

d. Hoffman.

e. Hubbell, Inc.

f. Killark Electric Manufacturing Co.

g. O-Z/Gedney; Unit of General Signal.

h. RACO; Division of Hubbell, Inc.

i. Robroy Industries, Inc.; Enclosure Division.

j. Scott Fetzer Co.; Adalet-PLM Division.

k. Spring City Electrical Manufacturing Co.

l. Thomas & Betts Corporation.

m. Walker Systems, Inc.; Wiremold Company (The).

n. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary

B. Outlet Boxes

1. Sheet Metal Outlet and Device Boxes: NEMA OS 1; UL514A.

2. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

3. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified in the following paragraphs. Manufacturers and model numbers listed are used only to represent the characteristics required and are not intended to restrict the use of other Manufacturers listed above and models that meet the specified criteria.

a. Boxes for exposed work: deep drawn type with raised covers:

1) Appleton 4S 1/2-DR; 8300 series cover.

2) RACO 190 series; 800 series cover.

3) Steel City 52150 series; RS series cover.

b. Concealed and exposed boxes for lighting:

1) Appleton 40-3/4.

2) RACO 160 series.

3) Steel City 54170 series.

c. Boxes for flush switches, receptacles, or other general devices:

1) Appleton 4SVB series; 8400 series cover.

2) RACO 198 series; 770 series cover.

3) Steel City CWV series; 52-C-00 series cover.

d. Boxes for flush switches, receptacles, or other general devices installed in masonry construction:

1) Appleton MI-250 series or MI-350 series.

2) RACO 690 series or 960 series.

3) Steel City GW series.

C. Junction and Pull Boxes

1. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

D. Cabinets and Enclosures

1. General:

a. Compliance: NEMA 250; UL 50 and 508A, as applicable.

b. NEMA Type 1: Code-gauge phosphatized steel with continuously welded seams; manufacturer's standard ANSI 61 gray polyester powder finish inside and out; non-gasketed removable hinged front cover, with flush latch and concealed hinge; collar studs.

c. Removable painted steel interior panel mounted on standoffs; metal barriers to separate wiring of different systems and voltages.

d. Provide enclosures wider than 36 inches with double doors; removable center posts; internal bracing, supports, or both, as required to maintain their structural integrity; and, accessory feet where required for freestanding equipment.

e. Provide clamps, grids, slotted wireways, or similar devices to which or by which wiring may be secured. Provide DIN-rail mounted terminal strips for terminating all incoming and outgoing control wiring, and power terminal blocks for incoming/outgoing power wiring.

f. Provide metal barriers to separate compartments containing control wiring operating at less than 50 volts from power and higher-voltage control wiring.

2.4 FACTORY FINISHES

A. Finish: For enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAYS

A. General

1. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on drawings or in this article are stricter.

2. Provide sizes and types of raceways as indicated on the Drawings. Sizes are based on THWN insulated copper conductors, except where noted otherwise. Where sizes are not shown on the Drawings or in the Specifications, size raceways in accordance with NFPA 70 requirements for the number, size and type of conductors installed. Minimum raceway size: 1/2 inch (concealed and exposed); 1 inch (underground and under slab).

3. Provide all raceways, fittings, supports, and miscellaneous hardware required for a complete electrical system as described by the Drawings and Specifications.

4. Install a green-insulated, equipment-grounding conductor, which is bonded to the electrical system ground, in all raceways, with the exception of Service Entrance raceways.

5. Install grounding bushings on all conduit terminations and bond to the enclosure, equipment grounding conductor, and electrical system ground.

6. Install raceways concealed in walls or above suspended ceilings in finished areas. Do not install raceways horizontally within slabs on grade.

7. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

8. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

9. Make bends and offsets so inside diameters are not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

10. Install raceways:

    a. To meet the requirements of the structure and the requirements of all other Work on the Project.

    b. To clear all openings, depressions, ducts, pipes, reinforcing steel, and so on.

    c. Within or passing through the concrete structure in such a manner so as not to adversely affect the integrity of the structure.

    d. Parallel or perpendicular to building lines or column lines.

    e. When concealed, with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

11. Where masonry walls are left unfinished, coordinate raceway installations with other trades so that the raceways and boxes are concealed and the wall will have a neat and smooth appearance.

12. Support raceways from structural elements of the building as required by NFPA 70, Division 26 Section “Hangers and Supports for Electrical Systems”. Do not support raceways by hangers used for any other systems foreign to the electrical systems; and, do not attach to other foreign systems. Do not lay raceways on top of the ceiling system.

13. Provide support spacing in accordance with NFPA 70 requirements, and at a minimum in accordance with NEMA standards. Support by the following methods:

    a. Attach single raceway directly to structural steel with beam clamps.

    b. Attach single raceway directly to concrete with one-hole clamps or clips and anchors. Outdoors and wherever subject to dampness or moisture, offset raceways from the surface by using galvanized clamps and clamp backs, to mitigate moisture entrapment between raceways and surfaces.

c. Attach groups of raceway to structural steel with slotted support system attached with beam clamps. Attach raceway to slotted channel with approved raceway clamps.

d. Attach groups of raceway to concrete with cast-in-place steel slotted channel fabricated specifically for concrete embedment. Attach raceway to steel slotted channel with approved raceway clamps.

e. Hang plumb horizontally suspended single raceway using a threaded rod. Attach threaded rods to concrete with anchors and to structural steel with beam clamps. Attach raceway to threaded rod with approved raceway clamps.

f. Hang horizontally suspended groups of raceway using steel slotted support system suspended from threaded rods. Attach threaded rods to concrete with anchors and to structural steel with beam clamps. Attach raceway to steel slotted channel with approved raceway clamps.

g. Support conductors in vertical raceway in accordance with NFPA 70 requirements.

h. Cross-brace suspended raceway to prevent lateral movement during seismic activity.

i. Use pre-fabricated non-metallic spacers for parallel runs of underground or under-slab conduits, either direct buried or encased in concrete.

14. Install electrically- and physically-continuous raceways between connections to outlets, boxes, panelboards, cabinets, and other electrical equipment with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between boxes. Make bends smooth and even, without flattening raceway or flaking the finish.

15. Protect all electrical Work against damage during construction. Repair all Work damaged or moved out of line after rough-in, to meet the Engineer's approval, without additional cost to the Owner. Cover or temporarily plug openings in boxes or raceways to keep raceways clean during construction. Clean all raceways prior to pulling conductors or cables.

16. Align and install raceway terminations true and plumb.

17. Complete raceway installation before starting conductor installation.

18. Install a pull cord in each empty raceway that is left empty for installation of wires or cables by other trades or under separate contracts. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull cord.

19. Install approved expansion/deflection fittings where raceways pass through or over building expansion joints.

20. Edit the following paragraph to coordinate with any Standard Details you use on the Drawings that indicate stub-ups, or delete if not applicable.

21. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with GRS; FMC

may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

B. RMC

1. Use GRS or IMC in the following areas:

   a. Where indicated.

   b. Exterior applications where above grade and exposed.

   c. Below grade when concrete-encased, plastic-coated, or provided with a corrosion resistant approved mastic coating.

   d. All raceways penetrating slabs on grade (use plastic-coated raceway or provide with a corrosion resistant approved mastic coating). This shall include the 90-degree elbow below grade and the entire vertical transition to above grade.

C. EMT

1. Use EMT in the following areas:

   a. Where indicated.

   b. Interior concealed locations for:

      1) Branch and feeder circuits.

      2) Low-voltage control, security, and fire alarm circuits

2. Do not use EMT:

   a. Below grade.

   b. In exterior applications when exposed.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. RMC and IMC: Use threaded rigid steel conduit fittings, unless otherwise indicated.

2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings and installation tools approved by the manufacturer for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits. Replace all fittings and conduits that have any portion of the coating scraped off to bare metal, at no additional cost to the Owner.

3. Join raceways with fittings designed and approved for that purpose and make joints tight.

4. Use insulating bushings to protect conductors at raceway terminations:

   a. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.

   b. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

E. Telephone and Signal/Data System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum

of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

3.2 BOXES

A. General

1. Verify locations of device boxes prior to rough in.

2. Set boxes at elevations to accommodate mounting heights as specified or indicated on the Drawings.

3. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box locations to accommodate intended purpose.

4. Install boxes to preserve fire ratings of walls, floors, and ceilings.

5. Install flush wall-mounted boxes without damaging wall insulation or reducing its effectiveness.

6. Support boxes independently of raceway.

7. Clean the interior of boxes to remove dust, debris, and other material. Clean exposed surfaces and restore finish.

8. Adjust flush-mounted boxes to make front edges flush with finished wall material.

9. Provide boxes of the depth required for the service, device and the application, and with raised covers set flush with the finished wall surface for boxes concealed in plaster finishes. Select covers with the proper openings for the devices being installed in the boxes. Install boxes flush unless otherwise indicated.

10. Install outlet boxes in firewalls complying with UL requirements, with box surface area not exceeding 16 square inches; and, when installed on opposite sides of the wall, separate by a distance of at least 24 inches.

B. Outlet Boxes

1. Install all electrical devices, such as plug receptacles, lamp receptacles, light switches, and light fixtures in or on outlet boxes.

2. Locations of outlets on Drawings are approximate. Locate outlets generally from column centers and finish wall lines or to centers or joints of wall or ceiling panels.

3. Locate outlet boxes so they are not placed back-to-back in the same wall, and in metal stud walls, so they are separated by at least one stud space, to limit sound transmission from room to room. Install outlet boxes in accessible locations and do not install outlets above ducts or behind furring.

4. Install extension and plaster rings as required by NFPA 70.

5. Carefully set outlet boxes concealed in non-plastered block walls so as to line up with wall joints. Coordinate the box and raceway installation with the wall construction as required for a flush and neat appearing installation. Outlet box extensions may be used where necessary.

6. Do not exceed allowable fill per NFPA 70.

7. Where multiple devices are shown grouped together, gang mount with a common cover plate.

C. Junction and Pull Boxes

1. Install junction and pull boxes above accessible ceilings and in unfinished areas.

2. Provide boxes set flush in painted walls or ceilings with primer coated cover.

3. Where junction and pull boxes are installed above an inaccessible ceiling, locate so as to be easily accessible from a ceiling access panel.

3.3 CABINETS AND ENCLOSURES

A. Unless otherwise indicated on the Drawings, provide NEMA 1 construction for indoor, dry locations.

B. Install flush mounted in the wall in finished spaces, with the top 78 inches above finished floor. The front shall be approximately 3/4-inch larger than the box all around.

C. Install surface mounted in unfinished spaces, with the top 78 inches above finished floor. The front shall be the same height and width as the box.

D. Electrically ground all metallic cabinets and enclosures. Where wiring to cabinet or enclosure includes a grounding conductor, provide a grounding lug in the interior of the cabinet or enclosure. Cabinets and enclosures specified in this Section are intended to house miscellaneous electrical components assembled in a custom arrangement, such as contactors and relays.

E. All components that are specified or indicated for assembly in cabinets and enclosures shall each be individually UL listed and labeled. Arrange wiring so that it can be readily identified. Support wiring no less than every 3 inches. Install gauges, meters, pilot lights and controls on the face of the door.

F. Do not provide cabinets and enclosures smaller than the sizes indicated. Where sizes and types are not indicated, provide cabinets and enclosures of the size, type and classes appropriate for the use and location per the guidelines of the NEC. Provide all items complete with covers and accessories required for the intended use.

END OF SECTION

SECTION 265100

INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Included in the work of this section are labor, material, and appurtenances required to complete the work of this Section as specified herein, including, but not limited to:

1. Interior light fixtures, lamps, LEDs, reflectors, lenses or faceplates, ballasts, transformers, drivers and power supplies.

2. Coordination.

3. Quality assurances.

4. Specific requirements.

1.2 SUBMITTALS

A. General:

1. Only those light fixtures and manufacturers per each fixture type designated and listed in the Light Fixture Schedule or on the Drawings, and approved in accordance with paragraph 1.4-SUBSTITUTIONS of this Section, or both, will be accepted. Where the Light Fixture Schedule indicates an allowance to be made for a specific light fixture, the price is a contractor price and monies shall be allotted for freight, installation, and lamping (if designated). Alternate manufacturers presented at bid shall be disqualified.

2. Submit all light fixtures, specified for use on this Project, in a single submittal package of portfolios, so that all light fixtures can be reviewed at one time.

3. Prepare portfolios from manufacturer's standard specification sheets, and include the fixture tag indicated on the Light Fixture Schedule to identify each light fixture. Do not combine more than one light fixture type on a single sheet.

4. Fixture or other materials shall not be shipped, stored, or installed into the work without approval of shop drawings.

5. Modifications to fixtures shall be in accordance with Architect’s comments.

B. Product Data: For each type of light fixture, collated and bound in sets, and arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Summary page with the following for each light fixture type

a. The number, type and wattage of the light fixture lamps or LEDs (including, but not limited to, assemblies, arrays, bars or modules).

b. Light fixture ballast, driver or auxiliary device manufacturer, number and type.

2. Fixture cut sheets with name of manufacturer and options to be provided marked, including, but not limited to, voltage, lensing, and finish/color.

a. Descriptive information providing physical characteristics of light fixture, including, but not limited to, materials, dimensions, fixture efficacy and/or efficiency, and verification of indicated parameters.

b. For LED fixtures, include also L70 lifetime and wattage of luminaire including driver/power supply losses.

