EDINBURG CISD
PURCHASING DEPARTMENT
411 N. 8th Ave., Edinburg, TX 78541
(956) 289-2311, (956) 38-7687

ADDENDUM 2
CSP 23-24
GYMNASIUM ADDITIONS/IMPROVEMENTS FOR
GUERRA & VILLARREAL ELEMENTARY SCHOOLS
November 9, 2022

I. INSTRUCTIONS:

A. The following changes, omissions or alterations to the specification and drawings shall be made insofar as the specifications and drawings are inconsistent with following, this addendum shall govern.

B. Acknowledge receipt of this addendum by inserting its number and date of issue in the place provided for same in the proposal. This addendum forms a part of the Contract Documents.

C. It is imperative that this addendum be inserted INTO set of specifications.

II. SEE ADDENDUM BELOW:

PLEASE SEE ATTACHED:

Respectfully Submitted,

Amaro Tijerina
Director of Purchasing

_____
(Signature of authorized officer) Date

_____
Company Name

DOCUMENT 00 91 13
ADDENDA

ADDENDUM NUMBER [2]

DATE: [**11/8/22**]

PROJECT: E.C.I.S.D. Guerra Elementary School – Gym

PROJECT NUMBER: 23-24

OWNER: Edinburg CISD

ARCHITECT: Negrete & Kolar Architects, LLP

TO: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated 10/19/2022, with amendments and additions noted below.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

This Addendum consists of 42 pages and the following Drawings:

No.	Drawing Title	Issue Date
1	EX.01 – Interior Elevation	11/7/2022
2	S4.0 – Roof Framing Plan	11/8/2022
3	S6.1 – Framing Details	11/8/2022

CHANGES TO ADDENDUM NUMBER 1 Issued 11/07/2022

- Project Name Correction to E.C.I.S.D. Guerra Elementary School - Gym

CHANGES TO THE PROJECT MANUAL

Specification Section 01 20 00 Price and Payment Procedures Paragraph 1.3 Structural Material Allowances:

- Remove Items 2. $10,000 Existing Frame Reinforcing allowance
- Remove Item 3. Additional allowance of $8,000 to be used as directed by the structural engineer.

Specification Section 07 95 13 Expansion Joint Cover Assemblies:

- Include into the project manual Section 07 95 13 Expansion Joint Cover Assemblies and apply to locations indicated in drawings.

Specification Section 260529 – Lighting Controls

- The lighting control acceptable manufacturer shall be Lutron, wireless system. Refer to drawings for devices models. No substitution. Revise specification, see attached.

CHANGES TO THE DRAWINGS:

EX.01 – Interior Elevation; Contractor to Coordinate with Owner location for Dedicatory Plaque
S4.0 – Roof Framing Plan; Replacement of Sheet
S6.1 – Framing Details; Replacement of Sheet

CLARIFICATION ITEMS:

1.) **Correction to Proposal Form Bidders Bond on page 10 of instructions to bidders. A bid bond will be required**

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contingency allowances.

B. Structural material allowances.

C. Schedule of values.

D. Applications for payment.

E. Change procedures.

F. Defect assessment.

G. Alternates.

1.2 CONTINGENCY ALLOWANCES

A. Include in the Contract, a stipulated sum/price of $25,000.00 (Twenty-five Thousand Dollars) for use upon Architect's instruction.

B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

C. Contractor shall provide detailed line-item breakdown of costs associated with Allowance request.

D. Funds will be drawn from Contingency Allowance only by Change Order.

E. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.3 STRUCTURAL MATERIAL ALLOWANCES

A. Include in the Contract, the cost of providing all materials and labor and attributable overhead and profit, for the installation as directed by the Architect and/or Structural Engineer. Refer to Structural Drawings.

1. Reinforcing Steel:
   a. 100 feet of #4 bars.
   b. 100 feet of #5 bars.
   c. 100 feet of #6 bars.
   d. Unused balance credited back to Owner at $1.25/pound.
2. N.A.
3. N.A.
4. N.A.

1.4 SCHEDULE OF VALUES

A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702.

B. Submit Schedule of Values in duplicate within 15 working days after date established in Notice to Proceed.

C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify material and labor as separate line items. Include site mobilization, bonds and insurance.

D. Include amount of Allowances specified in this section as a separate line item.

E. Include direct proportional amount of Contractor's overhead and profit to coincide with the progress of the Work as a separate line item.

F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.5 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment. Provide dollar value in each column for each line item for portion of work performed and for stored products.

C. Submit updated construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement.

E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.

F. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Partial release of liens from major subcontractors and vendors.
2. Affidavits attesting to off-site stored products.
3. Construction progress schedules revised and current as specified.

1.6 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on Architect developed form.

C. The Architect/Engineer may issue a Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time

during which the requested price will be considered valid. Contractor will prepare and submit estimate within 10 calendar days.

D. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 01 60 00 - Product Requirements.

E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.

F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material or Force Account Change Order.

G. Construction Change Directive: Architect may issue directive, signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

H. Time and Material or Force Account Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents. Provide full information required for evaluation of proposed changes to substantiate costs for changes in the Work.

I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.

K. Change Order Forms: AIA G701.

L. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

M. Correlation Of Contractor Submittals:
1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.7 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer and Owner.

D. Defective Work not accepted will not be funded. Work found to be defective after partial progress funding may be reduced to its appropriate level of value or to zero based on the evaluation of the Architect

E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of Architect and Owner to assess defects and identify payment adjustments is final.

G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected products.

1.8 ALTERNATES

1.9 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work.

