ADDENDUM NO. #06

DATE: June 15, 2021

PROJECT: BROWN FAMILY AMPHITHEATER
BALL STATE UNIVERSITY
MUNCIE, INDIANA

PROJECT NUMBER: RATIO #20032 / BSU# 2020-041.01 G

OWNER: Ball State University
2000 West University Ave.
Muncie, Indiana 47306
Phone: (765) 289-1241

ARCHITECT / LANDSCAPE ARCHITECT:
RATIO ARCHITECTS, INC.
101 South Pennsylvania Street
Indianapolis, Indiana 46204-3684
Phone: (317) 633-4040
Fax: (317) 633-4153

MEP ENGINEER:
Applied Engineering Services
5975 Castle Creek Parkway North Drive, Suite 300
Indianapolis, Indiana 46250
Phone: (317) 810-4141

STRUCTURAL ENGINEER:
CE Solutions
10 Shoshone Drive
Carmel, Indiana 46032
Phone: (317) 818-1912

CIVIL ENGINEER:
Cripe
3939 Priority Way South Drive, Suite 200
Indianapolis, Indiana 46240
(317) 844-6777

LIFE SAFETY:
RTM Consultants, Inc.
6640 Parkdale Place
Indianapolis, IN 46254
Phone: (317) 329-7300

THEATER PLANNING / LIGHTING DESIGN
Schuler Shook
750 North Orleans, Suite 400
Chicago Illinois 60654
Phone: (312) 944-8230

ACOUSTICS / AUDIO VISUAL DESIGN
Threshold Acoustics
141 West Jackson Boulevard, Suite 2080
Chicago Illinois 60604
Phone: (312) 386-1400

This Addendum is issued in accordance with the provisions of Contract Documents, and becomes a part of the Contract Documents as provided therein. The information contained herein modifies the original Bidding Documents dated May 07, 2021 and all prior Addenda as applicable. Requirements of the original Bidding Documents and previous Addenda remain in effect except as modified by this Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.
PART 1 - GENERAL

1. None

PART 2 - SPECIFICATION CHANGES

1. DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS
   a. General: Remove all requirements for Liquidated Damages
2. SECTION 004300 BID FORM SUPPLEMENTS
   a. Modify Appendix A, Item 2, “Project Completion” as follows:
   b. “Substantially Complete the Work by April 1st, 2022.”
3. SECTION 051200 STRUCTURAL STEEL FRAMING
   a. 1.6 QUALITY ASSURANCE:
      i. Delete Fabricator and Installer AISC Certification requirements.
4. SECTION 051213 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING
   a. 1.5 QUALITY ASSURANCE:
      i. Delete Fabricator and Installer AISC Certification requirements.
5. SECTION 055000 METAL FABRICATIONS
   a. Delete Item 1.2.A.6
   b. Modify Paragraph 2.9.A. as follows:
      “A. Fabricate metal bollards from Schedule 80 steel pipe.”
   c. Delete Article 2.13 in its entirety.
6. SECTION 062015 THERMALLY MODIFIED WOOD
   a. Modify Item 2.5.B.1 as follows:
      “1. Minimum Board Thickness: 1-1/2 inches, unless noted otherwise. 1-1/4 inches at soffit.”
7. SECTION 074213.16 METAL PLATE WALL PANELS
   a. Change Section 2.2.1, to read as follows:
      i. “Basis of Design: Knightwall, Greengirt by Smart Ci or approved equivalent.”
8. SECTION 074646 FIBER CEMENT SIDING
9. SECTION 087100 DOOR HARDWARE
   a. Insert Article 2.18 as follows:

“2.18 BARN DOOR HARDWARE

A. Provide exterior sliding barn door hardware sliding exterior door. Drawings indicated design intent.

1. Basis of Design: RW Hardware, Single Sliding Door hardware or approved equivalent.
2. Material: As standard with manufacturer for exterior use.
3. Hardware System Components: Include track, mounting bracket, end blinds, hangers, flush pull, bumper shoes, guide roller strip, bow handle, end stops and stay rollers.
4. Provide track with capacity for weight of the door.
5. Length of Track: Provide two times the width of the door.
6. Provide a track canopy to protect the sliding door hardware from the elements.”

10. SECTION 099100 PAINTING
    a. Insert Paragraph 3.1.C. as follows:
“C. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
2. Fiber-Cement Board: 12 percent.”
   b. Insert Article 3.8 as follows:

“3.8 EXTERIOR PAINT SYSTEMS
A. Cementitious Siding, Nontraffic Surfaces:

1. Latex System:
   c. Topcoat: Latex, exterior, satin.
      1) S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.”

11. SECTION 260961 – stage lighting control console and accessories removed from scope.

PART 3 - DRAWING CHANGES

1. SHEET S-201 FOUNDATION PLAN (Full sheet attached)
   a) 1/S-201: Added notes associated with Alternates #8 and #9. Revised foundations at northeast corner of building.
2. SHEET S-201S SLAB-ON-GRADE PLAN (Full sheet attached)
   a) 1/S-201S: Revised foundations/slab at northeast corner of building.
3. SHEET S-202 ROOF FRAMING PLAN (Full sheet attached)
   a) 1/S-202: Revised roof framing and section callout at northeast corner of building.
4. SHEET S-303 FOUNDATION DETAILS – 03 (Full sheet attached)
   a) Detail 1/S-303: Added notes associated with Alternate #9
5. SHEET S-501 WOOD FRAMING DETAILS – 01 (Full Sheet attached)
   a) Added detail 13/S-501
6. SHEET A-203 UPSTAGE EXTERIOR ELEVATIONS
   i) Changes as shown on attached drawings.
   ii) Assume reduction in Thermally modified hardwood horizontal slats of 10%
7. SHEET TE-001
   i) Stage lighting control console and accessories noted as not provided by Section 260961
8. SHEET TE-002
   i) CRP-2 changed to surface mount
9. SHEET TE-101
   i) CRP-2 changed to surface mount

PART 4 – GENERAL QUESTIONS

1. QUESTION: Can you clarify what we are to provide on the Maintenance of Traffic Plan C601-C602? Are we to provide traffic control signage of any kind? As far as we were concerned, this was all informative but we want to make sure because there is no spec showing how the signs are to be constructed and what material, etc. RESPONSE: Contractor shall install temporary safety signage in accordance with INDOT Standard Specification Section 802.2. The items shall not be measured individually for payment, but included within the lump sum bid.
2. QUESTION: Can Imetco quote Pemlock 1.5 (18” panel width) with S-5! Colorgard Snow rails?  
RESPONSE: Imetco 18” width Pemlock 1.5 is acceptable. S-5! Colorgard snow rails are acceptable if the cost is comparable to an adhesive-type.

3. QUESTION: Per D4/A-351 Note: Thermally Modified Hardwoods - See elevation for size and layout, where would this detail be? The rest of the panels are on A-203 but we are missing the door layout.  
RESPONSE: Thermally modified hardwood layout on the sliding door is to be the same as panel E.1 (note has also been added to attached drawing).

4. QUESTION: How is the Thermally Modified Hardwoods soffit material attached? Stainless steel face fasteners?  
RESPONSE: Yes, use Stainless steel fasteners per the specs.

5. QUESTION: Per detail D6/A350 could the 2x4 thermally treated hardwood soffit be of a thinner material to lighten the load? There would be a cost saving if we went with a 1" net or 1 1/4" net as opposed to 1 1/2" net.  
RESPONSE: Yes, see added Alternate No. 10 in this Addendum.

6. QUESTION: Per Section 062015 1.4 A - What temperature cook is required? There is a big difference on how 190C and 210C weather. 210C would require less maintenance. Please advise.  
RESPONSE: The medium shade of the 190C cook is preferred.

7. QUESTION: Per detail D4/A-351 please advise on track and roller requirements and manufacture.  
RESPONSE: See updated spec. information in this addendum. The sliding door is to be a delegated design.

8. QUESTION: Per Section 062015 2.5 C2.- Is the intent to have a monochrome look to the thermally modified material or are we looking at multiple colors being chosen?  
RESPONSE: Single 'color' is the intent.

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**PART 5 – ATTACHMENTS**

1. SECTION 004300 BID FORM SUPPLEMENTS
2. SECTION 012300 ALTERNATES
3. SECTION 074646 FIBER CEMENT SIDING
4. SECTION 260961 THEATER STAGE LIGHTING SYSTEMS
5. SECTION 261219 PAD-MOUNTED, LIQUID-FILLED, MEDIUM VOLTAGE TRANSFORMER
6. L-201 SITE FEATURES PLAN
7. L-401 GRADING PLAN
8. L-701 SITE DETAILS
9. L-702 SITE DETAILS
10. S-201 FOUNDATION PLAN
11. S-201S SLAB-ON-GRADE PLAN
12. S-202 ROOF FRAMING PLAN
13. S-303 FOUNDATION DETAILS -03
14. S-501 WOOD FRAMING DETAILS – 01
15. A-101 OVERALL FLOOR PLAN
16. A-102 ENLARGED FLOOR PLANS
17. A-105 ROOF PLAN
18. A-131 FIRST FLOOR REFLECTED CEILING PLAN
19. A-201 EXTERIOR ELEVATIONS – BUILDING
20. A-202 EXTERIOR ELEVATIONS
21. A-203 UPSTAGE EXTERIOR ELEVATIONS
22. A-301 BUILDING SECTIONS
23. A-321 WALL SECTIONS AND MOCKUP
24. A-350 EXTERIOR DETAILS
25. A-351 EXTERIOR DETAILS
26. A-421 STAIR AND RAMP PLANS AND SECTIONS
27. A-501 INT. ELEVATIONS, DETAILS, DOOR SCHEDULE & FINISHES
28. E-201 ELECTRICAL SITE PLAN
29. E-202 ELECTRICAL SITE PLAN – ALTERNATE BID #5
30. E-503 ELECTRICAL DETAILS
31. E-701 ELECTRICAL RISER DIAGRAMS
32. TE-001 STAGE LIGHTING SYSTEM ONE-LINE DIAGRAM
33. TE-001 STAGE LIGHTING SYSTEM SCHEDULES
34. TE-101 STAGE LIGHTING SYSTEM DEVICE DETAILS

I. END OF ADDENDUM NO. 06
DOCUMENT 00 43 00
BID FORM SUPPLEMENTS (BID)

This form must be submitted with the Bid along with additional copies as requested in the Project Manual.

To: Ball State University Board of Trustees
Ball State University
Muncie, IN 47306

Project: BSU BROWN FAMILY AMPHITHEATER

BSU Project No. 2020-041.01 G

Date: ______________________
Submitted by: (Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

(full address)

In accordance with Document 00 21 14 - Instructions to Bidders (AIA A701) and Document 00 22 13 - Supplementary Instructions to Bidders (BSU A701), we include the Bid Form Supplements Appendices listed below. The information provided shall be considered an integral part of the Bid Form.

These Appendices are as follows:

Appendix A Receipt of Addenda/Project Completion: If applicable, acknowledge receipt of all Addenda and fill in or acknowledge Completion time/Project Schedule.

Appendix B Alternates: When used, include the Cost variation to the Bid Price applicable to the Work described in the Contract Documents.

Appendix C Unit Prices: When used, include a listing of unit prices specifically requested by the Contract Documents.

Appendix D Principal Subcontractors: When used, include the names of all Primary Subcontractors and the portions of the Work they will perform.

Appendix E Supplementary General Construction Information: When used, list the requested Supplementary General Construction Information.

Appendix F Supplementary Mechanical Information: When used, list the requested Supplementary Mechanical Information.

Appendix G Supplementary Electrical Information: When used, list the requested Supplementary Electrical Information.

Appendix H Supplementary Telecommunication Information: When used, list the requested Supplementary Telecommunication Information.
SUBMITTAL SCHEDULE OF APPENDICES

a. All bidders shall submit with their Bid the following Appendices:
   APPENDIX A – Receipt of Addenda/Project Completion
   APPENDIX B – Alternates
   APPENDIX C – Unit Prices
   APPENDIX D – Principal Subcontractors

b. The Low bidder, and the second and third bidders if requested, shall execute and submit to the Owner the remaining SUBCONTRACTOR AND MATERIAL QUESTIONNAIRES.