1) Include MacAdam ellipse step information for:

a) All interior light fixtures

3. Light fixture mounting details, including non-standard outlet boxes.

4. Construction of light fixture housing and door (if applicable).

5. Ballast cut sheet with options marked, providing physical description of ballast including, but not limited to, voltage, lamp, ballast factor, power factor, amperage and wattage.

6. Power supply, transformer, and/or driver cut sheet with options marked, providing physical description of auxiliary device including, but not limited to, voltage, power factor, amperage, wattage, and maximum remote distance charts between device and light fixture.

7. Light fixture finish and color (if applicable).

8. Lamp cut sheet with options marked, providing physical description of lamps, including, but not limited to, voltage, wattage, efficacy, CCT, CRI, lumens, and life expectancy.

a. For LED lamps, include also number of MacAdam ellipse steps and L70 lifetime.

9. Photometric data, in IESNA format, including LM-79 for LED luminaires, based on laboratory tests of each light fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the light fixture as applied in this Project.

a. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.

C. Submittal Schedule

1. Within 30 days of Division 26 contractor award, shop drawings covering all light fixtures within this section shall be forwarded to architect to begin approval process. Any shop drawings submitted after the required time frame will require the contractor to submit only the 1st named manufacturer and associated specification data listed on the fixture schedule as the only approved manufacturer. No substitutions will be allowed after the specified time frame.

2. Within 15 days of “approved” and “approved as noted” shop drawings, contractor shall forward to Architect a guaranteed ship date for each specified fixture.

3. Within 15 days after contractor’s receipt of “reject and resubmit” or “not approved” shop drawings, contractor shall provide Architect with resubmitted shop drawings for only those fixtures deemed unacceptable.

4. Contractor is responsible to call to the attention of the Architect any submittals that have not been returned to him in a timely manner that may affect delivery of fixtures or as otherwise affecting Section 1.4.D of this specification.

D. Control Wiring

E. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, signed by product manufacturer.

F. Qualification Data: For agencies providing photometric data for light fixtures.

G. Field quality-control test reports.

H. Operation and Maintenance Data: For lighting equipment and fixtures to include in operation and maintenance manuals.

I. Warranties: Special warranties specified in this Section.

1.3 SUBSTITUTIONS

A. Refer to Division 26 Section “General Electrical Requirements”.

B. Prior to the Bid Date, substitutions will not be considered unless the Architect/Engineer have received written request for approval at least ten calendar days prior to the date for receipt of Bids. Include in each such request the Light Fixture Schedule designation, name of the material or equipment for which it is to be substituted and complete Product Data for the proposed substitute, as defined in SUBMITTALS above, and all other information necessary for an evaluation. Provide interior point-by-point calculations, under both normal and emergency lighting conditions, as applicable, if required by the Engineer. Submit a $100.00 review fee to the Engineer with each such point-by-point calculation for use of electronic base files. The fee will be returned if the substitution is added to the specification.

C. During the Bid

1. Any proprietary, sole-sourced light fixture listed in the fixture schedule shall be unit priced only. Unit prices shall be clearly identified on the bid form.

2. Representative agents shall be allowed to offer mini-lot pricing (MLP). MLP shall be defined as:

3. Agents can group only specified fixtures they represent, and

4. Only represent in the region where the specification originated, and

5. Exclude all fixtures outside their represented lines from the MLP, and

6. Sole-sourced (proprietary) light fixtures shall not be included in the MLP.

7. Packaging of light fixtures will not be considered nor approved. Packaging is defined as: distributor(s) providing a single price for a light fixture package made up of specified and non-specified light fixtures. Any submittal package containing non-specified light fixtures or inclusion of lighting control systems will be immediately rejected in its entirety.

D. After the Bid Date, proposals to substitute light fixtures for those shown on the Drawings or specified herein, will only be considered as a deduct. Submit proposed substitutions separately, in Submittal form, with a list of proposed substitutions together with a deduct price for each substitution. Proposed substitutions will then be reviewed by the Architect/Engineer.

E. During the construction period, no substitutions shall be considered if product delay is due to contractor’s failure to order products in a timely manner after presentation of fixture schedules and specifications. Additional costs associated with air freight or special factory runs to meet schedule due to contractor’s error shall be at the expense of contractor.

F. The Architect/Engineer has the final authority as to whether the light fixture is an acceptable replacement to the specified item. The proposed substitution may also be rejected for aesthetic reasons if felt necessary or desirable. In the event the proposed substitutions herein described are rejected, provide the specified item(s).

1.4 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature

C. CFL: Compact Fluorescent

D. CRI: Color-rendering index.

E. CU: Coefficient of utilization.

F. EISA: Energy Independence and Security Act of 2007.

G. HID: High-intensity discharge.

H. L70: minimum 70% maintained initial-rated lumens at average rated life for LEDs

I. LED: Light Emitting Diode

J. LED Lamp: Replaceable LED light source with an integral driver within envelope of lamp. Lamp/Base types may include MR16/bi-pin, PAR/medium base, etc.

K. LED Module: Light source that contains LEDs, and may include additional components such as lenses, reflectors, or refractors, however do not include drivers.

L. LER: Light fixture (Luminaire) efficiency rating.

M. Light Fixture: Complete light fixture, including ballast housing if provided.

N. RCR: Room cavity ratio.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, Article 100, by an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

2. Marked for intended use.

B. Comply with NFPA 70.

C. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

D. Regulatory Agencies: Provide fixtures conforming to nationally- or internationally-recognized accredited testing agencies, such as U.S., ETL, ARL, or others in acceptance with local code enforcement policy.

E. Electrical Components and Devices: Provide only fixtures that comply with National Electric Code (NEC), and in particular to Section 410. All ceiling recessed fixtures, whether indicated in a catalog number or not, shall be equipped with an integral thermal protection device.

1.6 COORDINATION

A. Unless otherwise noted, perform all electrical Work required for the proper installation and operation of equipment, furnishings, devices and systems specified in other Divisions of these Specifications, furnished under other contracts, and/or furnished by the Owner for installation under this Contract.

B. Give ample notice of any special openings or rough-in work required for placing electrical/lighting work so as to avoid cutting or removal of completed work.

C. Where work of this Section is to be flush or concealed, install it so it does not project beyond finished lines of walls, ceilings or floor surface.

D. Verify all ceiling systems and coordinate light fixture type and accessories prior to ordering light fixtures. Coordinate and cooperate with ceiling installer in regards to the location and installation of light fixtures.

1.7 WARRANTY

A. General Guarantee: For a period of one year after Owner's initial acceptance and establishment of the beginning date of the guarantee period, and at no cost to the Owner, Contractor shall promptly furnish and install replacements for any fixtures or components deemed by the Owner as defective in workmanship under normal operating conditions, excluding lamp replacement as noted in Section 1.10.A.1. Contractor shall repair installed equipment on the job site to Owner's satisfaction. For any time during said guarantee period that fixtures are not fully functional due to defects in material or workmanship, Contractor shall provide or pay for suitable temporary light fixtures, and shall remove said temporary fixtures upon installation of replacement elements. Contractor shall furthermore guarantee replacement fixtures for a period of one year following replacement.