C. Schedule of Alternates:

1. Alternate No. 1: Epoxy primer and semi-gloss water-based coating at New Addition Restroom wet areas as indicated in sheet A.106B: Specification Section 09 90 00 Painting and Coating Part Three paragraph 3.7 Schedule – Interior Surfaces Concrete Floors (Alternate No. 1)
   a. Base Bid Item: 2x2 porcelain mosaic mat as selected by Architect. Refer to Detail 1/A.106, and 1/A.300 and other associated diagrams in the Construction Drawings, and Specification Section 09 30 00 – Tiling.
2. Alternate No. 2: Specification Section 07 21 16 Simple Saver System - fiberglass thermal batt insulation: Thermal Design, Inc; WMP-10, R30: Lamtec
   a. Facing Composition: Metalized Polypropylene with Bursting Strength of 65 psi.
   b. Facing Color: White

   **To be used in conjunction with:
3. Insul-Basket Insulation Support Grid: Heavy gauge galvanized steel grid, installed between purlins and conforming to the following:
   a. Manufacturer: Bay Insulation Systems; Green Bay WI; (920) 406-4000; www.bayinsulation.com
   b. Size: 5'x12'x10"-depth as appropriate for conditions of the project.
   c. For use with R30 thermal batts, sized to fit basket width & length.
   d. For use with Lamtec Corporation Gymgaurd Facing. Lamtec Corporation Bartley-Chester Road P.O. Box 37 Flanders, New Jersey 07836-0037 USA
   e. Phone: (973) 584-5500
   f. Install additional thermal protection at underside of existing roof and integrated with the existing metal building blanket insulation to achieve R30 or higher as required by code.
   g. Base Bid Item: Existing to remain metal building thermal insulation system between and above existing purlins.

H. PRODUCTS - NOT USED

I. EXECUTION - NOT USED

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:
   1. Expansion and seismic joint systems for building interiors.
   2. Expansion and seismic joint systems for building exteriors.

1.2 RELATED WORK

A. Related work that is specified elsewhere:
   1. Section 03300: Cast-In-Place Concrete.
   2. Section 04200: Unit Masonry.
   3. Section 05120: Structural Steel.

1.3 DEFINITIONS

A. Nominal Joint Width: The width of the expansion joint opening as specified in the project documents, at which the expansion joint will be constructed, and the cover will be installed.
B. Maximum Joint Width: The widest expansion joint width which the joint cover is required to accommodate without damage to its components.
C. Minimum Joint Width: The narrowest expansion joint width which the joint cover is required to accommodate without damage to its components.
D. Movement Capability: The amount of movement in a single direction (open or close), given as a percentage of the nominal joint width, that the joint cover is required to accommodate without damage to its components.
E. Lateral Shear: Movement horizontally and parallel to the expansion joint.
F. Vertical Shear: Movement vertically and parallel to the expansion joint.

1.4 SUBMITTALS

A. Submittals shall contain the following as required for each specified system:
   1. Shop Drawings showing complete fabrication details for all joint covers, including required anchorage to surrounding construction, recesses, blocking, backing, and connections between similar and dissimilar joint cover assemblies
   2. Manufacturer's product data including product details, installation instructions, maintenance and cleaning instructions, and Safety Data Sheets.

1.5 QUALITY ASSURANCE

A. Manufacturer: Obtain joint cover assemblies through one source from a single manufacturer.
   1. Manufacturer shall have a third-party certified ISO 9001 quality management system.
   2. Manufacturer shall have a minimum of ten (10) years of experience in the fabrication of joint cover assemblies.
B. Installer: All products listed in this section shall be installed by a single installer with demonstrated experience in installing products of the same type and scope as specified.

1.6 COORDINATION

A. Submittals shall be completed and approved prior to fabrication and shipment of material to the jobsite.
B. Schedule for the work of this section shall be planned to allow sufficient time for manufacturer's production and delivery scheduling.
C. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful and proper installation.
D. Coordinate installation of exterior joint assemblies to ensure that transitions are watertight.
E. Verify product types, quantities, dimensions, and attachment methods shown on shop drawings against field conditions prior to releasing materials for fabrication by the manufacturer.
F. Communicate necessary changes on the manufacturer's shop drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary protective cover on anodized aluminum, stainless steel, and bronze finished surfaces.
B. Deliver joint covers to jobsite in clean, unopened crates of sufficient size and strength to protect materials during transit.
C. Store components in original containers in a clean, dry location.

1.8 WARRANTY

A. Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than one (1) year when installed in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Balco, Inc. (Basis of Design); Wichita, KS; phone: (800) 767-0082.
B. Inpro; Muskego WI; phone: (800) 222-5556.
C. Construction Specialties; Lebanon NJ; phone: (800) 233-8493.
D. Substitutions: Section 01 60 00 - Product Requirements.

2.2 EXPANSION AND SEISMIC JOINT SYSTEMS

A. Interior Expansion and Seismic Joint Systems:
    1. Floor Expansion Joint Systems: Balco BHS-2 & BHSL-2.
        a. Joint Width: 2".
        b. Movement per ASTM E1399: Expansion / Contraction 25%.
        c. Load Capacity: Pedestrians, Gurney / Bed, X-Ray, Slow Vehicular.
        d. Fire Rating per UL 2079/ASTM 1966: Not less than the fire rating of the adjacent construction.
        e. Finish: Mill finish aluminum extrusions, AA-M10. All surfaces in contact with concrete or masonry shall be protected by a factory-applied coating.
    2. Wall and Ceiling Expansion Joint Systems: Balco WDC-1.
        a. Joint Width: 2".
        b. Movement per ASTM E1399: Expansion / Contraction 50%.
        c. Fire Rating per UL 2079/ASTM 1966: Not less than the fire rating of the adjacent construction.
        d. Finish: Clear anodized aluminum, Class II, AA-M12 C22 A31. All surfaces in contact with concrete or masonry shall be protected by a factory-applied coating.
B. Exterior Expansion Joint Systems:
    1. Wall Expansion Joint Systems: Balco CMXL-1.5-3.
        a. Joint Width: 3".
        b. Movement per ASTM E1399: Expansion / Contraction 50%.
        c. Fire Rating per UL 2079/ASTM 1966: Not less than the fire rating of the adjacent construction.
        d. 45 Mil EPDM water barrier.
        e. Finish: Mill finish aluminum extrusions, AA-M10. All surfaces in contact with concrete or masonry shall be protected by a factory-applied coating.