   Submit to the Owner: Finance Office, 2000 West University Avenue, Muncie, Indiana, 47306; the following appendices within forty-eight (48) hours after date and time for receiving bids:
   APPENDIX E – Supplementary General Construction Information
   APPENDIX F – Supplementary Mechanical Information
   APPENDIX G – Supplementary Electrical Information
   APPENDIX H – Supplementary Telecommunication Information

BID FORM SUPPLEMENTS SIGNATURE(S)

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

_______________________________________________
(Authorized signing officer)

_______________________________________________
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF ______________________________________ ss: ____________________________ (seal)
COUNTY OF ______________________________________

__________________________ (seal)
being duly sworn, deposes and says
that he/she is
_______________________________________________ of the above ____________________________ and that the
_______________________________________________ (Title) ____________________________ (Name of Organization)

statements contained in the foregoing Bid Form Supplements are true and correct.

Subscribed and sworn to before me this __________ day of __________, __________.

____________________________________
Notary Public

My Commission Expires: ____________________________

County of Residence: ____________________________
APPENDIX A - RECEIPT OF ADDENDA/PROJECT COMPLETION

1. ADDENDA

The Bidder acknowledges receipt of the following Addenda:

<table>
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<th>Addendum No.</th>
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2. PROJECT COMPLETION

If this Bid is accepted, we will:

Commence on site work on the 12th day of July, 2021 and

Substantially Complete the Work by the 12th day of March, 2022. April 1, 2022.
APPENDIX B - ALTERNATES

The following amounts shall be added to or deducted from the Base Bid Sum. Refer to Section 01 23 00 - Alternates: Schedule of Alternates.

Alternate No. 1

Public Restroom  (Add) (Deduct) $ ____________________

Alternate No. 2

Curved Canopy Edge  (Add) (Deduct) $ ____________________

Alternate No. 3

Resilient Wood Stage Surface  (Add) (Deduct) $ ____________________

Alternate No. 4

Horticultural Topsoil  (Add) (Deduct) $ ____________________

Alternate No. 5

Data Connections at Seating Bowl  (Add) (Deduct) $ ____________________

Alternate No. 6A

Architectural Lighting – Wall Accent, Color Changing  (Add) (Deduct) $ ____________________

Alternate No. 6B

Architectural Lighting – Canopy Uplight, Static White  (Add) (Deduct) $ ____________________

Alternate No. 6C

Architectural Lighting – Canopy Uplight, Color Changing  (Add) (Deduct) $ ____________________

Alternate No. 7

Warranty  (Add) (Deduct) $ ____________________
Alternate No. 8

Fiber Cement Siding

(Add) (Deduct) $ ________________

Alternate No. 9

North Planter

(Add) (Deduct) $ ________________

Alternate No. 10

Thermally Modified Wood – Thinner at Soffit

(Add) (Deduct) $ ________________

Alternate No. 11

Front Concrete State Platform Steps

(Add) (Deduct) $ ________________
## APPENDIX C - UNIT PRICES

The following are Unit Prices for specific portions of the Work as listed, and are applicable to authorized variations from the Contract Documents. Refer to Section01 22 00 – Unit Prices: Unit Price Schedule.

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APPENDIX D - PRINCIPAL SUBCONTRACTORS

A. The following Work will be performed (or provided) by subcontractors and their performance of the Work will be coordinated by us:

B. The Bidder will make no changes to this list after submission, without a written request by the bidder and approval by the Owner.

C. Provide additional copies of this page as needed for a complete listing.

D. Indicate YES/NO if Subcontractor is required to be pre-qualified (contract value greater than $300,000). If yes, indicate certification expiration date.

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<th>WORK SUBJECT</th>
<th>SUBCONTRACTOR</th>
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## APPENDIX E – SUPPLEMENTARY GENERAL CONSTRUCTION INFORMATION

A. The following Work will be performed (or provided) by subcontractors and their performance of the Work will be coordinated by us:

B. We submit the following list of manufactures (or fabricators) of materials, applications, and specialties. All such materials, appliances, and specialties to be of such characteristics, design and construction will meet the requirements of the Construction Documents. The Bidder will make no changes to this list after submission, without a written request by the bidder and approval by the Owner.

C. Provide additional copies of this page as needed for a complete listing.

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<td>Utility Vaults</td>
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APPENDIX F - SUPPLEMENTARY MECHANICAL INFORMATION

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<tr>
<td>Division 23 Testing, Adjusting, and Balancing</td>
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<td>Division 33 Underground Hydronic Piping</td>
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**APPENDIX G – SUPPLEMENTARY ELECTRICAL INFORMATION**

A. The following Work will be performed (or provided) by subcontractors and their performance of the Work will be coordinated by us:

B. We submit the following list of manufactures (or fabricators) of materials, applications, and specialties. All such materials, appliances, and specialties to be of such characteristics, design and construction will meet the requirements of the Construction Documents. The Bidder will make no changes to this list after submission, without a written request by the bidder and approval by the Owner.

C. Provide additional copies of this page as needed for a complete listing.

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<th>ITEM</th>
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<tr>
<td>Division 26 Enclosed Switches and Circuit Breakers</td>
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<td>Division 26 Wiring Devices</td>
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<th>Division 26 Interior Lighting Fixtures (indicate for each fixture type)</th>
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<td>Division 26 Exterior Lighting Fixtures and Poles (indicate for each fixture type)</td>
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APPENDIX H – SUPPLEMENTARY TELECOMMUNICATION INFORMATION

A. The following Work will be performed (or provided) by subcontractors and their performance of the Work will be coordinated by us:

B. We submit the following list of manufactures (or fabricators) of materials, applications, and specialties. All such materials, appliances, and specialties to be of such characteristics, design and construction will meet the requirements of the Construction Documents. The Bidder will make no changes to this list after submission, without a written request by the bidder and approval by the Owner.

C. Provide additional copies of this page as needed for a complete listing.

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<tbody>
<tr>
<td>Division 27 Cameras for Audio/Visual Systems</td>
<td></td>
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<td>Division 27 Hangers and Supports for Communications Systems</td>
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<td>Division 27 Surface Raceways for Communications Systems</td>
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<tr>
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<td></td>
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<td>Division 27 Communications Optical Fiber Backbone Cabling</td>
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<td>Division 27 Distributed A/V Communications Systems</td>
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<th>Division 28 Power Sources for Electronic Security and Safety</th>
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<tr>
<td>Division 28 Uninterruptable Power Supply</td>
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<tr>
<td>Division 28 Safety and Security Network Communication Equipment</td>
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<td>Division 28 Access Control Systems Hardware</td>
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<tr>
<td>Division 28 Integrated Credential Readers and Entry Management</td>
</tr>
<tr>
<td>Division 28 Fire Protection and Alarm</td>
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</table>
PART 1 - GENERAL

1.1 SUMMARY
   A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS
   A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

   1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
   2. Unless explicitly permitted, Alternates shall not adjust the Construction Time of Completion. Costs for additional manpower, overtime, or additional work shifts shall be included in the cost of the Alternate.

1.3 PROCEDURES
   A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

       1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

   B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

   C. Execute accepted alternates under the same conditions as other work of the Contract.

   D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 01: Public Restroom
   1. Base Bid: Building construction does not include public restroom construction as shown in drawings.
   2. Alternate Bid: Additional building construction to include public restrooms on the west end of the base bid building as shown in the drawings.

B. Alternate No. 02: Curved Canopy Edge
   1. Base Bid: The east and west edges of the canopy have a straight profile.
   2. Alternate Bid: The east and west edges of the canopy to have a curved profile as shown in the drawings.

C. Alternate No. 03: Resilient Stage Surface
   2. Alternate Bid: Resiliently supported wood stage floor assembly as shown in drawings F1/A351 and described in specification Section 096400 “Wood Stage Flooring”.

D. Alternate No. 04: Horticultural Topsoil
   1. Base Bid: Does not include providing or placing any topsoil. Owner to furnish and install the topsoil.

E. Alternate No. 05: Data Connections at Seating Bowl
   1. Base Bid: Install (2) 2 inch conduits out of building to point indicated on drawing E-20. Provide 2 inch conduit direct to building for fiber cable as shown on E-201.
   2. Alternate Bid: Extend 2 inch conduits stubbed out of building around the Grand Lawn and connect to existing site lighting poles as shown on E-20. The 2 inch conduit for fiber cable direct to building is eliminated. The fiber cable shall be installed in conduit ring around the Grand Lawn.

F. Alternate No. 06C: Architectural Lighting – Wall Accent, Color Changing
   1. Alternate Bid: Provide type S23 light fixtures along length of stage north wall wood panels as shown in drawing E-301. Refer also to drawings A-351, E-602, and TE-203 and specification section 265110.

G. Alternate No. 06A: Architectural Lighting – Canopy Uplight, Static White
   1. Alternate Bid: Provide one (1) row of type S22 ALT 1 light fixtures as shown in drawings E-302 and TE-203. Refer also to drawing E-602 and specification section 265110.

H. Alternate No. 06B: Architectural Lighting – Canopy Uplight, Color Changing
   1. Alternate Bid: Provide two (2) rows of type S22 ALT 2 light fixtures as shown in drawings E-302 and TE-203. Refer also to drawing E-602 and specification section 265110.

I. Alternate No. 07: Warranty
   1. Alternate Bid: Provide a price for extending the warranty twelve (12) months past the expiration date of the original warranty. Terms of the warranty shall be consistent with 260961.1.7.E.

J. Alternate No. 08: Fiber Cement Siding on Building in lieu of Metal Panel
   1. Base Bid: Custom color metal panel as shown on drawings.
2. Alternate Bid: Painted Fiber Cement Siding on building with reveals to match those shown on the drawings. Adjust overall building depth and length as needed for system depth. Use countersunk screws with holes filled and painted to match panels. In restroom alternate use fiber cement panels for corridor ceiling.

K. Alternate No. 09: North Planter
   1. Base Bid: As shown on drawings.
   2. Alternate Bid: Remove north planter walls and planting bed. Face of cast in place concrete wall finish to match those of front face of stage walls.

L. Alternate No. 10: Thinner Soffit Wood at underside of canopy
   1. Base Bid: As shown on drawings.
   2. Alternate Bid: In lieu of 2x4 (1 ½” net thickness) provide 1x4 thermally modified hardwood (3/4” min. to 1 ¼” net thickness)

M. Alternate No. 11: Front Concrete Stage Platform Steps
   1. Base Bid: As shown on drawings.
   2. Alternate Bid: Remove stage platform steps (stairs on East and West ends of stage to remain). Front wall of stage to be cast in place concrete, finish to match east and west walls of stage. Adjust location of front concrete apron as shown on Landscape Architecture drawings.

END OF SECTION
SECTION 074646 - FIBER-CEMENT SIDING

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.

1.2 SUMMARY

A. Section includes fiber-cement siding with reveal joints and accessories.

B. Related Requirements:

1. Section 072500 "Weather Barriers" for weather-resistive barriers.

1.3 COORDINATION

A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cladding junctions and penetrations which are outside the scope of the standard details and specifications provided by the manufacturer.

C. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.

2. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of fiber-cement siding.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockups for fiber-cement siding including accessories.
   a. Size: 48 inches (1200 mm) long by 60 inches (1800 mm) high.
   b. Include outside corner on one end of mockup and inside corner on other end.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with labels intact until time of use.

B. Store materials on elevated platforms, under cover, and in a dry location.

C. Store siding flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
a. Structural failures including cracking and deforming.
b. Deterioration of materials beyond normal weathering.

2. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT SIDING

A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E136; with a flame-spread index of 25 or less when tested according to ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   b. Certainteed; SAINT-GOBAIN.
   c. GAF.
   d. James Hardie Building Products, Inc.
   e. Nichiha Architectural Panels.

B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 7/16 inch.

D. Vertical Pattern: As indicated on Drawings.

E. Panel Texture: Smooth texture.

F. Factory Priming: Manufacturer's climate zone acrylic primer.

G. Performance:
   1. Fiber-cement siding, complies with ASTM C 1186 Type A Grade II.
   2. Fiber-cement siding, complies with ASTM E 136 as a noncombustible material.
   3. Fiber-cement siding, complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
4. Fiber-cement siding, complies with ASTM E 119 1 hour and 2 hour fire resistive assemblies listed with Warnock Hersey.