B. Contractor shall not be held responsible for damage of fixtures or equipment components occurring after the beginning of the guarantee period due to acts of vandalism, acts of war, or acts of God.

C. LED Warranties: Shall be free from defects in materials and workmanship for the period indicated from date of factory shipment.

1. LED Luminaires, including LED modules, arrays and drivers: Five years.

2. LED Lamps: Three years.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

A. In Light Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

1. Basis-of-Design Product: The design for each light fixture is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified that meets or exceeds performance characteristics of the named product.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified. No substitutions shall be allowed as per Section 1.4.

2.2 LIGHT FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Provide light fixtures as shown on the drawings and/or specified. This shall include all lamps, material and labor to securely hang light fixtures, clean them and make them completely ready for use. Provide all hangers, supports, and miscellaneous hardware required to install light fixtures. Provide additional tie wires connected to structure to conform to applicable seismic requirements where required.

B. Light fixture models scheduled on the Drawings are to show the manufacturer, grade and style of light fixtures required. Regardless of the manufacturer's catalog number suffixes indicated, provide all options and features as described in the Light Fixture Schedule.

C. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures. Manufacturer of recessed fixtures shall provide mounting brackets suitable for connection to ceiling system structure. Modifications to standard mounting brackets shall be coordinated with contractor and delivered with fixture so that no delays to product delivery shall be allowed.

D. Metal Parts: Free of burrs and sharp corners and edges.

E. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

G. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.

2. Specular Surfaces: 83 percent.

3. Diffusing Specular Surfaces: 75 percent.

4. Laminated Silver Metallized Film: 90 percent.

5. Glass: Annealed crystal glass, unless otherwise indicated.

H. Fixture Finishes:

1. Apply fixture finishes after fabrication in a manner that assures a durable wear-resistant surfacing. Give exposed metal surfaces (brass, bronze, aluminum and others) and finished castings, except chromium-plated or stainless steel parts, an even coat of high-grade meth/acrylate lacquer or transparent epoxy.

I. Reflectors:

1. Provide aluminum reflectors or reflecting cones for downlight style fixtures comprised of #12 aluminum reflector sheet, 0.57 inch (15 gauge) or heavier and free of tool-making indentations, including spinning lines caused by assembly techniques. All reflectors shall be of first-quality, anodized finish :Alzak" with specular or semi-specular finish and color as selected. Provide specular reflectors with no apparent brightness above 45 degrees from Nadir and semi-specular, diffuse reflectors with no apparent brightness above 75 degrees from Nadir.

J. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps, LEDs, ballasts and/or drivers. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp, LEDs, ballast and/or driver characteristics:

a. "USE ONLY" and include specific lamp or LED type.

b. LED type, wattage, beam angle (if applicable) for LED luminaires. Indicate maximum allowed wattage.

c. CCT and CRI for all luminaires.

2.3 DRIVERS FOR LED LUMINAIRES

A. Description: Designed for type and quantity of LED diodes of light fixture. Drivers shall tolerate sustained open circuit and short circuit output conditions without damage. Driver shall be designed for full light output unless dimmer or bi-level control is indicated:

1. Sound Rating: A.

2. Total Harmonic Distortion Rating: Less than 20 percent. Shall comply with ANSI C82.77.

3. Transient Voltage Protection: IEEE C62.41, Category A or better.

4. Power Factor: 0.90 or higher at full load.

5. Driver shall operate with maximum sustained variations of +/-10% input voltage and frequency with no damage to driver.

6. Driver output shall be regulated to maximum +/- 5% published load range or requirements of downstream LED fixture.

7. LED Current Crest Factor: 1.5 or less.

8. LED drivers shall not over-drive LEDs at a current or voltage above LED rated values in order to increase LED lumen output.

9. Meets EN610000 for input harmonics.

10. ROHS Compliant.

B. Dimming Drivers:

1. Dimming Range: Visually flicker-free, strobe-free, continuous dimming of source as follows, unless specifically noted otherwise in the Light Fixture Schedule whichever is more stringent:

a. Luminaires: 100 to 1 percent of rated lumens.

2.

3. Compatibility: Certified by manufacturer for use with specific dimming control system and LED indicated.

4. Control: Coordinate to ensure that the dimming driver, power supply, controller, dimming module, and/or wallbox dimmer and connecting wiring are compatible.

2.4 LED LUMINAIRES

A. Comply with ANSI C78.377 for white light LED color range.

B. LED binning specification tolerance to be within 3 MacAdam ellipses of rated values or as indicated in the Light Fixture Schedule, whichever is more stringent. All LEDs used for same fixture type throughout the project to originate from same production bin.

C. Unless indicated otherwise in the Light Fixture Schedule, minimum 70% maintained initial-rated lumens at average rated life of as follows:

1. LED luminaires: 50,0000 hours

D. ROHS compliant

E. Manufacturer of LED chips will be evaluated based on the manufacturer's product literature and data. At a minimum, LED fixtures or lamps will incorporate Bridgelux, Cree, Nichia, Osram or Xicato LEDs; additional manufacturers may be considered however the Architect or Engineer has the authority to reject other manufacturers for technical or aesthetic reasons if felt necessary or desireable.

2.5 AUXILIARY DEVICES FOR LOW VOLTAGE AND LED FIXTURES

A. Provide remote power supplies, drivers and/or transformers for light fixtures as required for a complete and operational system. Where equipment is not indicated as plenum rated, provide an additional enclosure for the device(s) suitable for the installed environment.

2.6 LIGHT FIXTURE SUPPORT COMPONENTS

A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

B. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conditions of equipment and installation prior to beginning work.

B. Verify that equipment is ready for connecting, wiring, and energizing.

3.2 INSTALLATION

A. Light Fixtures: All work shall be executed to present a neat appearance. Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Suspended Light Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end. Provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.

4. Decorative pendant mounted light fixtures

a. Provide cord and/or stem lengths to match elevations above finished floor as indicated on architectural elevations. If architectural elevations do not indicate suspension heights, coordinate with Architect to determine final suspension heights. Regardless, contractor shall not field cut pendants or order rigid stems without elevation approval from Architect. Pendant suspensions on electrical documents are for reference only.

1) Cord-mounted: Manufacturers shall supply luminaires with flexible, field cutting cords. Contractor shall field cut cords as required.

2) Field-cuttable, rigid-stem mounted: Manufacturers shall supply luminaires with field cutting rigid stems. Contractor shall field cut stems as required.

3) Factory-cut rigid stem mounted: Contractor shall provide rigid stem dimensions to the manufacturer as required.

b. Junction boxes used to feed light fixtures shall be covered by manufacturer supplied canopy plates.