2.3 MATERIALS

A. Metals
    1. Aluminum extrusions: ASTM B221, alloys 6063-T5, 6005A-T6, 6061-T6.
    2. Aluminum plate and sheet: ASTM B209, alloys 6061-T6, 5052-H32.
    3. Steel: ASTM A36 Plate.
    4. Stainless steel: ASTM A666, type 304.
    5. Bronze extrusions: ASTM B455, alloy C38500.
    6. Bronze sheet and plate: ASTM B36, C28000 Muntz metal.
B. PVC Vinyl: 90 Shore A, ASTM D2240.
C. Silicone: ASTM D 2000 4GE 709 M.
D. Santoprene:
    1. 75 shore A durometer, 15 sec, ISO 868.
    2. Face seals to be installed in exterior conditions shall be UV resistant.
E. Abrasive: Two (2) part Epoxy combined with aluminum oxide grit.

F. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum).
G. Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover by an independent, nationally recognized testing entity in accordance with UL 2079, or ASTM E1966, including hose stream test, where applicable, at the full rated period. Assemblies shall be listed with an independent, nationally recognized testing and listing entity.
H. Standard fasteners required for assembly and installation shall be included.
I. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.

2.4 FINISHES

A. Aluminum:
   1. Floors: Mill finish extrusions, AA-M10.
   2. Interior Walls and Ceilings: Clear anodized, Class II, AA-M12 C22 A31.
   3. Exterior Walls and Roofs: AA-M10.
   4. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.
B. Steel:
   1. Galvanized steel plate shall meet ASTM 123.
   2. Galvanized sheet metal shall meet ASTM A65 G90.
   3. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.
C. Elastomeric Seals: Color as selected and approved from manufacturer's samples.
D. Foam seals with silicone face: Color as selected and approved from manufacturer's samples.
E. Abrasive: Black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer shall examine conditions under which work is to be performed and shall notify the contractor in writing of unsatisfactory conditions. Installer shall not proceed until all unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 PREPARATION

A. Prepare surfaces using methods recommended by the manufacturer for achieving the required results within project conditions.
B. Corner blockouts should be square, level, free of spalling or laitance, and meet the dimensions shown on shop drawings. Repairs should be made using appropriate materials as recommended by concrete repair material manufacturer, based on project-specific conditions.
C. Concrete repair material must be applied and allowed to cure in accordance to the manufacturer of the product recommendations and instructions.
D. Clean dirt, debris, and other contaminants from both the blockout and joint opening.
E. Mask areas adjacent to the joint as required to achieve neat, clean joint lines. Remove masking prior to the curing process.

3.3 INSTALLATION

A. Install expansion and seismic joint covers in accordance with the manufacturer's instructions.
B. Centering bars shall be fully engaged with base members.
C. Locate fasteners at interval recommended by manufacturer as shown on shop drawings.
D. Floor systems: Where shimming is required, provide continuous support for base members to prevent vertical deflection when in service.
E. Heavy-duty floor systems: Repair or grout blockouts as required for continuous frame support. Bring base

members to proper level; shimming is not allowed.

F. Fire-rated joint covers: Install fire rated covers in accordance with requirements of applicable fire rated product. Install fire barriers and flame sealant as shown on shop drawings and in accordance with installation instructions.

G. Water barrier: Install water barriers at exterior joints and where called for on shop drawings. Provide drainage fittings where called for on shop drawings.

3.4 PROTECTION AND CLEANING

A. Protect the installation from damage by work of other sections.

B. Where required, remove and store cover plates and install temporary protection over joints and re-install cover plates prior to substantial completion of work.

C. Do not remove protective coverings until finish work in adjacent areas is complete.

D. Prior to project closeout, clean exposed surfaces with a suitable cleaner as recommended by manufacturer.

3.5 SCHEDULE

A. Interior Floor: Provide and install expansion joint cover at interior expansion joint located at floor along new addition to existing gym floor and foundation.

END OF SECTION 07 95 13

CHANIN
ENGINEERING, LLC

November 8, 2022

ECISD Guerra Elementary School Gym Addition
Addendum No. 2

CE Project No.:22-143

The following changes, additions, and/or deletions are hereby made a part of the Construction Documents for the above noted project, fully and completely as if the same were fully contained therein. All other terms, conditions, and specifications of the original Invitation to Bid remain unchanged and is included in the contract.

PLEASE NOTE CHANGES AS FOLLOWS:

A. **Replacement of (2) 24"x36" sheets:**

- **S4.0**
- **S6.1**

End of – Addendum #2

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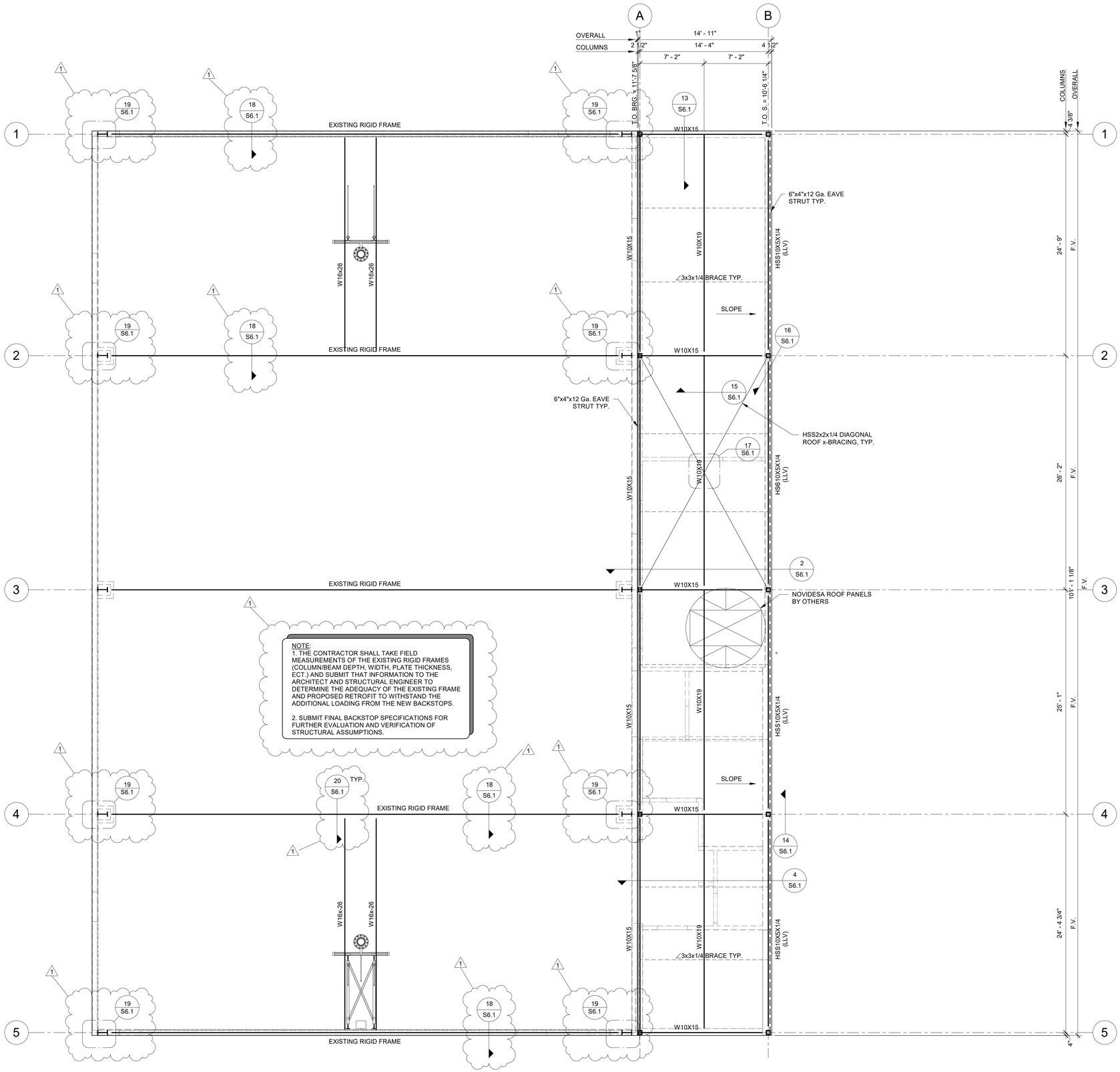
TBPE Firm Registration No. F-9369



FRAMING NOTES:

1. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH ARCHITECTURAL PLANS BEFORE COMMENCING WORK.
2. REFER TO ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DIMENSIONS.
3. ALL COLUMNS TO BE HSS 5x5x1/4, U.N.O.
4. CONTRACTOR TO COORDINATE ALL MECHANICAL,ELECTRICAL AND PLUMBING COMPONENTS SUPPORTED BY THE STRUCTURE WITH THE STRUCTURE MANUFACTURER. THIS INCLUDES COORDINATING EXACT WEIGHT AND LOCATION, AND ALL NECESSARY ATTACHMENTS.
5. CONTRACTOR TO COORDINATE EXACT LOCATION AND SIZE OF ANY AND ALL ROOF HATCHES WITH ARCH'L DRAWINGS.

1 ROOF FRAMING PLAN
3/16" = 1'-0"

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STATE OF TEXAS
MIGUEL CHANIN
93127
LICENSED PROFESSIONAL ENGINEER
10-20-22

Project #22143

E.C.I.S.D.
GUERRA ELEMENTARY GYM ADDITION
Edinburg, Texas 78541

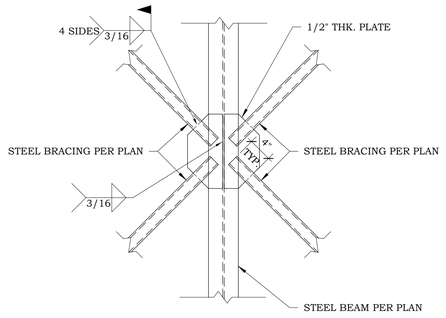
DRAWN BY: EC
ISSUED DATE: 10/20/22

REVISION / ADDENDA

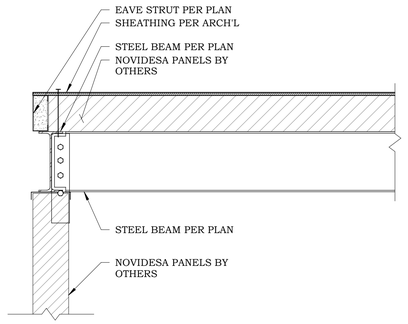
NO.	DATE	DESCRIPTION
1	11/08/22	Addendum #2