2.3 FURRING (STRAPPING)

A. Rainscreen Cavity: Install Reveal Panels on a drained and vented rainscreen cavity, with a minimum 3/4 inch (19mm) air cavity. Selection of cavity vent materials shall be incorporated into the design to prevent insect and pest entry.

2.4 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.

B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:

1. Door and window casings.
2. Moldings and trim.

C. Trims: Reveal™ Trims manufactured by Custom Aluminum of Elgin, IL in the following profiles supplied by James Hardie. Aluminum alloy 6063-T5 with a minimum thickness of 0.050 inch. All reveal trims are 8 feet in length.

1. Surround horizontal trim.
2. Surround vertical trim.
3. Surround horizontal end cut transition trim.
4. Surround outside corner trim.
5. Surround inside corner trim.
7. Surround drainage flashing.
8. Recess horizontal trim.
10. Recess horizontal edge trim.
12. Recess outside corner trim.
13. Recess drainage flashing.

D. Finishes of Reveal Trims:
1. Primed for field painting; coating tested to ASTM D3363, ASTM D3359, D2794, D4585, D523, and D1308.
2. Clear anodized; conforming to ASTM B244 and ASTM B136.

E. Flashing: Provide stainless-steel flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

F. Fasteners:
   1. For fastening to steel framing, Countersunk Screws: No. 8 by 0.39 inch head diameter by 1-5/8 inch long.
   2. For fastening fiber cement, use stainless-steel fasteners.

2.5 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   1. Primer: Factory applied sealer/primer by manufacturer. Apply flat sheen finishes to panels.
   2. Topcoat: Refer to Division 09 “Painting”.

B. Factory Finish for Trim:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
   1. Do not install damaged components.
2. Install fasteners no more than 24 inches (600 mm) o.c.

B. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

C. Metal Framing: Minimum 16 gage, 16 inches maximum metal framing complying with local building codes, including the use of water-resistant barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.

1. Install water-resistant barriers and claddings to dry surfaces.
2. Repair any punctures or tears in the water-resistant barrier prior to the installation of the siding.
3. Protect siding from other trades.

D. Furring: Install furring on a minimum 3/4 inch (19mm) rainscreen cavity, or in accordance with local building code for rainscreen requirements.

E. Installation: Install materials in strict accordance with manufacturer's installation instructions.

1. Fastening Method: Countersunk and filled.
2. Place fasteners no closer than 3/4 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
3. Use fasteners as specified in the James Hardie Tech Data sheet and in the Reveal Panel Installation Instruction.
4. Install panel using 1/2 inch (13 mm) spacers at horizontal joints. Leave bottom edge of panel above all horizontal trims exposed, no caulking shall be placed at this overlap of Horizontal Reveal Trim. Factory primed edge shall always be used.
5. Install a kickout flashing to deflect water away from the siding at the roof intersection.
6. Install a self-adhering membrane on the wall before the subfascia and trim boards are nailed in place, and then install the kickout.
7. Allow minimum vertical clearance between the bottom edge of siding and any other material in strict accordance with the manufacturer's installation instructions and as determined by manufacturer.
8. Maintain clearance between siding and adjacent finished grade.
9. Specific framing and fastener requirements - refer to the applicable building code compliance reports.

3.4 FINISHING

A. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic exterior flat grade paint with flat finish within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
B. Field cut edges shall be coated during the installation process using an exterior grade primer/sealer that is compatible with the type of paint to be used on project.

3.5 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074646
SECTION 260961 - THEATRE STAGE LIGHTING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

All materials, components, and services necessary to provide a complete system indicated in this Section, as specified herein and shown on related Drawings, including:

A. Preparation and submission of complete shop drawings and samples for review prior to fabrication.

B. Verification of dimensions and conditions at the job site.

C. Shipment of equipment to the job site and the secured storage of all non-fixed equipment.

D. Installation and completion in accordance with these Specifications, related Drawings, the Equipment Manufacturer's recommendations, established trade criteria, and all applicable code requirements.

E. The observation, demonstration, and necessary adjustment of the completed installation by the Manufacturer's engineering personnel.

F. Preparation and submission of complete record drawings and operational and maintenance data and certificates.

1.2 WORK INCLUDED

A. Stage lighting control consoles and control accessories.

B. Remote control panels and receptacles.

C. Network data system.

D. Dimmers.

E. Wiring devices.

The above is for reference only and is not intended to define the limits of the work for a complete installation.
1.3 RELATED WORK IN OTHER SECTIONS

A. General requirements for all electrical work.
B. Electrical service
C. General lighting system.
D. Theatrical rigging system.
E. Theatrical sound and communications system.
F. Theatrical luminaires and accessories.

1.4 QUALIFICATIONS

A. All dimming and control system equipment shall be provided by qualified Stage Lighting Manufacturers.
B. The Manufacturers shall have at least ten (10) years experience in the fabrication of similar equipment.
C. If requested, the Manufacturers shall submit a representative list of installations during the above period.
D. Subject to the above requirements, the equipment indicated herein shall be by one of the following manufacturers:
   1. Dimming and control
      a. Electronic Theatre Controls, Middleton, Wisconsin
   2. Wiring devices
      a. Electronic Theatre Controls, Middleton, Wisconsin
      b. LEX Products, Stamford, Connecticut
      c. Southeast Stage Rigging & Curtains, Greenville, South Carolina
      d. TMB, New York, New York
      e. Union Connector, West Babylon, New York
E. Other manufacturers may be considered with the prior review of the Theatre Consultant. Manufacturers seeking review must contact the Theatre Consultant not later than fourteen (14) days prior to bid date.
F. The dimming and control system shall be provided by a qualified theatrical dealer, who shall have at least five (5) years experience in the sales and installation of similar systems and who shall be factory certified to provide warranty service for all of the equipment in this Section. Dealer shall be a Business member, accredited as
a Dealer/Retailer, of the entertainment service organization Entertainment Services and Technology Association (ESTA).

G. Dealer shall be responsible for the integration, operation, and performance of all elements of the system described in this Section. Dealer shall provide all warranty work and equipment upgrades as called for in this Section. The dealer shall be available for product service onsite within (24) hours of a call for service.

H. Subject to the above requirements, the equipment indicated herein shall be provided by one of the following dealers:
   1. Grand Stage, Chicago, Illinois 312-332-5611
   2. Indianapolis Stage, Indianapolis, Indiana 317-635-9430
   5. Vincent Lighting Systems, Solon, Ohio 216-475-7600
   6. Beck Studios, Milford, Ohio 513-831-6650

Other dealers may be considered with the prior review of the Theatre Consultant. Dealers seeking review must contact the Theatre Consultant not later than fourteen (14) days prior to bid date.

1.5 SUBMITTALS

A. With bid.
   1. Identification of qualified Theatrical Dealer providing system.
   2. All deviations and exceptions from specification must be revealed with bid. Deviations and exceptions from specification submitted after this time shall not be accepted.
   3. Manufacturer shall indicate any additional infrastructure that is not shown in the Drawings and is required to install Manufacturer's system.

B. Shop drawings. Within sixty (60) days of receipt of order, the Manufacturer shall submit drawings and equipment data sheets to the Architect for distribution to the Theatre Consultant for review and action prior to fabrication:
   1. Dimensions, components, and finishes of all equipment and accessories.
   2. All system assemblies and major sub-assemblies, cabinets, and enclosures, including notation of type and manufacture of switches, pilot lights, locks, hardware, and electrical and electronic connectors.
   3. Block schematics of system internal wiring and system element interconnection.
   4. Full size samples of labeling styles for all wiring device types.
   5. Quantities of each component and sub-assembly.
6. Indication by boxed caption of any and all variations from contract Drawings and Specifications, whether or not these variations have been formally or informally accepted by the Theatre Consultant.

7. Submittal Review:
   a. All shop drawing information shall be submitted at the same time; no partial submittals will be reviewed.
   b. Review and approval shall not relieve the Manufacturer/Dealer of responsibility for meeting all functional, operational, and safety requirements of the project as set forth in this Specification and related Sections. Review does not relieve the Contractor of responsibility to verify field conditions; nor does it relieve the contractor of responsibility for errors, omissions, or deviations in submittals.

C. Samples. Within sixty (60) days of receipt of order, the Manufacturer shall submit to the Architect for review prior to fabrication samples of any equipment component requested by the Theatre Consultant. Samples shall not be included in quantities of equipment specified but shall be returned.

D. Final submittal. Within thirty (30) days of final tests, and as a condition for final review, the Manufacturer shall submit to the Architect:
   1. Three (3) sets to the Architect and one (1) set on electronic media to the Theatre Consultant. Format of sets shall be compliant with Division One of this Specification.
      a. Receipts for delivery of all non-installed items, i.e., all items designated, "deliver to Owner."
      b. "As built and approved" drawings and equipment data sheets showing all systems and components as installed, including all field modifications.
      c. Documentation of Data Network system, noting system layout, all panel locations, and all wire lengths. Documents shall indicate the device IP address, MAC/NIC address, Hub Number, and Port number, where applicable. Subnet Masks and Subnet documentation shall be provided where applicable. Provide cable analyzer printouts of all tests performed as required in this Section, labeled by cable number.
      d. Operating and maintenance manuals.
      e. Parts lists.
      f. Training videos as noted below.
      g. Certificates of warranty, as set forth below.

1.6 TESTING AND INSTRUCTION

A. Upon completion of all installation work, the Contractor and Dealer shall certify in writing to the Architect that the work is complete and ready for final observation.
Final observation shall be scheduled by the Owner, the Architect, and the Theatre Consultant within fourteen (14) days following the Contractor’s notice of completion.

B. System testing shall include testing of control data network, documenting traffic utilization within the Network Data System requirements noted below in this Section. Testing shall also include verification of Wireless Handheld Remotes operational range as required in Part 2 of this Section.

C. After system checkout and adjustment, the Dealer’s factory certified technician shall operate the system for the review of the Owner, the Architect, and the Theatre Consultant.

D. Necessary adjustments or modifications shall be made as required.

E. As a condition of final completion, the Dealer’s factory certified technician shall instruct the Owner’s staff or representatives, under the observation of the Architect and Theatre Consultant, in the operation and maintenance of the system.

1. Initial Instruction: This instruction session shall be scheduled for a minimum duration of six (6) hours. While it may be possible to schedule this instruction session to coincide with the system checkout, such coincidence shall not be assumed. Instruction shall be scheduled by the Owner, the Architect, and the Theatre Consultant to occur within fourteen (14) days following the Contractor’s written notice.

   a. Provide to Users at time of training a copy of the circuit termination schedule that has been revised by the Dealer and Electrical Contractor to reflect the installed circuit terminations for the Owner’s use and reference. This document shall not supplant any other requirements contained in this Specification.

2. Follow-up Instruction: This instruction session shall take place not less than thirty (30) days nor more than six (6) months from the initial instruction. This instruction shall be scheduled by the Owner, shall be scheduled for a minimum duration of four (4) hours and will cover topics requested by the Owner.

F. The Dealer shall provide to the Owner video instructions on the operation and maintenance of the system. Information contained in video will cover all points of operation and maintenance covered in the instruction session with Owner’s staff. A video recording of the actual instruction session is acceptable. Provide four (4) full copies of video instruction. Video format shall be electronic media in a MP4 file format.

1.7 GENERAL REQUIREMENTS

A. General Conditions of the project contract, work schedules, and site regulations apply to this work. Refer to Division One.
B. This work shall comply with local codes and applicable standards as established by NEC and approved testing agencies, and all components shall carry pertinent labels by approved testing agencies.

C. For all requirements not otherwise addressed by this Specification, the work shall be at a minimum compliant with the requirements of the following standards:
   5. ANSI E1.24 – 2012 (R2017) Entertainment Technology – Dimensional Requirements for Stage Pin Connectors
   7. ANSI E1.27-2 - 2009 (R2019) – Entertainment Technology - Recommended Practice for Permanently Installed Control Cables for Use with ANSI E1.11 (DMX512-A) and USITT DMX512/1990 Products
   8. ANSI E1.30 Series of Documents level equipment interoperability for control of commonly encountered entertainment technology devices using E1.17.
   11. ANSI E1.37 Series of Documents Additional Message Sets for ANSI E1.20 (RDM)

D. The Contractor shall provide full insurance against loss or damage during shipment, storage, installation, and testing. Certification of such coverage shall be furnished to the Architect within thirty (30) days of award of contract.