C. Installation within non-standard ceilings, including, but not limited to, wood and metal ceilings.

1. For recessed downlight light fixtures, specification is based on standard throats to accommodate ceiling thicknesses of ¾" or less. If non-standard ceiling (such as wood, thickened gypboard ceilings and metal plank type) require throats greater than ¾",

modifications to manufacturer's standard ¾" throat shall be determined by Architect and Contractor prior to shop drawing submission.

2. For light fixtures recessed into metal ceilings, rigidly support light fixture to ensure that trim fits flush with ceiling plane.

D. Connect wiring according to Section "260519 - Low-Voltage Electrical Power Conductors and Cables."

E. Through wiring of recessed light fixtures, in suspended ceilings, is not permitted. Connect each light fixture by a whip to a junction box. The whip shall be of sufficient length to allow the light fixture to be relocated within a 6-foot radius.

F. Auxiliary Devices for low voltage and LED Fixtures

1. Install device within maximum remote distances and with wiring sized per manufacturer's recommendations.

2. In public areas or other areas where remote device visibility is undesireable, install device where concealed from view, well ventilated and accessible. Provide access panels as required.

3. Provide label on device indicating fixture type and location/room served along with panelboard circuit number.

4. Properly support remote lighting devices, including transformers, power supplies, and drivers, per Code and manufacturer's recommendations.

3.3 DIMMING

A. For dimmable light fixtures, provide both control and power wiring between light fixture and control device and between light fixtures. Quantity of low voltage and line voltage wiring and wire type shall be per manufacturer's recommendations. At a minimum, provide the following based on control type at either 120V or 277V, unless recommended otherwise by the manufacturer:

1. Wireless DMX – two line voltage conductors plus ground and wireless DMX receivers and transmitters.

B. Coordinate light fixture and control device dimming types for compatibility.

3.4 COORDINATION

A. Coordinate the installation and location of light fixtures with other work and all other trades before installation to avoid conflicts. Coordinate light fixture locations in mechanical rooms with final installed piping and ductwork layouts.

B. Verify all ceiling systems and coordinate light fixture type and accessories prior to ordering light fixtures. Coordinate and cooperate with ceiling installer in regards to the location and installation of light fixtures.

3.5 ADJUSTING

A. Contractor shall adjust all light fixture sockets to match the lamp specified and aim all adjustable light fixtures as directed by the Architect.

3.6 FIELD QUALITY CONTROL

A. Clean light fixtures of dirt and debris upon completion of the installation. Protect installed light fixtures from damage during the remainder of the construction period.

B. Upon completion of the installation of light fixtures, and after building circuits have been energized, energize lighting branch circuits to demonstrate capability and compliance with the requirements. Where possible, correct malfunctioning units at the site, then retest to

demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

C. At the time of final acceptance of this project by the Owner, ensure that all lamps are in working order and all light fixtures are fully lamped.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.7 STARTUP SERVICE

A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION

SECTION 265561

THEATRICAL LIGHTING

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data: For each type of product indicated, including lighting control panels, control console, control devices, light fixtures, distribution components and accessories.

B. Shop Drawings: For stage lighting. Show fabrication and installation details for lighting control panels and fixed (non-motorized) connector strips, including arrangements, and circuit assignments of various relay modules, dimming cards and portion of connector strip and labeling Provide one line diagrams of system and load schedules indicating load types, voltage, amperage per circuit, circuits and their respective control zones and circuit capacities.

1.2 WARRANTY

A. Manufacturer shall warrant its products for a period of 2 years, with the warranty period beginning on the date of energization of permanently installed products and date of shipment for portable systems.

1.3 SYSTEM INTEGRATOR

A. The Contractor shall utilize a System Integrator to coordinate and assist in the installation of all aspects of the theatrical lighting and controls as specified in this section. The following companies have prior approval as System Integrator:

1. Texas Scenic – San Antonio, TX
2. Secoa – Minneapolis, MN
3. TPI – St. Louis
4. AV Pro – Desoto, TX
5. Theatrical Services Inc – Wichita, KS
6. A to Z Theatrical Supply – Kansas City, MO
7. XS Lighting – Kansas City, MO
8. Ford Audio and Visual – Oklahoma City, OK
9. Integrated Lighting Systems – Tulsa, OK

B. In order to be considered as a System Integrator on this project, each Contractor requesting approval must submit to the Engineer at least ten (10) days prior to the date of bid opening a letter expressing his intent to bid. This letter shall include a list of at least five (5) projects of similar size and scope completed by this firm within the last five (5) years. Inspection of one completed installation may be requested by the Engineer's Representative prior to consideration of request to bid. The System Integrator shall have been in business under the same name for five (5) full years preceding the date of this bid

doing work similar to the type specified. The decision of the Engineer as to the capability of the Bidder to successfully complete and maintain the system based on this pre-qualification information shall be final.

C. Pre-Bid request letter shall include a statement that all major items of equipment shall be bid and supplied as specified, or shall contain details of all proposed substitute equipment for review by the Engineer's Representative. Substitute equipment items to include specifications, parts numbers, and details of interconnection to proposed system. The decision of the Engineer as to the acceptability of substitute equipment shall be final.

1.4 MAINTENANCE AND SUPPORT SERVICES BY MANUFACTURER

A. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.

B. Make new replacement parts available for minimum of ten years from date of manufacture.

C. If there is a problem on the job site, the manufacturer must be reachable M – F 8am – 5pm CST.

D. Factory direct technical support during and after warranty period shall be provided, at no additional cost to the Owner, M-F 8 am – 5 pm CST.

E. Pre-program the lighting control system per plans and approved submittal, to the extent data is available.

F. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES AND ACCESSORIES

A. Manufacturers:

1. : Subject to compliance with requirements, provide first-named product indicated on Light Fixture Schedule or comparable equivalent product as indicated on the Light Fixture Schedule.

B. General:

1. Comply with UL 1573 and listed and labeled by an NRTL.

2. Fixtures: Equipped with 36” pigtail, yoke with pipe clamp, safety cable for batten mounting, and filter holder.

3. Metal Parts: Free of burrs, sharp corners, and edges.

4. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

5. Fixture Doors and Their Internal Access: Smooth operating, free of light leakage under operating conditions, and arranged to permit relamping without use of tools. Doors, lenses, diffusers, and other pieces arranged to prevent accidental falling during relamping and when secured in operating position.

6. Lamping: Provide lamping as indicated in the Light Fixture Schedule.

7. Lamp Sockets: Relampable without disturbing alignment or focus adjustment.

8. Fixture Ventilation Openings: Baffled against light leaks.

9. Fixture Operating Controls and Handles: Thermally insulated.

10. Lenses: Borosilicate glass in silicone mountings.

11. Fixture Yoke: Rigid metal, arranged for vertical aiming of unit and equipped with T-bolt or hand screw to lock alignment.