ROOF FRAMING PLAN

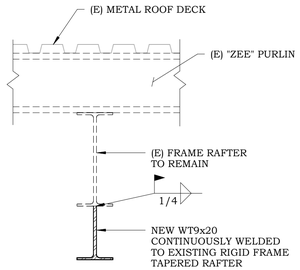
S4.0



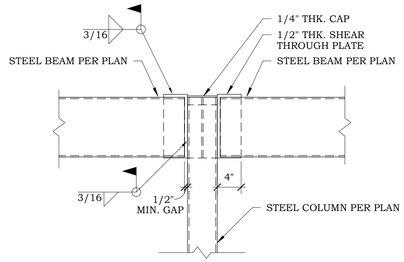
HSS BRACE TO STEEL BEAM | 17



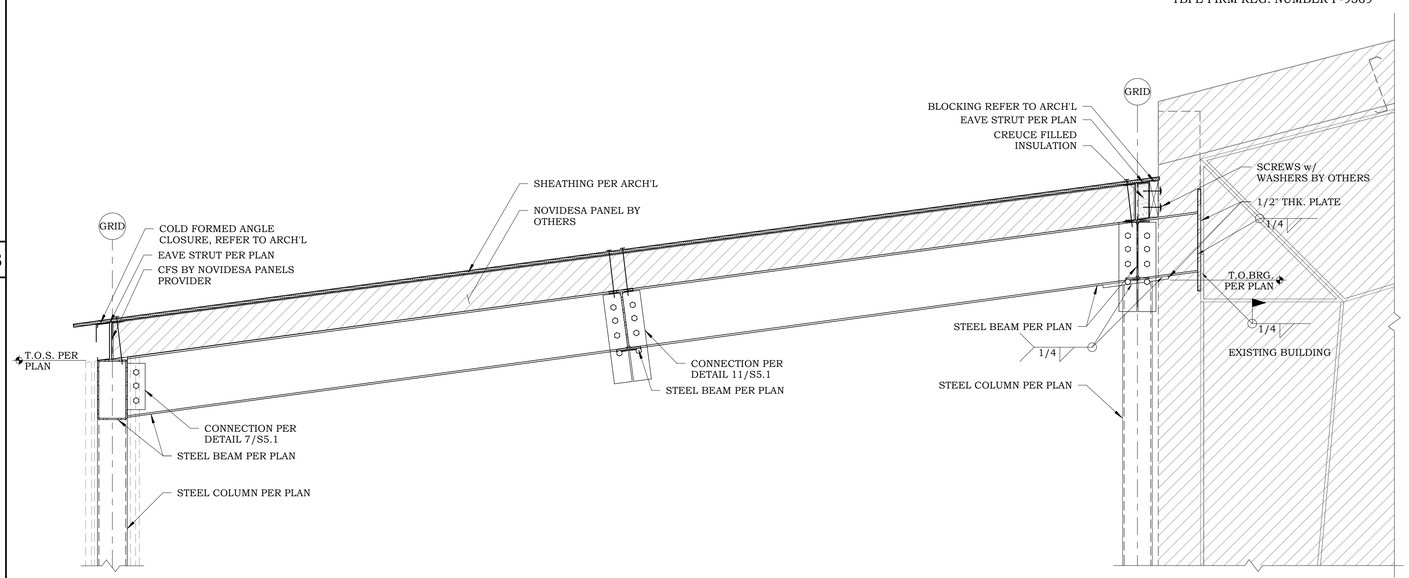
STEEL BEAM TO STEEL BEAM | 13



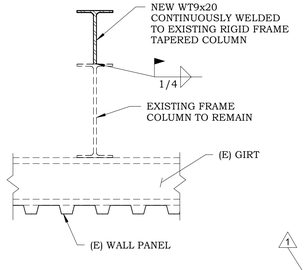
RIGID FRAME RAFTER DETAIL | 18



STEEL BEAM TO STEEL COLUMN | 14



STEEL BEAM TO STEEL BEAM | 2



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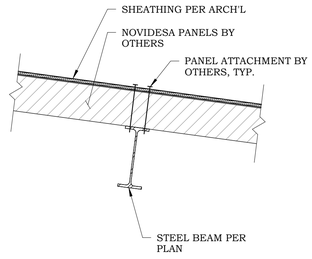
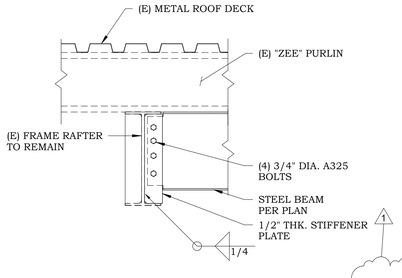
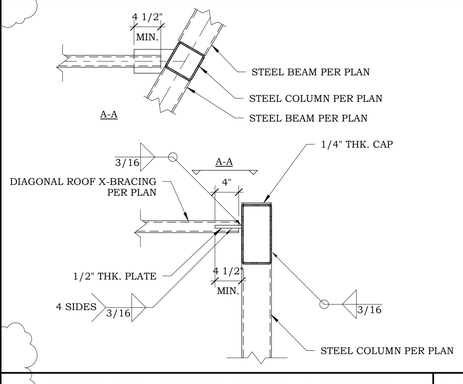