E. Warranty
   1. The Dealer shall unconditionally warrant all equipment and systems provided under this Section to be free from defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance of all work of this Section. Lamps and normal wear and tear are exempted.
a. Project Alternate No. 07: The Dealer shall provide a warranty extension of twelve (12) months past the expiration of the original warranty, for a total period of at least twenty-four (24) months.

2. Appropriate additional equipment to replace equipment removed for service shall be provided at the job site at no expense to the Owner to replace any and all equipment which must be removed for service. Replacement control console(s) must of the same model as those removed for service.

3. All warranty service shall be performed by technicians factory certified for the installed equipment.

4. For a period of two (2) years following acceptance, the Dealer shall provide and install, at no cost to the Owner, software upgrades to all control system components of all control systems including consoles and architectural lighting controllers. Thereafter the Dealer shall notify the Owner of all software upgrades for the life of the control system(s). The Dealer shall keep Owner’s name and address in a database for this purpose. All upgrades shall include a full written description of operational modifications. Software upgrades shall be designed so as to allow existing data, configurations and show files to be maintained, accessed and edited in the future.

F. State-of-the-art assurance: All products specified shall be the Manufacturer’s most recent iteration and most recent product. No products shall be accepted if they have been discontinued or superseded at the time of shipment. Should the Manufacturer develop products of comparable function above and beyond the specification of the listed product, the Dealer shall make the newly developed product available to the project at no additional cost. The Dealer shall notify the Architect and the Theatre Consultant of any developments to the specified products, and shall note any change in the requirements of building infrastructure(s) to support the developments. The Architect and Theatre Consultant shall then determine whether upgraded products shall be accepted.

PART 2 - PRODUCTS

2.1 GENERAL

A. All components shall be new, in good condition, and under warranty.

B. All components shall bear labels from approved testing agencies and labels identifying the manufacturer, model number, and serial number. All such labels shall be permanently attached in a conspicuous location.

C. All control and receptacle faceplates not otherwise described in this Specification shall be black anodized aluminum or black painted steel, and all labels and legends shall be permanently engraved directly into the faceplate. Engravings shall be filled with white paint except where specifically noted. Minimum text height if not specified elsewhere shall be 3/16-inch. No other labeling techniques shall be used except
where specifically noted. All faceplates shall have beveled edges and rounded corners.

D. Control signal protocols and connector types
   1. All control signal protocol and connector types shall comply with the standards noted in Item 1.7 of this Section.
   2. All components shall be compatible within the Stage Lighting Manufacturer’s network data system.
   3. All control, signal, and video connectors shall be of substantial construction and shall be of the locking or latching type. All plate-mounted connectors shall be bolted to faceplates. Rivets shall not be acceptable.

E. Provide a total of (2) keys for each keyed device.

F. Where specification allows for “approved equal,” substitutions shall be proposed to the Theatre Consultant at least ten (10) days prior to bid date.

2.2 NETWORK DATA SYSTEM

A. The Network Data System shall provide for the interconnection of devices used solely for stage lighting and special effects.

B. The network shall consist of receptacle panels, connecting wiring, patch bay(s), patch cables, routers, and switches.

C. Provide all materials, components, and services necessary to provide a complete network data system indicated in this Section. Dealer shall be responsible for performance of the complete system.

D. Network capacity shall be determined by the following simultaneous usage criteria. System shall allow all the data below to be sent simultaneously, within the traffic and collision maximums noted in Item L below.
   1. Control Consoles – quantity one (1)
   2. Power control panels - as shown in the Drawings.
   3. Remote video displays – quantity four (4) in use, in two separate locations
   4. Architectural Lighting Control System as shown in the Drawings.
   5. Wireless Handheld remote controls as shown in the Drawings.
   6. Distributed sACN signal – sixteen (16) 512-address universes for connection to lighting and effects devices. Network shall be designed for the quantity of addresses specified herein and a 50% future expansion of addresses.
   7. DMX Gateways – as specified herein and a 50% future expansion of DMX gateways.
E. The system shall utilize one of the following wiring methodologies:

1. The wiring to the end-point receptacles of the system shall utilize unshielded twisted pair (UTP) wiring. UTP wiring shall be 4 pair #24 AWG minimum unshielded twisted pair wiring.

2. Fiber optic wiring is permissible for "backbone" wiring runs.

3. All elements of the system shall meet the following requirements:
   a. Institute of Electrical & Electronic Engineers Standard 802.3.

4. All permanent network wiring shall terminate in receptacles in panels. All equipment shall be connected to receptacles via "patch cables" with RJ45 connectors. No installed wire shall terminate directly to network equipment. The use of male RJ45 pigtails shall not be permitted.

F. All system elements shall be provided from a qualified network hardware manufacturer. The manufacturer shall have at least five (5) years experience in the fabrication of network hardware. Subject to the above requirements, the equipment indicated herein shall be by one of the following manufacturers:

1. Cisco Systems
2. Dell Systems.
3. HPE
4. Approved Equals.

G. Network terminations shall be provided at panels and devices as shown in the Drawings and Schedules:

H. Electrical requirements

1. All UTP wiring segments shall be of continuous runs of not more than 250 feet. The Contractor shall coordinate and submit all conduit runs for review, verifying the maximum length of each wiring run. If a wiring run exceeds the noted maximum footage, Contractor shall notify the Architect of all issues and coordinate with Manufacturer to bring the segment wiring to the stated maximum run. Manufacturer shall provide repeaters and system elements as necessary. Contractor shall provide and install such elements as part of the work of this Section. All elements shall be provided with uninterruptible power supplies. Such equipment shall be located in a location mutually agreed upon by the Theatre Consultant and Architect.

2. All cable shall meet the standards for TIA/EIA-568-B Category 5e, or highest rated category wiring in use for this project at the time of installation.

3. All cable shall be tested for continuity, attenuation, near end crosstalk, mutual capacitance, cable impedance, cable resistance, cable length, structural return loss and pair mapping. The Contractor shall use a current generation 100Mhz or higher network/cable analyzer to perform testing on the cable plan and shall test all data pairs. All testing will be performed by certified cable technicians.
a. Cable Testing shall meet the following minimum requirements:
   i. TIA/EIA Bulletin TSB-95 for field-testing of Category 5e cabling.
   ii. TIA/EIA 568-B.2-1 for field-testing of Category 6 cabling.

4. All terminations shall meet the requirements of TIA/EIA-T586B Technical Bulletin.
5. All cable and installation shall support 100BASE-TX minimum.
6. The system shall be designed for maximum 40% traffic utilization.
7. All Layer 2 switches shall provide for IGMP version 3 snooping to accommodate IP multicast events.
8. System to incorporate Power over Ethernet via IEEE 802.3at compliant Power over Ethernet switches.

I. Patch cables
1. Cables shall have a Category rating to match rating of installed wiring.
2. Cables shall include RJ45 plugs at each end, for proper mating to receptacle panels and node devices. Each cable shall be protected by a rubber boot of a diameter sufficient to extend beyond the plug connection tab.
3. Quantities as sufficient to fully patch the network.
4. Deliver to Owner.

J. Uninterruptable power supply.
1. Capable of sustaining operating voltage to supported devices for a minimum of ten (10) minutes in the event of a loss of power.
2. Capable of filtering spikes, surges, and noise from power source.
3. Conditioner shall provide continuity of earth ground from source to the utilization equipment.
4. Shall include test switch to confirm battery charge.
5. Shall include battery end-of-life indicator.
6. Shall be rack mounted.
7. UPS shall be sized to provide rated power supply for supported devices.
8. Eaton Powerware Series 5 or approved equal.

2.3 SIGNAL PROCESSING RACK

A. The Signal Processing Rack shall be 19" equipment mounting rack(s) with a hinged front door.

B. The Rack shall be surface wall mounted and completely wired internally. Rack shall include hinged “swing-away” mounting for rear access. Design and configuration as shown in the Drawings.
C. All wires shall be identified at the jacket with separate numbers.

D. The rack shall contain the following elements as shown in the Drawings:
   1. Network Patch Panel(s)
      a. Patch panel(s) shall include sufficient patching for all network receptacles, plus (12) spare receptacles.
         i. The Panel(s) shall include wire management panel(s) as manufactured by Panduit or approved equal.
         ii. The Panel(s) shall include engraved labeling of each receptacle.
   2. Network Switch
      a. Network Switch(es) shall include sufficient patching for all network ports, plus (12) spare ports.
   3. Cable Management.
   4. Signal Translation node, if required.
   5. Uninterruptable Power Supply.
   7. 0-10v Lighting Control Gateway(s)
   8. Centralized DMX Distribution

E. Install as shown in the Drawings.

2.4 CENTRALIZED DMX GATEWAYS

A. The Gateways shall provide for the translation of network control data into discrete DMX512 data streams to the termination points indicated on the drawings and schedules. The system shall be designed with the following functionality:
   1. The device(s) shall be capable of accepting the following lighting control network data: sACN and RDM.
   2. The device(s) shall use a dedicated multiplexed signal conforming to the ANSI E1.11 – 2008 (R2018) DMX512-A standard.
   3. DMX512 data streams shall be optically isolated.
   4. Each discrete DMX512 data stream shall be programmable to provide data within the specified DMX512 Universe(s).

B. Wiring between Centralized DMX Gateways and indicated termination points, per the drawings and schedules, shall:
   1. Meet the standards for TIA/EIA-568-B Category 5e, or highest rated category wiring in use for this project at the time of installation.
   2. Cable length shall be limited to 250 feet.
3. Follow all recommended practices, unless otherwise noted above, of ANSI E1.27-2 - 2009 (R2019) – Recommended Practice for Permanently Installed Control Cables for Use with ANSI E1.11 (DMX512-A) and USITT DMX512/1990 Products.

C. All wires shall be identified at the jacket with separate numbers.

D. Provide one discrete input or output for each termination point in the system, as shown in the Drawings and Schedules, plus four (4) spares. Provide rear-mounted terminals for the connection of all DMX wiring.

E. Multiple DMX receptacles on a single input or output cable shall not be accepted.

F. The system described above is based upon general performance criteria common to the products listed below. No other system shall be considered unless specifically approved by Theatre Consultant at least ten (10) days prior to the bid date:
   1. Electronic Theatre Controls “Net3 Four Port Gateway.”
   2. Pathway Connectivity “Pathport Quattro Node.”
   3. Pathway Connectivity “Pathport Octo Node.”

G. Install in the Signal Processing Rack.

2.5 PORTABLE NODE DEVICES

A. The Node(s) shall provide for the translation of network control data into discrete DMX512 data streams. Node devices shall be portable, for the connection of equipment at receptacle panels.
   1. The device(s) shall be capable of accepting the following lighting control network data: sACN and RDM.
   2. The device(s) shall use a dedicated multiplexed signal conforming to the ANSI E1.11 – 2008 (R2018) DMX512-A standard.
   3. DMX512 data streams shall be optically isolated.
   4. Each discrete DMX512 data stream shall be programmable to provide data within the specified DMX512 Universe(s).

B. Nodes shall have receptacles for connection of network cables and at least two (2) DMX cables.

C. Nodes shall be provided with a C-Clamp and a safety cable.

D. Nodes shall have black enclosure.

E. Receptacles for device connection.
   1. Network connectors shall be Neutrik “Ethercon” type connectors or approved equal.
2. DMX connectors shall be equal to 4-pin or 5-pin XLR, Switchcraft.

3. Smaller or less substantial connectors shall not be acceptable.

F. Unless noted otherwise the Dealer shall configure all nodes to have DMX out receptacles.

G. Quantities per schedule. Provide scheduled quantity in addition to any nodes required for basic system operation.

H. Deliver to Owner.

I. Approved Manufacturers:
   1. Electronic Theatre Controls
   2. Pathway Connectivity
   3. Approved equal.

2.6 NETWORK CABLES

A. Cables shall have a Category rating to match rating of installed wiring.

B. Cables shall include RJ45 plugs at each end, for proper mating to receptacle panels and node devices.
   1. Connectors shall be Neutrik “Ethercon” type connectors or approved equal.