2.2 WIRE AND CABLE

A. Building Wire in Raceways: Comply with requirements specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ethernet Cabling: Provide in compliance with manufacturer's requirementsand of industry standards ANSI and EIA/TIA.

1. For 10/100BaseT, comply with provisions for UTP cable and hardware.

2. For 10Base-FL, comply with provisions for micrometer, multimode, optical-fiber cable and hardware required by manufacturer.

C. ANSI E1.11 (USITT DMX512-A) Control Cabling: Comply with requirements of industry standards ESTA, ANSI and EIA/TIA.

1. Standard Cable: NFPA 70, Type CM or Type CMG.

a. Paired, low-capacitance computer cable for ANSI E1.11 (USITT DMX512-A) applications. Two pairs, twisted, No. 22 AWG stranded, tinned-copper conductors.

b. PE insulation.

c. Inner Shield: 100 percent coverage, aluminum foil-polyester tape.

d. Outer Shield: 90 percent coverage, tinned-copper braid.

e. Outer Shield Drain Wire: Stranded, tinned copper.

f. PVC jacket.

g. Flame Resistance: Comply with UL 1581.

D. Low-Voltage Control Cabling:

1. Control-Cable Conductors:

a. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway; complying with UL 83.

b. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.

2. Paired Cable: NFPA 70, Type CMG.

a. One pair, twisted, No. 16 AWG, stranded, tinned-copper conductors.

b. PVC insulation.

c. Unshielded.

d. PVC jacket.

e. Flame Resistance: Comply with UL 1581.

3. Paired Cable: NFPA 70, Type CMG.

a. One pair, twisted, No. 18 AWG, stranded (19x30), tinned-copper conductors.

b. PVC insulation.

c. Unshielded.

d. PVC jacket.

e. Flame Resistance: Comply with UL 1581.

2.3 LIGHTING CONTROL SYSTEM

A. Existing to remain ETC Sensor/Paradigm processor.

1. Comply with ANSI E1.11 (USITT DMX512-A) for data transmission.

B. Control Console: Existing to remain.

C. System Operation: Selectable between multichannel two-scene preset and four-channel single-scene memory. Console features include electronic patching of control signals for up to 512 dimmers and off-line data storage using internal, 3-1/2-inch disk-drive unit. Operational capability includes the following:

1. Live and blind programming.

2. Special effects programmability for automatic operation of lights in pulsating, sequential dimming and brightening, and other special operating modes. Special effects menu displays operator guidance for programming and individual step levels.

3. Signal from fire-alarm control panel that automatically brings selected circuits to fully on or fully bright condition, overriding normal dimming and on-off controls.

4. Inserting cues between designated cues without renumbering.

5. Out-of-sequence playback of cues.

6. Controlling houselights and stage lights from console by assigning their dimmers or non-dim on-off controls to a channel.

7. Retaining programmed cues in memory for minimum of one year after power outage.

8. Automatic sequential execution of programmed cues.

9. Printing cues using parallel or serial printer port, cable, and printer. Cable and printer are not included with this system.

D. Console Power and Control Outlets: Multiple receptacles matched to connector on console connector cord.

E. Preset Lighting Control Station: Architectural-type, multichannel, remote-dimmer-control station with the following features:

1. System controls designated houselights, stage lights, and other lights.

2. Channels as indicated on drawings.

3. Take-control/off switch that places station in control of channels and sets lighting to levels dictated by channel and master-slider controls.

4. Illuminated push buttons for activating preset scenes of house lighting and labeled as indicated on Drawings. Confirm exact preset scenes and button labels with Owner after field verification.

5. Flush wall mounted unless otherwise indicated.

2.4 CONTROL PROCESSOR MODULES

A. The Architectural Control Processor shall be the Unison Paradigm Series, P-ACP Control Processor as manufactured by Electronic Theatre Controls, Inc., or equal.

B. Mechanical

1. The Architectural Control Processor (ACP) assembly shall be designed for use in DRd Series Power Enclosures and ERn Series Control Enclosures.

2. The processor shall utilize microprocessor based, solid state technology to provide multi-scene lighting and building control.

3. ACP module electronics shall be contained in a plug-in assembly.

    a. The module shall be housed in a formed steel body and contain no discrete wire connections.

        1) No tools shall be required for module removal or insertion.

4. The ACP shall be convection cooled.

5. User Interface

    a. The ACP shall utilize a backlit liquid crystal display capable of graphics and eight lines of text.

    b. The ACP shall provide an alpha-numeric keypad for data entry and navigation.

    c. The ACP shall provide a touch-sensitive control wheel for navigation.

    d. The ACP shall provide shortcut buttons to assist in navigation, selection, and data entry.

    e. The ACP keypad, buttons, and wheel shall be backlit for use in low-light conditions.

        1) The backlight shall have a user selectable time out, including no time out.

6. The ACP shall provide a front-panel RJ45 receptacle for Ethernet connection to the processor for configuration, live control, and web-browser-based system access.

    a. The RJ-45 receptacle shall be secured behind the locking door.

7. The ACP shall provide a Secure Digital (SD) Removable Media slot on the front panel for transfer of configuration data.

a. The SD slot shall be secured behind the locking door.

8. The ACP shall provide a Universal Serial Bus (USB) port on the front panel for transfer of configuration data.

   a. The USB port shall be secured behind the locking door.

9. Architectural Lighting System configuration and program information shall be stored in flash memory, which does not require battery backup.

   a. The ACP shall provide a Compact Flash (CF) Card as backup flash memory and storage.

   b. The CF Card is located in the back of the ACP, and can be accessed only by removing the ACP.

   c. The ACP data can be exchanged by inserting the CF card into another ACP.

C. Electrical

1. The ACP shall require no discrete wiring connections; all wiring shall be terminated into Dimming or Control Enclosure.

2. The ACP shall require low-voltage power supplied by the Dimming or Control enclosure.

3. The ACP shall be hot-swap capable.

4. The ACP shall support Echelon LonTalk with LinkPower communications with control stations and other remote devices, including button stations, button/fader stations, Touchscreen stations, sensors, and third party LonMARK compliant products.

   a. The LinkPower network shall utilize polarity-independent, low-voltage Class II twisted pair wiring, type Belden 8471 (unshielded) or Belden 8719 (shielded) or equivalent. One # 14 AWG drain wire will be required for system not using grounded metal conduit. Touchscreen stations, interface stations and portable stations connectors will also require (2) #16 AWG wires.

   b. The LinkPower network shall be topology free. Network wiring may be bus, loop, home run, star or any combination of these.

   c. Link power wiring shall permit a total wire run of 1640 ft. (500m) without a repeater. Repeater option modules shall be available to increase wiring maximums in increments of 1640 ft. (500m).

d. Link power wiring between stations shall not exceed 1313 ft. (400m).