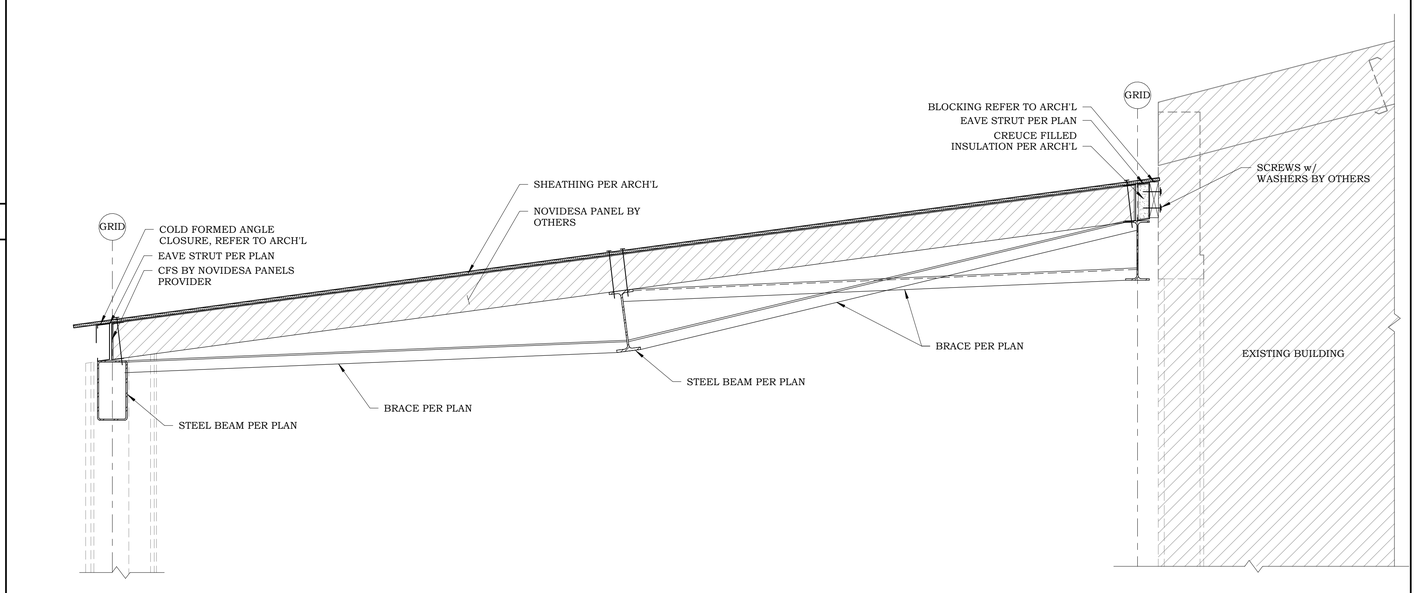
PANELS TO STEEL BEAM | 15



STEEL BEAM TO FRAME RAFTER | 20



STEEL BRACE TO STEEL COLUMN | 16



STEEL BEAM TO STEEL BEAM | 4

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STATE OF TEXAS
MIGUEL CHANIN
93127
LICENSED PROFESSIONAL ENGINEER
10-20-22

Project #22143

E.C.I.S.D.
GUERRA ELEMENTARY GYM ADDITION
Edinburg, Texas 78541

DRAWN BY: EC

ISSUED DATE: 10/20/22

REVISION / ADDENDA

NO.	DATE	DESCRIPTION
1	11/08/22	Addendum #2

FRAMING DETAILS

S6.1

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11-09-22

ADDENDUM

Project Name: ECISD Guerra Villareal Gym Renovation
Project Number: 22.2.30
Architect: NEGRETE & KOLAR ARCHITECTS LLP
Date: 11/9/2022

Note: The work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

I. Specifications:
   A. Section 260529 – The lighting control acceptable manufacturer shall be Lutron, wireless system. Refer to drawings for devices models. No substitution. Revise specification, see attached.

II. General:

III. Mechanical:

IV. Electrical:

I. Plumbing:

II. Fire Protection: N/A

SECTION 26 09 26

LIGHTING CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single space wireless lighting control systems and associated components:
   1. Wireless occupancy/vacancy sensors.
   2. Wireless daylight sensors.
   3. Wired load control modules with wireless communication inputs.
      a. Includes fixture control modules with wired occupancy/vacancy/ daylight sensors.
   4. Wired receptacles with wireless communication inputs.
   5. Wireless fixture control components factory-installed in luminaires not specified in this section.
   6. Wired wall dimmers and switches with wireless communication inputs.
   7. Wired wallbox occupancy sensors with wireless communication inputs.
   8. Wireless control stations.
   9. Fluorescent electronic dimming ballasts.
   10. LED Drivers.
   11. Power interfaces.
   12. Digital dimming ballast modules.

B. Wireless hub(s) for centralized control, monitoring, and system integration.

C. Software data and analytics dashboard, including server requirements.

1.02 RELATED REQUIREMENTS

A. Section <<_____>>: Building automation system, for interface with lighting control system.

B. Section 26 0553 - *Identification for Electrical Systems*: Identification products and requirements.

C. Section 26 *2726 - Wiring Devices - Lutron*:
   1. Finish requirements for wall controls specified in this section.
   2. Accessory receptacles and wallplates, to match lighting controls specified in this section.

D. Section 26 *5133 - Luminaires, Ballasts, and Drivers - Lutron*.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; *current edition*.

B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; *2011*.

C. ANSI/ESD S20.20 - Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices); *2014*.

D. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; *2002a (Reapproved 2010)*.

E. CAL TITLE 24 P6 – California Code of Regulations, Title 24, Part 6 (California Energy Code); *2013*.

F. CSA C22.2 No. 223 – Power Supplies with Extra-low-voltage Class 2 Outputs; *2015*.

G. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; *2015*.

H. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; *2008*.

I. IEC 61347-2-3 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. and/or D.C. Supplied Electronic Control Gear for Fluorescent Lamps; *2011, with Amendments, 2016*.

J. IEEE 1789 - Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers*; 2015*.

K. IEEE C62.41.2 - Recommended Practice on Characterization of

Surges in Low-Voltage (1000 V and less) AC Power Circuits; *2002 (Cor 1, 2012)*.

L. ISO 9001 - Quality Management Systems-Requirements; *2008*.

M. NECA 1 - Standard for Good Workmanship in Electrical Construction; *2015*.

N. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; *2010*.

O. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; National Electrical Manufacturers Association; *2015*.

P. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; *1999 (R 2015)*.

Q. NFPA 70 - National Electrical Code; National Fire Protection Association; *Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements*.

R. UL 20 - General-Use Snap Switches; *Current Edition, Including All Revisions*.

S. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc.; *Current Edition, Including All Revisions*.

T. UL 924 - Emergency Lighting and Power Equipment; *Current Edition, Including All Revisions*.

U. UL 935 - Fluorescent-Lamp Ballasts; *Current Edition, Including All Revisions*.

V. UL 1310 – Class 2 Power Units; *Current Edition, Including All Revisions*.

W. UL 1472 - Solid-State Dimming Controls; *Current Edition, Including All Revisions*.

X. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; *Current Edition, Including All Revisions*.

Y. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; *Current Edition, Including All Revisions*.

Z. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; *Current Edition, Including All Revisions*.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate the placement of wall controls with actual installed door swings.
3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Pre-Wire Meeting*; Lutron LSC-PREWIRE*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to conduct on-site meeting prior to commencing work. Manufacturer to review with installer:

1. Low voltage wiring requirements.
2. Separation of power and low voltage/data wiring.
3. Wire labeling.
4. Wireless hub locations and installation.
5. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS",

sensor locations to be reviewed in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.

6. Control locations.
7. Computer jack locations.
8. Load circuit wiring.
9. Network wiring requirements.
10. Connections to other equipment.
11. Installer responsibilities.

C. Sequencing:
1. Do not install sensors and wall controls until final surface finishes<< and painting>> are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - *Administrative Requirements* for submittal procedures.

B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations.