C. Cable lengths shall be identified with the length near the receptacle end of the cables with 1/4” (6mm) high black numbers on a colored background and sealed with clear shrink tubing. Colors as follows:
   a. 50’ cables – double blue stripes
   b. 25’ cables – blue
   c. 10’ cables – white
   d. 5’ cables – red

D. Each cable shall have (1) "Velcro" tiewrap permanently attached to the insulation near the female connector.

E. Cables shall be of type “ProPlex” as manufactured by TMB, Carlstadt, NJ or approved equal.

F. Quantities per schedule.

G. Deliver to Owner.
2.7 THEATRE ARCHITECTURAL LIGHTING CONTROL SYSTEM

A. The Theatre Architectural Lighting Control System shall be a comprehensive lighting control system designed to control dimming racks, relay panels, and lighting fixtures as shown in the Schedules.

B. The system shall be comprised of individual control panels as shown in the Drawings. Each panel shall contain one or more of the following control elements:

1. Controls, quantities and labeling as noted in the Drawings.

2. Rear-illuminated liquid crystal display touchscreen shall display available presets and programming information.
   a. It shall be possible to limit control and access to the screen through the use of passcode controls.
   b. It shall be possible to program fade times for each preset
   c. The panel shall be capable of controlling assigned control channels in the system.
   d. Control zone numbers and names as noted in the Drawings.

3. Master Override Controls
   a. Panic switch. Rear-illuminated pushbutton switch. Color: Red. Operation: Push On / Lock. Panic switch shall bring designated architectural lighting zones on to full power overriding all other controls. The designated zones shall be locked at this state until deactivation of this switch. This switch shall function regardless of the operating status of other control system elements.
   b. Night Light switch. Rear-illuminated pushbutton switch. Color: Blue. Operation: Push On / Push Off. Night Light switch shall activate a preset of house lights and work lights for use when the theatre is unoccupied. The Night Light preset shall only be activated and deactivated with this switch. All other houselight controls and worklight switches, including Entry Panels, will continue to operate while the Night Light preset is engaged, but their action shall not affect any channels being controlled by the Night Light preset.
   c. Entry Panel Lockout Switch. Recessed rear-illuminated pushbutton switch. Color: White. Lockout switch shall address all designated Entry Panels. Switch shall be able to lock out local control.

4. Sliders - Linear sliders for individual control of zones.

5. Pushbuttons. Operation: Push On / Push Off. Each button shall incorporate or have associated with it a status indicating LED.

   a. Pushbuttons to activate separate presets.
   b. UP and DOWN pushbuttons to raise and lower channel levels, and to program presets in setup mode.
C. The following systems shall be acceptable:
   1. ETC "Paradigm"

D. Auxiliary Control Console
   1. The Auxiliary Control Console shall be a separate console, totally enclosed, portable, and completely wired internally.
   2. The face of the panel shall contain the control Panels as shown in the Drawings
   3. The console elements shall retain their memory regardless of connection status to system power.
   4. Design and configuration as shown in the Drawings.
   5. The Auxiliary Control Console shall include a vinyl dust cover or case lid as appropriate, and one (1) 25-foot multi-conductor cable terminating in a locking connector appropriate for mating with Control Receptacle Panels as required by the Drawings.

E. Entry Panels
   1. Entry Panels shall be mounted as shown in the Drawings and Schedules, and completely wired internally, with terminals of the proper rating for all external wiring.
   2. The faceplate shall contain pushbuttons or sliders. Quantity, labeling, and circuits controlled per Drawings.
   3. Enclosed entry panels.
      a. The faceplate of the panel shall be recessed and covered by a hinged latching cover with a clear view panel.
      b. All entry panel enclosures mounted in audience areas shall be a custom color per the Architect’s specifications. All faceplates shall be a color from manufacturer’s standard finish selections as selected by the Architect.
   4. The panels shall retain their memory regardless of connection status to system power.
   5. Install as shown in the Drawings.

F. All labels and legends shall be permanently engraved directly into the faceplate, or the surrounding faceplate of the panel's enclosure. Engravings shall be filled with paint of a contrasting color.

2.8 0-10V CONTROL GATEWAY

A. The Gateway shall provide for the translation of network control data into discrete 0-10V control to the termination points indicated on the schedules. The system shall be designed with the following functionality:
The gateway shall support multiple input protocols including:
   a. ANSI E1.17 Architecture for Control Networks (ACN)
   b. ANSI E1.31 Streaming ACN (sACN)

2. The gateway shall support an input for use in Emergency Systems

3. The gateway shall have a backlit display for identification, status reporting and configuration.

4. Each gateway shall have power and network activity indicators on the front of the gateway

B. Provide one discrete input or output for each termination point in the system, as shown in the Schedules, plus four (4) spares. Provide terminal-strip style connectors for connection of all 0-10v control circuits.

C. The Input for Emergency Systems shall support:
   1. A dry contact input shall provide triggering of an emergency condition
   2. A three-position switch shall set the input as Normally Open (NO) Normally Closed (NC), or Off

D. Configuration
   1. The gateway shall be field configurable.
   2. The gateway shall support a configurable start address from 1 to 512 and use consecutive addresses.
   3. The gateway shall support three configurable dimming curves with each channel independently assignable. Supported curves shall be linear, mod-square and custom.
   4. Multiple sACN sources may be combined with a priority may be assigned to each source sending data to the gateway

E. Acceptable products:
   1. “Response 0-10V Gateway” as manufactured by Electronic Theatre Controls.
   2. Approved equal

G. Install as shown in the Drawings.

F. Quantities per Drawings & Schedules.

2.9 STAGE LIGHTING CONSOLES

A. Specifications
   1. DMX Outputs: 4,096
   2. Control Channels: 32,000
3. Encoders: 4
4. Touchscreens: 1
5. Removable Media recording for show file storage
6. 5 Submaster Faders with bump buttons and status indicating LEDs

B. Console shall include:
   1. One (1) flat-screen color monitor. Monitor shall provide SXGA minimum resolution and shall be no larger than 21 inches, measured diagonally.
   2. One (1) flat-screen color multi-touch monitor. Monitor shall provide SXGA minimum resolution and shall be no larger than 21 inches, measured diagonally.
   3. Two (2) Removable Media for show file storage.
   4. One (1) set of 25-foot control cables terminating in locking connectors appropriate for mating with the Control Receptacle Panel and the console.
      a. Connectors for connection to Control Receptacle Panel shall be Neutrix EtherCon or equivalent.
   5. Vinyl dust covers for the console and video displays.
   6. Offline Editing Software. Software for off-line editing of show information from main control console. Software shall enable user to load show information directly from main control console, view, edit, and print all show data, and re-load information back into main control console for playback.

C. Acceptable products:
   1. ETC "GIO @5-4K"

No other system shall be considered unless specifically approved by the Theatre Consultant at least 10 days prior to bid date.

D. Deliver to Owner.

2.10 CONTROL ACCESSORIES

A. Uninterruptable power supply.
   1. Capable of sustaining operating voltage to control console and video display(s) for a minimum of ten (10) minutes in the event of a loss of power.
   2. Capable of filtering spikes, surges, and noise from power source.
   3. Conditioner shall provide continuity of earth ground from source to the console.
   4. Shall include test switch to confirm battery charge.
   5. Shall include battery end-of-life indicator.
   6. Shall be sized to provide rated power supply for control console, external display(s), and any console-mounted work light.
7. Eaton Powerware Series 5 or approved equal.

B. Wireless Handheld Remotes.
   1. Unit(s) shall be capable of calling up channels, adjusting levels, calling up cues, running cues, and performing dimmer check.
   2. Provide all portable transmitter(s)/access point(s) required for a complete and functioning system.
      a. System shall provide for continuous operation from all points within the auditorium chamber and stage house including but not limited to the gridiron, stage floor, dimmer room, auditorium catwalks, control rooms, and auditorium.
   3. The following transmission protocol methodologies shall be acceptable:
      a. IEEE 802.11 b/g, commonly known as Wi-Fi technology.
      b. UHF radio transmission. Systems utilizing UHF radio transmission shall be in compliance with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.
   4. Systems requiring line-of-sight technology shall not be accepted.
   5. Units shall be capable of four (4) hours of continuous use on a single battery charge.

C. Extension control cable. Two (2) 100'-0" extension cable for control console, neoprene outer jacket.
   1. Connectors for connection to Control Receptacle Panel shall be Neutrik EtherCon or equivalent.

D. Rolling Table/Stand. All-metal construction, of sufficient size to carry control console, video monitor, and power conditioner. Video monitor may be carried on a higher shelf than control console, and power conditioner may be carried on a lower shelf. Stand shall be mounted on substantial locking rubber casters.

E. Road Cases. Of substantial plywood construction, with steel reinforced corners and flush locking latches. Interior shall be molded foam conforming to shape of console, with spaces provided for all dedicated peripherals. Provide wheeled cases for any equipment weighing more than fifty (50) pounds, inclusive of case. Provide road cases for the following equipment:
   1. Main Control Console.
   2. Main Control Console video monitors.

F. Deliver to Owner.
2.11 REMOTE CONTROLLED RELAY PANELS

A. The Relay Panels shall be totally enclosed and completely wired internally, with hinged locking doors.

B. Each panel shall provide circuit quantities as noted in the Drawings. Racks shall be required to accommodate multiple voltages in the same enclosure.

C. All relays shall be individually addressable and controlled by the stage lighting network.

D. Each relay shall meet or exceed the characteristics defined in NEMA-410-2015 Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts.

E. Panel shall accept a 3-phase, 4-wire mains feed and shall provide a mains feed circuit breaker sized for said feed.

1. Panel shall have a fault current rating of not less than 35,000 AIC.

F. An engraved lamicoid label shall be bolted or riveted to the front of the rack, to read:

   RELAY PANEL (Number)
   RELAYS (Beginning no.)—(End no.)/
   CHANNEL NUMBER (Beginning no.)-(End no.)
   Schuler Shook Theatre Planners, Chicago, IL
   (Year of Commissioning)

G. Acceptable products:

   1. “ECHO Relay Panel” as manufactured by Electronic Theatre Controls.
   2. Approved equal

H. Provide and deliver to Owner spare modules of each module type in the panel. See Schedule of Quantities.

I. Install as shown in the Drawings.

2.12 REMOTE ZONE CONTROLLERS

A. General

   1. All controls shall be fully accessible when the Controller is mounted.
   2. Each zone provided by the controller shall be individually addressable and controlled by the stage lighting network.
   3. The controller shall provide integral passive heat management sized to the thermal requirements of the device.
4. The controller shall be available in configurations that support either a 120V or 277V power input.

B. Phase-Adaptive Dimmer

1. The Phase-Adaptive Dimmer shall be fully rated for loads up to 600 watts and shall operate with a minimum load of 1 watt.

2. The Phase-Adaptive dimmer shall support two dimming modes:
   a. Auto (default) - Phase-Adaptive dimmers shall automatically detect the required dimming mode based on connected loads and lock the mode in at power-up
   b. Forward-Phase – manually or remotely configure the dimmer to forward-phase operation

3. The Phase-Adaptive Dimmer shall support tungsten/ incandescent, 2-wire fluorescent, line-drive LED, and electronic transformer loads.

4. All Phase-adaptive dimmers shall have the following remotely configurable parameters.
   a. Device Label – configure a name for the device
   b. DMX Start Address – set the starting DMX address of the Zone Controller to a value from 1-512
   c. Curve and Mode – configure the dimming mode and dimming curve: Auto, Mod-Square; Auto, Linear; Forward-Phase, Mod-Square; Forward-Phase, Linear
   d. Output Response Time – configure the response time of the dimmer between instant, 800µs (default), and 1,000µs

5. The following systems shall be acceptable:
   a. Unison Foundry Series Phase Adaptive Dimmer by ETC, Inc.

C. Relay Controller

1. All Relay Controllers shall provide fully rated 20A normally open relay switching.

2. All Relay Controllers shall have the following remotely configurable parameters.
   a. Device Label – configure a name for the device
   b. DMX Start Address – set the starting DMX address of the Zone Controller to a value from 1-512

3. The following systems shall be acceptable:
   a. Unison Foundry Series Relay Controller by ETC, Inc.

D. 0-10V Controllers

1. All 0-10V Controllers shall provide fully rated 20A normally open relay switching.

2. 0-10V Controller output(s) shall support 0-10V sink for dimming of LED drivers and ballasts.
a. All 0-10V output(s) shall be fully isolated from ground to 2500V RMS.