5. The ACP shall support 10/100BaseTX, auto MDI/MDIX, 802.3af compliant Ethernet networking using TCP/IP, ESTA BSR E1.17 Advanced Control Networks (ACN) and ESTA BSR E1.31 (sACN) Protocols for internal communication and integration with third-party equipment.

6. The ACP shall support EIA-RS232 serial protocol for bi-directional command and communication with third-party equipment.

7. The ACP shall support two discrete ESTA DMX512A ports, configurable as input or output ports.*

   a. *When used in a Dimming Enclosure, the second port is always an output port.

8. The ACP shall provide four onboard dry contact closure inputs for integration with third-party products.

9. The ACP shall provide four onboard contact closure outputs, rated at 1A@30VDC, for integration with third-party equipment.

D. Functional

1. Capacity

   a. Shall support 1024 channels of control

   b. Shall support 2 physical DMX ports, each of which may be configured as an input or output

2. System

   a. Runtime application shall utilize support Net3 system interoperability

   b. System shall support the use of Network Time Protocol for real time clock synchronization

   c. System shall support remote firmware upload an over Ethernet connection from a connected PC running the Light Designer software or another connected processor.

   d. System shall support local firmware upload from removable media (SD Card, USB Flash Drive)

3. Diagnostics

a. Shall output an Event log

b. Standard log shall store a fixed-length history of recent activity

c. Separate critical log shall only store important messages (such as boot-up settings)

4. Configuration Data

a. Configuration Data can be uploaded over an Ethernet connection from a PC running Light Designer application

b. Configuration Data can be retrieved from another Paradigm Processor

c. A Paradigm Processor shall make its configuration data available for retrieval by another Processor as a backup/recovery mechanism

d. Configuration Data shall be stored on solid-state media that can be removed to facilitate transfer between Processor units

e. Configuration Data may be loaded to and from removable media access provided on front panel

f. Configuration Data for the entire System shall be available for download from any single Processor

g. Shall store configuration data for Dimming enclosure processors and shall make available for download

5. Scalability

a. Adding additional Processors to a System shall proportionately increase its overall capabilities up to a maximum project size

b. The maximum number of Processors configured as a project shall be at least 12. The use of a Central Control Processor (P-CCS) shall allow for larger system sizes up to 72 processors

c. Multiple Processors shall utilize the Ethernet network to remain time synchronized and share control information

d. Multiple Processors shall utilize the Ethernet network to maintain configuration data synchronization as modifications are made

e. Failure of a single Processor shall not prohibit continuing operation of the remaining Processors

f. It shall be possible for multiple Systems to coexist on the same physical network with logical isolation between Systems

6. Local User Interface

a. Shall provide access to Processor setup (IP address)

b. Shall provide access to Processor status and diagnostics

c. Where the Processor is installed within a Dimming enclosure, shall provide access to Dimming enclosure setup, status and diagnostics

d. Shall provide control functionality for Control Channels, Zones, Fixtures, Groups, Presets, Macros, Walls and Sequences within the current configuration.

e. Shall provide functionality to schedule astronomical and real time events (add/edit/delete)

f. Shall allow for display of local DMX information

g. Shall allow for transfer of log files to local removable media

h. Shall allow to perform firmware upgrades for connected Dimming enclosures

i. Shall allow for transfer of configuration to and from Dimming enclosures using removable media

j. Shall allow for transfer of configuration to and from LCD Stations using removable media

k. Shall allow for binding of Stations

7. Access Controls

a. There shall be 2 user accounts - Administrator, and User with separate password protection

b. Account and password settings shall be local to each Processor

c. Access Controls shall be applied to certain areas of the Paradigm Local User Interface and Web Interface

8. Web User Interface

a. Shall be an internal web server accessible via Ethernet port

b. Shall support common web browsers on Windows and Mac platforms

c. Shall provide functionality to Activate and Deactivate Presets

d. Shall provide functionality to schedule timed events (add/delete)

e. Shall display status information

f. Shall display log files

g. Shall allow for configuration of Processor settings (date, time)

h. Shall allow for upload and download of configuration data

i. There shall be links to other web-enabled devices in the System, including other Paradigm Processors

9. Stations

a. Stations shall be connected to a Paradigm Processor via a LinkPower network or Ethernet

b. Station discovery and binding shall be accomplished from the Local User Interface or Light Designer

10. Net3 and ACN Devices

a. Paradigm Processors shall provide DMX-Net3 gateway functionality

b. Net3 devices shall be connected to and controlled from the Processor via Ethernet

c. It shall be possible to send and receive Macro triggers defined within the System configuration via Net3

d. There shall be support for a maximum of 1024 Streaming ACN outputs configured to a maximum of 12 universes per Processor

11. Operation

a. When contained in an dimming enclosure, a snapshot of the dimming enclosure output data shall be stored in persistent memory so that hardware can access it for immediate output on boot

b. DMX output refresh rate shall be configurable

c. There shall be support for 16-bit DMX Attributes

d. DMX inputs may be patched to DMX and Streaming ACN outputs as external sources

e. Streaming ACN inputs shall be patched to DMX outputs (gateway) as external sources

f. Where there are multiple external sources then priority and HTP shall be used to perform arbitration

g. External and internal sources shall be arbitrated based on user-selection of standard or custom rules

h. On Preset Record, the values of Attributes within the Preset shall be updated to reflect the current output

i.The total output may be the combination of many different Presets running concurrently

j.There shall be no hard limit on number of concurrent cross fades

k. Multiple Presets controlling the same Attribute shall first interact based on priority and second based on Latest Takes Precedence (LTP) or Highest Takes Precedence (HTP)

l.LTP and HTP operation shall be supported simultaneously and interact (at the same priority) using HTP

m. Settings due to LTP Presets may be automatically discarded from operation when overridden

n. It shall be possible to specify that a Preset or Attribute Control will persist when overridden

o. A Preset may be designated as an HTP Override and shall cause HTP values to be discarded

p. It shall be possible to modify the rate of a Preset (Cross fades, Effects) from a Control within the System

q. Each Preset shall have a status that can be Activated, Deactivated or Altered

r. Preset status may be set based on matching levels in the current output as an option

s. On startup the System shall be capable of automatically executing timed events within the previous 24 hours to synchronize its initial output state with the current time of day

12. Serial Input/Output

a. RS232 shall support 8-bit word length, parity selection and 1 or 2 stop bits

b. RS232 shall support baud rates from 4800 to 115,200 bps

c. Serial input and output messages are fully customizable

d. Serial output messages can be generated by any Control or Event

PART 3 - EXECUTION

3.1 DIVISION OF RESPONSIBILITIES

1. The THEATRICAL LIGHTING VENDOR/CONTRACTOR shall be responsible for furnishing and installing:

    a. House light fixtures and all associated accessories as described in the Theatrical Light Fixture Schedule.

    b. Network cabinet and network accessory devices, including but not limited to gateways, distributed and wireless DMX lighting control modules and preset wall stations.

    c. Low voltage terminations at connector strips and lighting control system network devices, including but not limited to nework cabinet, lighting control panels, network gateways and preset wall stations.

    d. All factory commissioning (startup and programming) of theatrical lighting and controls.

    e. Owner training of theatrical lighting and controls.

    f. Coordination as required with the Owner and Electrical and/or General Contractor to ensure a functional, operational theatrical lighting and control installation that meets Owner requirements.