C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.
2. Wall Dimmers: Include derating information for ganged multiple devices.

D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. System Performance-Verification Documentation*; Lutron LSC-SPV-DOC*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for manufacturer's enhanced documentation detailing start-up performance-verification procedures and functional tests performed along with test results.

F. Title 24 Acceptance Testing Documentation: Submit Certification of Acceptance and associated documentation for lighting control acceptance testing performed in accordance with CAL TITLE 24 P6, as specified in Part 3 under "COMMISSIONING".

G. Project Record Documents: Record actual installed locations and settings for lighting control system components.

H. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

I. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications:
1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.
2. Registered to ISO 9001, including in-house engineering for product design activities.
3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.

4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1. Basis of Design System Requirements - *Lutron*, Unless Otherwise Indicated:
   a. Ambient Temperature:
      1) Lighting Control System Components, Except Fluorescent Electronic Dimming Ballasts: Between 32 and 104 degrees F (0 and 40 degrees C).
      2) Fluorescent Electronic Dimming Ballasts: Between 50 and 140 degrees F (10 and 60 degrees C).
   b. Relative Humidity: Less than 90 percent, non-condensing.
   c. Protect lighting controls from dust.

1.09 WARRANTY

A. See *Section 01 7800 - Closeout Submittals*, for additional warranty requirements.

--CHOOSE ONLY ONE OF THE TWO STANDARD WARRANTIES BELOW ACCORDING TO WHETHER OR NOT MANUFACTURER FULL-SCOPE START-UP SERVICES WILL BE SPECIFIED IN PART 3--

B. Manufacturer's Standard Warranty, Without Manufacturer Full-Scope Start-Up:

1. Manufacturer Lighting Control System Components, Except Wireless Sensors, Ballasts/Drivers and Ballast Modules: One year 100 percent parts coverage, no manufacturer labor coverage.
2. Wireless Sensors: Five years 100 percent parts coverage, no manufacturer labor coverage.
3. Ballasts/Drivers and Ballast Modules: Three years 100 percent parts coverage, no manufacturer labor coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: *Lutron Electronics Company, Inc; Vive; www.lutron.com*.

B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 LIGHTING CONTROLS - GENERAL REQUIREMENTS

A. Sensor Layout and Tuning:

1. Lighting Control Manufacturer to take full responsibility for wired or wireless occupancy/vacancy and daylight sensor layout and performance for sensors provided by Lighting Control Manufacturer.
2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.
3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.

4. Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits, within one calendar year from Date of Substantial Completion to fine-tune sensor calibration per the agreed upon sequence of operations.

B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.

C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.

D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C) and 90 percent non-condensing relative humidity.

E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

F. Power Failure Recovery: When power is interrupted for periods up to <<10 years; or _____>> and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.

G. Wireless Devices:
1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.
2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).
3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).
4. System does not require a factory technician to set up or program the system.
5. Capable of diagnosing system communications.
6. Capable of having addresses automatically assigned to them.
7. Receives signals from other wireless devices and provides feedback to user.
8. Capable of determining which devices have been addressed.
9. RF Range: 60 feet (18 m) line-of-sight or 30 feet (9 m) through typical construction materials between RF transmitting devices and compatible RF receiving devices.
10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 15, for Class B application.

H. Wireless Network:
1. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
a. Wireless sensors, wireless wall stations and wireless load control devices do not operate in the noisy 2.4 GHz frequency band where high potential for RF interference exists.
b. Wireless devices operate in an uncongested frequency band

providing reliable operation.
c. Fixed network architecture ensures all associated lights and load controls respond in a simultaneous and coordinated fashion from a button press, sensor signal, or command from the wireless hub (i.e. no popcorning).
2. Distributed Architecture: Local room devices communicate directly with each other. If the wireless hub is removed or damaged, local control, sensing, and operation continues to function without interruption.
3. Local room devices communicate directly with each other (and not through a central hub or processor) to ensure:
a. Reliability of system performance.
b. Fast response time to events in the space (e.g. button presses or sensor signals).
c. Independent operation in the event of the wireless hub being removed or damaged.

I. Device Finishes:

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

1. Wall Controls: Match finishes for Wiring Devices in Section 26 2726, unless otherwise indicated.
2. Wall Controls: White; Black; Ivory; Light Almond; To be selected by Architect
3. Standard Colors: Comply with NEMA WD1 where applicable.
4. Color Variation in Same Product Family: Maximum delta E of 1, CIE L*a*b color units.
5. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

2.03 WIRELESS SENSORS

A. General Requirements:
1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.
2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
3. Does not require external power packs, power wiring, or communication wiring.
4. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:
1. General Requirements:
a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions*; Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
d. Provide optional, readily accessible, user-adjustable controls for timeout,

automatic/manual-on, and sensitivity.

e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.

f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.

g. Color: White.

h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.

i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.

j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.

k. Ceiling-Mounted Sensors:
   1) Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
   2) Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.

l. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.

2. Wireless Combination Occupancy/Vacancy Sensors:
   a. Ceiling-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one footcandle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).
   b. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).
   c. Product(s):
      1) <<Type _____ - >>Ceiling-Mounted Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OCR2B-P-WH; or Lutron Radio

Powr Savr Series, Model ULFR2-OCR2B-P-WH (BAA-Buy American Act Compliant)>>: Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

2) <<Type _____ - >>Wall-Mounted Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OWLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-OWLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.

3) <<Type _____ - >>Corner-Mounted Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OKLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-OKLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1225 square feet (113.8 sq m) and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 90 degree field of view.

4) <<Type _____ - >>Hallway Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OHLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-OHLB-P-WH (BAA-Buy American Act Compliant)>>: Major motion coverage of up to 150 feet (45.7 m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); narrow field of view.

3. Wireless Vacancy-Only Sensors:
   a. Operates only as a vacancy sensor (manual-on and automatic-off)<< in accordance with CAL TITLE 24 P6 requirements>>.
   b. Product(s):
      1) <<Type _____ - >>Ceiling-

Mounted Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VCR2B-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VCR2B-P-WH (BAA-Buy American Act Compliant)>>: Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

2) <<Type _____ - >>Wall-Mounted Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VWLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VWLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.