3. All 0-10V Controllers shall have the following remotely configurable parameters.
   a. Device Label – configure a name for the device.
   b. DMX Start Address – set the starting DMX address of the Zone Controller to a value from 1-512.

4. The following systems shall be acceptable:
   a. Unison Foundry Series 0-10V Dimming Controller by ETC, Inc.

E. Install as shown in the Drawings.

F. Quantities per Drawings & Schedules.

2.13 400A COMPANY SWITCH (SP-1)

A. The Company Switch shall be wall mounted, deadfront, substantially framed, and fabricated of aluminum or steel. All parts shall be properly cleaned prior to painting and then painted with a rust inhibiting primer. The finish paint shall be baked enamel. Color: Black

B. The panel shall be completely wired internally, and terminals of the proper rating shall be provided for all external connections.

C. Panel shall provide the following connections
   1. Single Pole Connectors.
   2. Bare end cable connectors.

D. Panel shall operate on 400A, 3Ø, 5-wire, 120/208 V service with connection through conduit to lugs on main breaker. Panel shall include one (1) 400A, 3-pole main breaker.

   1. Panel shall have a fault current rating of not less than 35,000 AIC.

E. Panel shall include one of the following options:
   1. A system requiring all plugged connections to be made before panel delivers power.
   1. A lockable access door that provides access to the wiring chamber denying access to mated connections when locked. This door shall engage the shunt-trip mechanism of the main breaker so that connections may not be made or broken under load.

F. Panel shall contain a neon lamp to indicate voltage present on each phase leg and a neon lamp to indicate ground integrity.
G. Panel shall be one of the following:
   1. “Power Safe” as manufactured by Electronic Theatre Controls, Middleton, Wisconsin.
   3. "SafeCam" cabinet, as manufactured by the Union Connector Co., Inc., Roosevelt, N.Y.
   4. “Series 600” as manufactured by Stagecraft Industries, Inc, Portland, OR.

H. Label the panel with permanently engraved Lamicoid labels riveted to the disconnect panel, with white lettering not less than 1/2 inch high. Label to read, "Company Switch, 400A, 3Ø, 5-wire, plus ground. FOR STAGE EQUIPMENT USE ONLY."

2.14 STAGE LIGHTING CONNECTORS

A. PARALLEL BLADE AND GROUND
   1. 20-Ampere devices
      a. Connectors shall be 20 ampere, 2 wire plus ground with nylon bodies and casings, and integral cable clamp. Configuration shall be NEMA 5-20.
      b. The following manufacturer’s devices shall be acceptable:
         i. Hubbell
         ii. Leviton

B. TWIST-LOCK
   1. 20-Ampere devices
      a. Connectors shall be 20 ampere, 2 wire plus ground, locking, with nylon bodies and casings, and integral cable clamp. Configuration shall be NEMA L5-20.
      b. The following manufacturer’s devices shall be acceptable:
         i. Hubbell
         ii. Leviton
   2. 20-Ampere 208V devices
      a. Connectors shall be 20 ampere, 2 wire plus ground, locking, with nylon bodies and casings, and integral cable clamp. Configuration shall be NEMA L6-20.
      b. The following manufacturer’s devices shall be acceptable:
         i. Hubbell
         ii. Leviton
C. 20-AMPERE 6-CIRCUIT MULTI-PIN
   1. A threaded coupling 19-pin cylindrical connector for theatrical lighting applications
   2. All multi-conductor connectors shall be wired in accordance with the recommended practice RP-1 as published by the U. S. Institute for Theatre Technology.
   3. The following manufacturer’s devices shall be acceptable:
      a. Veam
      b. Socapex
      c. LEX Products
   4. All products shall be compatible with Socapex 419 Series connectors.

D. SINGLE POLE LOCKING CONNECTORS
   1. Connectors shall be 400 ampere, single wire, locking with Thermoplastic Elastomer casing, with nylon retaining screw. Body shall be brass with double set screw termination. Configuration shall be compliant with UL 1691.
   2. Connectors shall accept wire sizes from 4Ø to 2Ø.
   3. Acceptable Products:
      a. Hubbell Single Pole Devices
      b. Crouse-Hinds Cam-Lok
      c. Leviton Rhino-Hide

E. Quantities per Drawings & Schedules.

2.15 WIRING DEVICES
A. General Requirements
   1. All device number and letter labeling shall be provided with matching character fonts.
   2. 20-ampere pigtails shall be 12-3 type S cord, length per Drawings, secured by cushioned strain reliefs or nylon "Heyco" bushings.
   3. Connectors for circuits other than standard 20-amp stage circuits shall have covers that correspond to the label color.
   4. Device labeling
      a. Circuit numbers on all devices shall be engraved into the face plate in letters not less than one inch high and filled with white epoxy paint for standard stage circuit numbers and epoxy paint, color as noted, for all other numbers per the Drawings.
5. All multi-pin receptacles shall include a removable threaded cover with retaining chain.

6. Receptacle configuration as shown in the Drawings.

7. Exterior finish shall be flat black baked enamel (for steel) or black anodized (for aluminum) unless noted otherwise.

8. Devices with multiple voltages shall provide continuous voltage barriers separating each voltage.

9. All components requiring external electrical connections of more than eight (8) conductors shall include barrier-type terminal strips properly sized and permanently labeled.
   a. For drop boxes the terminal strips shall be sized to accept a range of wire from #10 to 12.
   b. For all other devices the terminal strips shall be sized to accept a range of wire from #12 to #6

10. Units shall be UL listed and carry a UL label.

B. Control Receptacle Panels

1. The Control Receptacle Panels shall be mounted as indicated in the Drawings, and completely wired internally, with terminal strips of the proper rating for all external connections.

2. The face of each panel shall contain receptacles as indicated in the Drawings. These receptacles shall be of the locking type and shall be sized for the proper number and capacity of conductors as indicated in the Drawings.
   a. Receptacles for device connection.
      i. All Category connectors shall be RJ45. All female RJ45 connectors shall be individual connectors of matching catalog number.
      ii. All fiber optic connectors shall be ST style connectors.
      iii. Control connectors shall be equal to 4-pin or 5-pin XLR, Switchcraft.
      iv. Smaller or less substantial connectors shall not be acceptable.
   b. Engraved Lamicoid label(s) with the following information:
      i. Designation of wire destination
      ii. Maximum length of patch cable permissible from the receptacle.
   c. Faceplate engraving of device name and receptacles as shown in Drawings.

3. Initial programming of DMX Receptacles shall be as follows:
   a. If one (1) DMX INPUT then: DMX INPUT shall be 1-512 and control house dimmers unless noted otherwise.
   b. If two (2) DMX INPUT then: first DMX INPUT shall be 1-512 and control house dimmers unless noted otherwise; second DMX INPUT shall be 513-1024.
c. If one (1) DMX OUTPUT then: DMX OUTPUT shall be 513-1024.
d. If two (2) DMX OUTPUT then: first DMX OUTPUT shall be 1-512; second DMX OUTPUT shall be 513-1024.
e. If three (3) or more DMX INPUT or OUTPUT then DMX Receptacle shall be initially programmed for the next sequential DMX Universe.

4. Install as shown in the Drawings.

C. Plug boxes
   1. Plug boxes shall be constructed of 16-gauge steel or extruded aluminum. Knockouts shall be provided on all sides of the back box.

D. Locations, quantities, sizes and circuits as shown in the Drawings.

E. Install as shown in the Drawings.
# 2.16 SCHEDULE OF QUANTITIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>2.2</td>
<td>Network Data system</td>
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<td>I</td>
<td>Network patch cables</td>
<td>8 additional</td>
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<tr>
<td>2.3</td>
<td>Signal Processing Rack</td>
<td>Per Drawings</td>
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<td>2.4</td>
<td>Centralized DMX Gateways</td>
<td>Per Drawings</td>
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<td>2.5</td>
<td>Portable Node devices: DMX Translation</td>
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<td>2.6</td>
<td>Network cables: 10-foot</td>
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<td></td>
<td>100-foot</td>
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<td>Auxiliary Control Console, cable and dust cover</td>
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<td>E</td>
<td>Entry Panels</td>
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<td>2.8</td>
<td>0-10V Control Gateway</td>
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<td>2.9</td>
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<td>B1</td>
<td>Flat-screen Color Monitor</td>
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<td>B2</td>
<td>Flat-screen Color Multi-Touch Monitor</td>
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<td>B3</td>
<td>Removable Storage Media</td>
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<tr>
<td>B4</td>
<td>Control Cables</td>
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<tr>
<td>B5</td>
<td>Dust covers, console and monitors</td>
<td>1-set</td>
</tr>
<tr>
<td>B6</td>
<td>Off-Line Editing Software</td>
<td>1</td>
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</table>
### Section 2.10

**A. Uninterruptible Power Supply**
- Quantity: 1

**B. Hand-held remote control and cable**
- Quantity: 0

**C. Extension Control Cable**
- Quantity: 1 set

**D. Rolling Stand**
- Quantity: 0

**E. Road Cases**
- Quantity: 1 set

### Section 2.11

**Remote Controlled Relay Panels**
- Quantity: Per Drawings

**H. Spare rack components**

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<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
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<tr>
<td>Control Electronics Module</td>
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<tr>
<td>120V/20A relay module</td>
<td>1 set</td>
</tr>
<tr>
<td>208V/20A relay module</td>
<td>1 set</td>
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</table>

### Section 2.12

**Remote Zone Controllers**
- Quantity: Per Drawings

### Section 2.13

**Company Switch – 400A**
- Quantity: Per Drawings

### Section 2.15

**Wiring Devices**
- Quantity: Per Drawings

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Control Receptable Panels</td>
<td>Per Drawings</td>
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#### PART 3 - EXECUTION

**3.1 FABRICATION**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Racks and cabinets</td>
<td>Welded assemblies of sheet steel or aluminum or bar size angles, channels, and tees or aluminum extrusions forming rigid enclosures to support internal components.</td>
</tr>
<tr>
<td>B. Operating elements</td>
<td>Mechanically safe and electrically &quot;dead.&quot;</td>
</tr>
<tr>
<td>C. Steel parts and panels</td>
<td>Cleaned and primed with rust inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel in matte black, or in Manufacturer's standard color where not specified.</td>
</tr>
<tr>
<td>D. Internal wiring</td>
<td>Factory completed. All wiring shall be in harnesses and bound. No loose or randomly routed wires shall be permitted.</td>
</tr>
</tbody>
</table>
E. All wire sizes and insulations shall comply with NEC, UL, and local codes and meet or exceed electronics industry standards.

3.2 PACKING AND SHIPPING

A. Equipment shall be wrapped and sealed in polyethylene and substantially crated for shipment. Crates shall clearly indicate equipment contained, nature of components, and theatre site allocation.

B. Electronics shall be packed and shipped in dust and static proof packaging.

C. All materials shall be delivered to the site in clean, undamaged operational condition.

3.3 INSTALLATION

A. Install all items in conformity with Project Documents, standard trade practices and Manufacturer's recommendations.

B. Consult and coordinate work with trades doing adjoining work.

C. Position all items accurately as indicated in the Drawings, and true to plumb line and level. Maintain maximum headroom and clearance at all points.

D. Do not uncrate, unpack, unwrap, or install control console, video monitor(s), remote controls, or other auxiliary control components until construction is complete and environment is clean and dust-free.

3.4 SYSTEMS INTEGRATION AND PROGRAMMING

A. Stage Lighting Dealer shall provide addressing for all LED fixtures and any other DMX controlled fixture. Stage Lighting Dealer to provide Division 26 contractor a list of DMX address numbers prior to installation of fixtures. At time of commissioning Stage Lighting Dealer to patch all DMX controlled fixtures and test to ensure proper functionality.

B. Stage Lighting Dealer shall install the most current LED fixture profiles at each control console and train the owner to add and update fixture profiles during the Owner training required herein.

C. Stage Lighting Dealer, at the direction of Theatrical Consultant and/or owner's representative, will adjust all programmable components of the lighting and control system to meet the design intent of the project. Programmable devices include lighting controls (including the layout and design of all touchscreen control panels), addressable lighting fixtures, and user interfaces.
D. Stage Lighting Dealer to coordinate any connection to A/V system with A/V contractor and work with A/V programmer to provide desired cross platform functionality.

END OF SECTION 260961
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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.

B. This specification addresses the installation of an Owner furnished Contractor installed Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase distribution transformers as referenced in IEEE Standard C57.12.34.