2. The ELECTRICAL contractor shall be responsible for furnishing and installing:

    a. All wiring and termination providing line voltage to all house lighting fixtures and network rack equipment requiring line voltage power, including but not limited to, lighting control panels, connector strips, motorized hoistways (see 265561.01), receptacles (wall-mount outlet and floor mount pockets), emergency lighting transfer cabinets and network rack.

    b. All pipe and wiring connecting data lines between all lighting control system network components, including but not limited to network cabinet, lighting control panels, connector strips, network gateways, and preset wall stations.

    c. Standard and special back boxes for receptacles and data devices associated with the theatrical lighting and controls.

    d. Installation only of theatrical vendor supplied line voltage special receptacles, e.g. floor and wall pockets indicated with theatrical circuit labeling.

    e. Other receptacles indicated on the E series drawings.

    f. Coordination as required with the Owner and Theatrical Lighting Vendor/Contractor to ensure a functional, operational theatrical lighting and control installation that meets Owner requirements.

3.2 INSTALLATION

A. Install equipment in accordance with manufacturer's installation instructions.

B. Provide complete installation of system in accordance with Contract Documents.

C. Assign each load to a zone and set control functions.

D. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.

E. Set permanently mounted items level, plumb, and square with ceilings and walls.

F. Indicated mounting heights are to bottom of unit for suspended items and to center of unit for wall-mounted items.

G. Mount and connect fixtures, and install and connect distribution devices.

1. If arrangement is not indicated, install so each fixture, dimmer, house lighting circuit, control channel, and outlet circuit can be operated, and complete system demonstrated, in all operating modes.

2. Install safety cables secured to stage rigging or gridiron for all pipe-mounted electrical fixtures and equipment.

3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

H. Comply with mounting and anchoring requirements specified in Section 260529 "Hangers and Supports for Electrical Systems".

3.3 WIRING

A. Power Wiring:

1. Install wiring as specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for hardwired connections. Install wiring in raceways except cable and plug connections.

2. Install power wiring with a separate neutral for each output circuit from main dimmer and for each house and stage lighting circuit.

B. Signaling, Remote-Control, and Power-Limited Circuits:

1. Comply with requirements specified in Section 260523 "Control-Voltage Electrical Power Cables" for installation of wiring. Install wiring in raceways except cable and plug connections.

2. Comply with the following unless otherwise indicated:

a. Size conductors according to lighting control device manufacturer's written instructions.

b. Select cable insulation, shielding, drain wire, and jacket complying with lighting control device manufacturer's written instructions.

c. Install circuits to eliminate radio-frequency interference and electromagnetic interference.

3. Remote-control circuits associated with emergency lighting control shall be installed complying with Class 1 Circuit standards in NFPA 70.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes and in terminal cabinets and equipment enclosures.

E. Remove wall plates and protect devices and assemblies during painting.

F. Support lighting fixtures, distribution components, and accessories as specified in Section 260529 "Hangers and Supports for Electrical Systems." Equip all pipe-mounted equipment with safety cables that are secured to supporting pipe.

G. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.4 IDENTIFICATION

A. Identify components, power, and control wiring according to Section 260553 "Identification for Electrical Systems."

B. Label each fixture, lighting outlet, distribution device, and dimmer module with unique designation. Labels on elevated components shall be readable from the floor.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.

2. Visual and Mechanical Tests and Inspections:

a. Inspect each fixture, outlet, module, control, and device for defects, finish failure, corrosion, physical damage, labeling by an NRTL, and nameplate.

b. Exercise and perform operational tests on mechanical parts and operable devices according to manufacturer's written instructions.

c. Check tightness of electrical connections with torque wrench.

d. Verify proper protective device settings, fuse types, and ratings.

e. Record results of tests and inspections.

3. Electrical Tests: Perform tests according to manufacturer's written instructions.

a. Continuity tests of circuits.

b. Operational Tests: Connect each outlet to a fixture and a dimmer output circuit so each dimmer module, dimmer control and output circuit, outlet, and fixture in a typical operating mode will be sequentially tested. Set and operate controls to demonstrate fixtures, outlets, dimmers, and controls in a sequence that cues and reproduces actual operating functions for a typical system of the size and scope installed. Include operation and control of houselights and stage lights from each control location and station including optional plug-in, control-console outlet locations. Record fixture and outlet assignments, control settings, operations, cues, and observations of performance.

4. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible organization and individual.

D. Stage lighting will be considered defective if it does not pass tests and inspections.

E. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

F. Prepare test and inspection reports.

1. Prepare a schedule of lighting outlets by number; indicate circuits, dimmers, connected fixtures, and control-channel assignments. Prepare a schedule of control settings and circuit assignments for house control channels. Prepare written reports of tests and observations. Report defective materials, workmanship, and unsatisfactory test results. Include records of repairs and adjustments made.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

B. Set field-adjustable time schedules to settings indicated on Drawings or as directed by the Owner. Confirm final time schedules with Owner prior to Commissioning.

3.7 COMMISSIONING

A. Provide factory-certified field service engineer, certified on the system installed, to make minimum of three site visits to ensure proper system installation and operation under following parameters:

B. Following represents minimum requirements, and shall not absolve the factory commissioning engineer from meeting intent for proper system installation and operation.

1. Make first visit prior to installation of wiring. Review:

a. Low voltage wiring requirements.

b. Separation of power and low voltage/data wiring.

c. Wire labeling.

d. Information required on load schedules.

e. Control panels and cabinets locations and installations.

f. Control locations and addressing.

g. Network device locations

h. Power and data provisions for connector strips.

2. Make second visit upon completion of installation of lighting control system:

a. Verify connection of power feeds and load circuits.

b. Verify connection and location of controls.

c. Energize processor panel and download system data program.

d. Verify proper connection of panel links (low voltage/data) and address panel.

e. Download system panel data to control panels

f. Verify system operation control by control, circuit by circuit.

g. Verify proper operation of manufacturer’s interfacing equipment.

h. Verify proper operation of manufacturer’s supplied PC and installed programs.

i. Verify operation of Ethernet connection.

j. Verify proper operation and labeling of preset wall stations buttons.

k. Obtain sign-off on system operation and functions.

1. Make third visit to demonstrate and educate owner’s representative on system capabilities, operation and maintenance.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain all stage lighting equipment described in these specifications and indicated on Drawings..

END OF SECTION