1.2 SUMMARY

A. Section includes description of Owner furnished pad-mounted, liquid-filled, medium-voltage distribution transformers, with primary and secondary bushings within or without air-terminal enclosures.

B. Section includes Contractor provided surge arrestors.

1.3 DEFINITIONS

A. BIL: Basic Impulse Insulation Level.

B. Bushing: An insulating structure including a central conductor, or providing a central passage for a conductor, with provision for mounting on a barrier, conducting or otherwise, for the purpose of insulating the conductor from the barrier and conducting current from one side of the barrier to the other.

C. Bushing Elbow: An insulated device used to connect insulated conductors to separable insulated connectors on dead-front, pad-mounted transformers and to provide a fully insulated connection. This is also called an "elbow connector."

D. Bushing Insert: That component of a separable insulated connector that is inserted into a bushing well to complete a dead-front, load break or nonload break, separable insulated connector (bushing).

E. Bushing Well: A component of a separable insulated connector, either permanently welded or clamped to an enclosure wall or barrier, having a cavity that receives a replaceable component (bushing insert) to complete the separable insulated connector (bushing).
1.4 DELIVERY, STORAGE AND HANDLING

A. Store transformers protected from weather and so condensation will not form on or in units. Provide temporary heating according to manufacturer’s written instructions.

B. Contractor shall pickup transformer from location on BSU campus and move to project site. Contractor to include all cost associated with loading, transporting and off loading at site.

1.5 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of transformer and transformer pad with medium voltage duct bank being installed under a separate contract.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with IEEE C2.

C. Comply with IEEE C57.12.00.


F. IEEE C57.12.26 – Pad-Mounted, Compartmental Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors.


A. National Electrical Manufacturers Association (NEMA)
B. American Society of Testing and Materials (ASTM)

H. All Codes and Standards referenced above shall be the latest revisions in effect at the time the proposals are received.

2.2 PERFORMANCE REQUIREMENTS

A. Windings Material: Aluminum or Copper.

B. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, fully shielded, separable-elbow type, suitable for plugging into the inserts provided in the high-voltage section of the transformer. Connected in each phase of incoming circuit and ahead of any disconnecting device.

C. Winding Connections: The connection of windings and terminal markings shall comply with IEEE C57.12.70.

D. Efficiency: Comply with 10 CFR 431, Subpart K.

E. Insulation: Transformer kVA rating shall be as follows: The average winding temperature rise above a 30 deg C ambient temperature shall not exceed 65 deg C and 80 deg C hottest-spot temperature rise at rated kVA when tested according to IEEE C57.12.90, using combination of connections and taps that give the highest average winding temperature rise.

F. Tap Changer: External handle, for de-energized operation.

G. Tank: Sealed, with welded-on cover. Designed to withstand internal pressure of not less than 7 psi (50 kPa) without permanent distortion and 15 psig (104 kPa) without rupture. Comply with IEEE C57.12.36.

H. Enclosure Integrity: Comply with IEEE C57.12.28 for pad-mounted enclosures that contain energized electrical equipment in excess of 600 V that may be exposed to the public.

I. Mounting: An integral skid mounting frame, suitable to allow skidding or rolling of transformer in any direction, and with provision for anchoring frame to pad.

J. Insulating Liquids: Mineral Oil.

K. Sound level shall comply with NEMA TR 1 requirements.

L. Corrosion Protection:

A. Transformer coating system shall be factory applied, using manufacturers standard process, in manufacturer’s standard color green.
2.3 THREE-PHASE TRANSFORMERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   A. ABB, Power Grids Division.
   B. Cooper Industries, Inc.
   C. ELSCO

B. Description:
   A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Compartment Construction:
   A. Double-Compartment Construction: Individual compartments for high- and low-voltage sections, formed by steel isolating barriers that extend full height and depth of compartments, with hinged, lift-off doors and three-point latching, with a stop in the open position and provision for padlocking.

D. Primary Fusing: Designed and rated to provide thermal protection of transformer by sensing overcurrent and high liquid temperature.
   A. 150-kV BIL current-limiting fuses, conforming to requirements of IEEE C37.47.
   B. Interrupting Rating: 50,000 rms A symmetrical at system voltage.
   C. Fuse Assembly: Bayonet-type, liquid-immersed, expulsion fuses in series with liquid-immersed, partial-range, current-limiting fuses. Bayonet fuse shall sense both high currents and high oil temperature to provide thermal protection to the transformer.
   D. Provide bayonet fuse assembly with an oil retention valve and an external drip shield inside the housing to eliminate or minimize oil spills. Valve shall close when fuse holder is removed and an external drip shield is installed.
      a. Standard “load sensing” type bayonet fusing shall be provided. Three spare fuse elements shall be supplied with each transformer.
   E. Provide a conspicuously displayed warning adjacent to bayonet fuse(s), cautioning against removing or inserting fuses unless transformer has been de-energized and tank pressure has been released.

E. High-Voltage Section: Dead-front design.
A. To connect primary cable, use separable insulated connectors; coordinated with and complying with requirements of Section 260513 "Medium-Voltage Cables." Bushings shall be one-piece units, with ampere and BIL ratings the same as connectors.

B. Bushing inserts and feed-through inserts:
   a. Conform to the requirements of IEEE 386.
   b. Rated at 200 A.

C. Bushing wells configured for loop-feed application.

D. Provide six parking stands for mounting accessory equipment.

E. Access to liquid-immersed fuses.

F. All bushing inserts.

G. Tap-changer operator.

H. Ground pad.

I. Parking stand bushings, elbows and other miscellaneous equipment will be supplied by others.

F. Low-Voltage Section:

A. Bushings with spade terminals drilled for terminating the number of conductors indicated on the Drawings, and the lugs that comply with requirements of Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

G. Capacities and Characteristics:

A. Power Rating (kVA): As scheduled on the drawings.

B. Voltage Ratings: 12,470V - 208Y/120 as scheduled on the drawings.

C. Taps: Comply with IEEE C57.12.26 requirements.

D. Transformer BIL (kV): Comply with IEEE C57.12.26 requirements.

E. Minimum Tested Impedance (Percent at 85 deg C):
   a. Up to 300KVA – Manufacturers standard.
   b. 500KVA and larger – 5.75.

F. Comply with UL listing requirements for combination classification and listing for transformer and less-flammable insulating liquid.

H. Transformer Accessories:

A. Drain and filter connection.

B. Filling and top filter press connections.

C. Pressure-vacuum gauge.

D. Dial-type analog thermometer with alarm contacts.

E. Magnetic liquid level indicator with high and low alarm contacts.
F. Automatically resetting pressure-relief device. Device flow shall be as recommended by manufacturer.
G. Stainless-steel ground connection pads.
H. Machine-engraved nameplate, made of anodized aluminum or stainless steel.

2.4 SERVICE CONDITIONS
A. Transformers shall be suitable for operation under service conditions specified as usual service conditions in IEEE C57.12.00.

2.5 WARNING LABELS AND SIGNS
A. Comply with requirements for labels and signs specified in Section 260553 "Identification for Electrical Systems."
   A. High-Voltage Warning Label: Provide self-adhesive warning signs on outside of high-voltage compartment door(s). Sign legend shall be "DANGER HIGH VOLTAGE" printed in two lines of nominal 2-inch- (50-mm-) high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background.
   B. Arc Flash Warning Label: Provide self-adhesive warning signs on outside of high-voltage compartment door(s), warning of potential electrical arc flash hazards and appropriate personal protective equipment required.

2.6 SOURCE QUALITY CONTROL
A. Provide manufacturer's certificate that the transformer design tests comply with IEEE C57.12.90.
   A. Perform the following factory-certified routine tests on each transformer for this Project:
      a. Resistance.
      b. Turns ratio, polarity, and phase relation.
      c. Transformer no-load losses and excitation current at 100 percent of ratings.
      d. Transformer impedance voltage and load loss.
      e. Operation of all devices.
      f. Lightning impulse.
      g. Low frequency.
      h. Leak.
2.7 CONTRACTOR PROVIDED MATERIAL
A. Provide and install one set of three M.O.V.E arrestors. Arrestors shall be elbow type complete with grounding cable.

B. Equal to Elastimold 167-ESA-10 or Cooper 3238018C10M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pad-mounted, liquid-filled, medium-voltage transformers upon delivery.

A. Upon delivery of transformers and prior to unloading, inspect equipment for any damage that may have occurred during shipment or storage.
B. Verify that tie rods and chains are undamaged and tight, and that all blocking and bracing is tight. Verify that there is no evidence of load shifting in transit, and that readings from transportation shock recorders, if equipped, are within manufacturer's recommendations.
C. Verify that there is no indication of external damage and no dents or scratches in doors and sill, tank walls, radiators and fins, or termination provisions.
D. Verify that there is no evidence of insulating-liquid leakage on transformer surfaces, at weld seams, on high- or low-voltage bushing parts, and at transformer base.
E. Verify that there is positive pressure or vacuum on tank. Check pressure gauge; it is required to read other than zero.
F. Compare transformers and accessories received with bill of materials to verify that shipment is complete. Verify that transformers and accessories conform with manufacturer's quotation and shop drawings. If shipment is incomplete or does not comply with Project requirements, notify manufacturer in writing immediately.
G. Verify presence of polychlorinated biphenyl content labeling.
H. Unload transformers carefully, observing all packing label warnings and handling instructions.
I. Open termination compartment doors and inspect components for damage or displaced parts, loose or broken connections, cracked or chipped insulators, bent mounting flanges, dirt or foreign material, and water or moisture.

B. Handling:

A. Handle transformers carefully, in accordance with manufacturer recommendations, to avoid damage to enclosure, termination compartments, base, frame, tank, and internal components. Do not subject transformers to impact, jolting, jarring, or rough handling.
B. Protect transformer termination compartments against entrance of dust, rain, and snow.
C. Transport transformers upright, to avoid internal stresses on core and coil mounting assembly and to prevent trapping air in windings. Do not tilt or tip transformers.
D. Verify that transformer weights are within rated capacity of handling equipment.
E. Use only manufacturer-recommended points for lifting, jacking, and pulling. Use all lifting lugs when lifting transformers.
F. Use jacks only at corners of tank base plate.
G. Use nylon straps of same length to balance and distribute weight when handling transformers with a crane.
H. Use spreaders or a lifting beam to obtain a vertical lift and to protect transformer from straps bearing against enclosure. Lifting cable pull angles may not be greater than 15 degrees from vertical.
I. Exercise care not to damage tank base structure when handling transformer using skids or rollers. Use skids to distribute stresses over tank base when using rollers under large transformers.

C. Storage:

A. Store transformers in accordance with manufacturer’s recommendations.
B. Transformers may be stored outdoors. If possible, store transformers at final installation locations on concrete pads. If dry concrete surfaces are unavailable, use pallets of adequate strength to protect transformers from direct contact with ground. Ensure transformer is level.
C. Ensure that transformer storage location is clean and protected from severe conditions. Protect transformers from dirt, water, contamination, and physical damage. Do not store transformers in presence of corrosive or explosive gases. Protect transformers from weather when stored for more than three months.
D. Store transformers with compartment doors closed.
E. Regularly inspect transformers while in storage and maintain documentation of storage conditions, noting any discrepancies or adverse conditions. Verify that an effective pressure seal is maintained using pressure gauges. Visually check for insulating-liquid leaks and rust spots.

D. Examine areas and space conditions for compliance with requirements for pad-mounted, liquid-filled, medium-voltage transformers and other conditions affecting performance of the Work.

E. Examine roughing-in of conduits and grounding systems to verify the following:

A. Wiring entries comply with layout requirements.
B. Entries are within conduit-entry tolerances specified by manufacturer, and no feeders will cross section barriers to reach load or line lugs.

F. Examine concrete bases for suitable conditions for transformer installation.
G. Pre-Installation Checks:
   A. Verify removal of any shipping bracing after placement.
   B. Remove a sample of insulating liquid according to ASTM D923. Insulating-liquid values shall comply with NETA ATS, Table 100.4. Sample shall be tested for the following:
      b. Acid Neutralization Number: ASTM D974.
H. Verify that ground connections are in place and that requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at transformer location.
I. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. Install transformers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
   B. Transformer shall be installed level and plumb and shall tilt less than 1.5 degrees while energized.
   C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and IEEE C2.

3.3 CONNECTIONS
   A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
      A. For counterpoise, use tinned bare copper cable not smaller than No. 4/0 AWG, buried not less than 30 inches (765 mm) below grade interconnecting the grounding electrodes. Bond surge arrester and neutrals directly to transformer enclosure and then to grounding electrode system with bare copper conductors, sized as shown. Keep lead lengths as short as practicable, with no kinks or sharp bends.
      B. Make joints in grounding conductors and loops by exothermic weld or compression connector.
      C. Terminate all grounding and bonding conductors on a common equipment grounding terminal on transformer enclosure.
      D. Complete transformer tank grounding and lightning arrester connections prior to making any other electrical connections.
B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

A. Maintain air clearances between energized live parts and between live parts and ground for exposed connections in accordance with manufacturer recommendations.

B. Bundle associated phase, neutral, and equipment grounding conductors together within transformer enclosure. Arrange conductors such that there is not excessive strain that could cause loose connections. Allow adequate slack for expansion and contraction of conductors.

C. Terminate medium-voltage cables in incoming section of transformers according to Section 260513 "Medium-Voltage Cables."

D. Coordinate termination of medium voltage cables with installing contractor.

3.4 SIGNS AND LABELS

A. Comply with installation requirements for labels and signs specified in Section 260553 "Identification for Electrical Systems."

B. Install warning signs as required to comply with 29 CFR 1910.269.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

A. General Field-Testing Requirements:

   b. Perform each visual and mechanical inspection and electrical test. Certify compliance with test parameters.
   c. After installing transformer but before primary is energized, verify that grounding system at the transformer is tested at specified value or less.
   d. After installing transformer and after electrical circuitry has been energized, test for compliance with requirements.
   e. Visual and Mechanical Inspection:

      1) Verify equipment nameplate data complies with Contract Documents.
      2) Inspect bolted electrical connections for high resistance using one of the following two methods:

         a) Use a low-resistance ohmmeter to compare bolted connection resistance values to values of similar connections. Investigate values
that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

b) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer’s published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer’s published data. In absence of manufacturer’s published data, use NETA ATS, Table 100.12.

f. Remove and replace malfunctioning units and retest.

B. Medium Voltage Surge Arrester Field Tests:

a. Visual and Mechanical Inspection:

1) Inspect physical and mechanical condition.
2) Verify arresters are clean.
3) Verify that ground lead on each device is individually attached to a ground bus or ground electrode.

END OF SECTION 261219
GENERAL ROOFING NOTES

A. THESE GENERAL NOTES APPLY TO ROOF DRAWINGS.

B. VERIFY SIZE, LOCATION AND NUMBER OF ROOF DRAINS, CONDUITS, ETC. PROVIDE NEW FLASHING AND SEAL PENETRATIONS WHETHER OR NOT INDICATED ON THE DRAWINGS.

C. VERIFY AND MAINTAIN ROOF SLOPES AND DRAINAGE PATTERNS. TEST FOR AND CORRECT ANY PONDING CONDITIONS.

D. NEW BLOCKING SHALL BE PRESERVATIVE-

E. PAINT EXTERIOR LADDERS, BRACKETS, ETC., UNLESS NOTED OTHERWISE.

F. CAP FASTENERS THAT PENETRATE ROOF DECK IN AREAS NOT CONCEALED BY CEILINGS WITH WIRE NUTS OR OTHER MEANS ACCEPTABLE TO ARCHITECT UNLESS OTHERWISE INDICATED. AREAS SUCH AS JANITOR CLOSETS, STORAGE ROOMS, MECHANICAL AND ELECTRICAL EQUIPMENT UNLESS OTHERWISE INDICATED.

G. REFER TO WALL SECTIONS NOTED ON ROOF PLANS FOR MEMBRANE FLASHING-

H. REFER TO MECHANICAL DRAWINGS TO COORDINATE ROOF CONDUCTOR LOCATIONS.

I. ROOF PLAN - ALT. NO. 01

TYP. ROOF DRAIN DETAIL

TYP. ROOF SADDLE/CRICKET DETAIL

TYP. ROOF PENETRATION DETAIL-VENT STACK

KEYNOTES (SPEC BASED)
CONTRACTOR SHALL DETERMINE ROUTING IN THE FIELD PVC TRANSITION TO RMC PRIOR TO STUB UPS.

ROUTE CONDUITS BELOW GRADE TO PANEL OR PULL BOX.

PROVIDE WEATHERPROOF IN USE COVER (TYP.)

CONCRETE KNEE WALL

PROVIDE 30A/3P CIRCUIT BREAKER IN PANEL WITH GFCI PROTECTION. ISOLATED GROUND CONDUCTOR SHALL BE #8 AWG.

AND CABLES.

TRANSPORTING TRANSFORMER FROM BSU STORAGE TO THE RACK LOCATED IN THE AV/DIMMER ROOM. SEE SHEET E-321 FOR LOCATION OF STUB UP IN AV/DIMMER ROOM. THIS CONDUIT NOT INSTALLED IF ALTERNATE BID #5.

NEW 500KVA, 12470-208/120V PAD MOUNTED TRANSFORMER TO NEW MAIN DISTRIBUTION PANEL INSIDE THE ELECTRICAL ROOM. SEE SHEET E501 FOR DUCT BANK DETAIL ON SHEET E501 FOR REQUIREMENTS.

CONTRACTOR INSTALLING MEDIUM VOLTAGE DUCT BANK FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.

IF EXISTING 2" BELOW GRADE CONDUIT ENTERS TUNNEL.

CONDUIT FROM THE NORTH WEST CORNER OF THE FIELD TO SIGNAL PROCESSING RACK SP-1.

STUB (2) 2" INCH CONTINUOUS HDPE CONDUITS FROM EXISTING 2" BELOW GRADE CONDUIT PRIOR TO STUB UP INTO AV/DIMMER ROOM. THIS CONDUIT NOT INSTALLED IF ALTERNATE BID #5.

NEW 500KVA PAD MOUNTED TRANSFORMER TO EXISTING 2" BELOW GRADE CONDUIT FOR MEDIUM VOLTAGE CABLES INSTALLED UNDER SEPARATE DUCT BANK.

TO THE RACK LOCATED IN THE AV/DIMMER ROOM. SEE SHEET E322 FOR CONTINUATION.

CONTRIBUTED FROM THE NORTH WEST CORNER OF THE FIELD TO THE RACK LOCATED IN THE AV/DIMMER ROOM.

SEE SHEET E322 FOR CONTINUATION.

GENERAL NOTES:

1. BID DOCUMENTS TO BE DISTRIBUTED TO CONTRACTOR AND "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

2. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

3. COORDINATE ALL AV ROUGH IN REQUIREMENTS WITH AV WORK LIMITED TO ROUGH IN AND POWER ONLY.

4. THIS CONDUIT NOT INSTALLED IF ALTERNATE BID #5.

5. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

6. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

7. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

8. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

9. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

10. CONTRIBUTE TO "AV" SERIES OF SHEETS PRIOR TO TESTING BY AV CONTRACTOR.

COORDINATE ALL SITE EQUIPMENT GROUND. SEE ISOLATED GROUND DETAIL ON SHEET E-321 FOR LOCATION OF STUB UP IN AV/DIMMER ROOM.

ISOLATED GROUND Conductor SHALL BE #8 AWG. ISOLATED GROUND CONDUCTOR SHALL BE #8 AWG.

CONTRACTOR TO INCLUDE IN BID THE COST OF DUCT BANK DETAIL ON SHEET E501 FOR REQUIREMENTS.

AS STATED IN THE GENERAL CONDITIONS AND SPECIFICATIONS.

THEME AND CABLES.

FOR REQUIREMENTS.

IF EXISTING 2" BELOW GRADE CONDUIT ENTERS TUNNEL.

CONDUIT PRIOR TO STUB UP INTO AV/DIMMER ROOM. SEE SHEET E322 FOR CONTINUATION.

SHEET ISSUE MV 5/7/21

BID DOCUMENTS 6/14/21

CONDUIT PRIOR TO STUB UP INTO AV/DIMMER ROOM. THIS CONDUIT NOT INSTALLED IF ALTERNATE BID #5.

CTC pointers can be placed at any point along the route.

CONTRIBUTED FROM THE NORTH WEST CORNER OF THE FIELD TO THE RACK LOCATED IN THE AV/DIMMER ROOM. SEE SHEET E322 FOR CONTINUATION.

SEE SHEET E322 FOR CONTINUATION.
BSU Brown
Family Amphitheater
1620 Riverside
Avenue
Muncie, IN 47306

Theater Planning / Lighting Design
Schuler Shook
750 North Orleans
Suite 400
Chicago, Illinois 60654
312-944-8230

Acoustics / Audio Visual Design
Threshold Acoustics
141 West Jackson Boulevard
Suite 2080
Chicago, Illinois 60604
312-386-1400

#6 AWG
TYPICAL TR RACK GROUNDING
RACK BUSBAR
CABLE TRAY
WITHIN TR

PLYWOOD
BACKBOARD IN TR

TMGB

CABLE TRAY
WITHIN TR

TYPICAL TELECOMMUNICATIONS ROOM GROUNDING DETAIL

NOTES:
1. FACE PLATE IS SEQUENCED LEFT TO RIGHT, THEN TOP TO BOTTOM.
2. EXAMPLE:
   - TOP LEFT JACK: 1001-1
   - BOTTOM RIGHT JACK: 1001-6
3. COORDINATE WITH BSU TELECOM FOR DATA RACK PATCH PANEL DESIGNATION PRIOR TO INSTALLING LABELS.

CABLE LABEL
CABLE LABEL
CABLE LABEL
CABLE LABEL

SKELETAL CONDUIT ENTERING ROOM
3/0 INSULATED COPPER GROUND IN 3/4" CONDUIT TO GROUND BUS IN MDP.

#6 AWG
CONDUITS STUBBED UP THROUGH FLOOR

1001
1001-1
1001-2
1001-3
1001-4
1001-5
1001-6

TYPICAL BSU TELECOM LABELING

BSU Brown
Family Amphitheater
1620 Riverside
Avenue
Muncie, IN 47306

Theater Planning / Lighting Design
Schuler Shook
750 North Orleans
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CONDUITS STUBBED UP THROUGH FLOOR

1001
1001-1
1001-2
1001-3
1001-4
1001-5
1001-6

TYPICAL BSU TELECOM LABELING
### 1. Schedule Lighting Fixtures

<table>
<thead>
<tr>
<th>Fixture Number</th>
<th>Type</th>
<th>Wattage</th>
<th>Voltage</th>
<th>Current</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>LED</td>
<td>20W</td>
<td>120V</td>
<td>0.2A</td>
<td>Stage</td>
</tr>
<tr>
<td>1002</td>
<td>Halogen</td>
<td>75W</td>
<td>120V</td>
<td>0.7A</td>
<td>Audience</td>
</tr>
<tr>
<td>1003</td>
<td>LED</td>
<td>15W</td>
<td>240V</td>
<td>0.15A</td>
<td>Backdrop</td>
</tr>
</tbody>
</table>

### 2. Schedule Lighting Controls

<table>
<thead>
<tr>
<th>Control Name</th>
<th>Type</th>
<th>Input</th>
<th>Output</th>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimmer</td>
<td>Analog</td>
<td>0-10V</td>
<td>0-100W</td>
<td>240V</td>
<td>0.5A</td>
</tr>
<tr>
<td>Relay</td>
<td>Solid State</td>
<td>24V</td>
<td>240V</td>
<td>0.1A</td>
<td>0.3A</td>
</tr>
<tr>
<td>Transformer</td>
<td>Rigid</td>
<td>230V</td>
<td>12V</td>
<td>2A</td>
<td>10A</td>
</tr>
</tbody>
</table>

### 3. Schedule Electrical Panel

<table>
<thead>
<tr>
<th>Panel Number</th>
<th>Type</th>
<th>Capacity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>A101</td>
<td>20A</td>
<td>250A</td>
<td>Stage</td>
</tr>
<tr>
<td>B102</td>
<td>30A</td>
<td>400A</td>
<td>Audience</td>
</tr>
<tr>
<td>C103</td>
<td>40A</td>
<td>500A</td>
<td>Backdrop</td>
</tr>
</tbody>
</table>

NOT FOR CONSTRUCTION

TE-002