3) <<Type _____ - >>Corner-Mounted Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VKLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VKLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1225 square feet (113.8 sq m) and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 90 degree field of view.

4) <<Type _____ - >>Hallway Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VHLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VHLB-P-WH (BAA-Buy American Act Compliant)>>: Major motion coverage of up to 150 feet (45.7 m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); narrow field of view.

C. Wireless Daylight Sensors:
   1. Product: *Lutron Radio Powr Savr Series, Model LFR2-DCRB-WH*.

2. Open-loop basis for daylight sensor control scheme.
3. Stable output over temperature from 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C).
4. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
5. Provide linear response from 2 to 150 footcandles.
6. Color: White.
7. Mounting:
   a. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
   b. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
   c. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.

2.04 WIRED WALL DIMMERS AND SWITCHES WITH WIRELESS COMMUNICATION INPUTS

A. General Requirements:
1. Provide air gap service switch to disconnect power to load for safe lamp replacement, accessible without removing faceplate.
2. Operates at the rated capacity across the full ambient temperature range including modified capacities for ganged configurations which require removal of fins.
3. Provide radio frequency interference suppression.
4. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 200 amps according to IEEE C62.41.2 without impairment to performance.
5. Dimmers: Provide full range, continuously variable control of light intensity.
6. Dimmers for Electronic Low Voltage (ELV) Transformers:
   a. Provide circuitry designed to control the input of electronic (solid-state) low voltage (ELV) transformers. Do not use dimmers that utilize standard phase control.
   b. Provide resettable overload protection that provides automatic shut-off when dimmer capacity is exceeded. Do not use protection methods that are non-resettable or require device to be removed from outlet box.
   c. Designed to withstand a short, per UL 1472, between load hot and either neutral or ground without damage to dimmer.
7. Dimmers for Magnetic Low Voltage (MLV) Transformers:
   a. Provide circuitry designed to control and provide a symmetrical AC waveform to input of magnetic low voltage transformers per UL 1472.
   b. Magnetic low voltage transformers to operate below rated current or temperature.
8. Electronic Switches:
   a. Listed as complying with UL 20, UL 508, and UL 1472.

B. Preset Smart Wall Dimmers and Switches with Wireless Communication Inputs*; Lutron Maestro Wireless Series:*
   1. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
   2. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
      a. Rocker raises/lowers light level, with new level becoming the current preset level.
      b. Switch single tap raises lights to preset level or fades lights to off.
      c. Switch double tap raises light to full on level.
      d. Switch tap and hold slowly fades lights to off over period of 10 seconds.
      e. LEDs adjacent to tap switch indicate light level when dimmer is on, and function as locator light when dimmer is off.
   3. Switch Control: Switch single tap turns lights on/off.
   4. Dimmer High End Trim:
      a. Incandescent Dimmers: Minimum of 92 percent of line voltage.
      b. Dimmers for Electronic Low Voltage (ELV) Transformers: Minimum of 95 percent of line voltage.
      c. Dimmers for Magnetic Low Voltage Transformers: Minimum of 92 percent of line voltage.
   5. Product(s) - Preset Smart Dimmers with Wireless Communication Inputs:
      a. <<Type _____ - >>Preset Smart Dimmer*; Lutron Maestro Wireless Series*: Incandescent/halogen (600 W, 120 V), magnetic low voltage (600 VA/450 W, 120 V), dimmable CFL/LED (150 W, 120 V); multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
         1) *Lutron Model MRF2S-6CL;* single pole/multi-location; 120 V.
      b. <<Type _____ - >>Preset Smart Dimmer*; Lutron Maestro Wireless Series*: Electronic low voltage (600 W, 120 V); neutral required; multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
         1) *Lutron Model MRF2S-6ELV-120;* single-pole/multi-location; 120 V.
      c. <<Type _____ - >>Preset Smart Dimmer*; Lutron Maestro Wireless Series*: Incandescent (600 W, 120 V), magnetic low voltage (600 VA/450 W, 120 V); neutral required; multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
         1) << Lutron Model MRF2S-6ND-120;

or Lutron Model UMRF2S-6ND-120 (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120 V.

d. <<Type _____ - >>Companion Dimmer: Provides multi-location capability for compatible *Lutron Maestro Wireless Series* dimmers.
   1) <<Lutron Model MA-R; or Lutron Model UMA-R (BAA-Buy American Act Compliant)>>; gloss finish; 120 V.
   2) *Lutron Model MSC-AD;* satin finish; 120 V.
   3) *Lutron Model MA-R-277V;* gloss finish; 277 V.
   4) *Lutron Model MSC-AD-277V;* satin finish; 277 V.

6. Product(s) - Electronic Switches with Wireless Communication Inputs:
   a. <<Type _____ - >>Electronic Switch*; Lutron Maestro Wireless Series*: 6 A lighting/3 A fan (120 V); neutral required; multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
      1) *Lutron Model MRF2S-6ANS;* single-pole/multi-location; 120 V.
   b. <<Type _____ - >>Electronic Switch*; Lutron Maestro Wireless Series*: 8 A lighting/5.8 A fan (120 V); neutral required; multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
      1) << Lutron Model MRF2S-8ANS-120; or Lutron Model UMRF2S-8ANS-120 (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120 V.
   c. <<Type _____ - >>Electronic Switch*; Lutron Maestro Wireless Series*: 8 A lighting/3 A fan (120 V); 8 A lighting (277 V); multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
      1) <<Lutron Model MRF2S-8S-DV; or Lutron Model UMRF2S-8S-DV (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120-277 V.
   d. <<Type _____ - >>Companion Switch: Provides multi-location capability for compatible *Lutron Maestro Wireless Series* electronic switches.
      1) <<Lutron Model MA-AS; or Lutron

Model UMA-AS (BAA-Buy American Act Compliant)*>>;* gloss finish; 120 V.

2) *Lutron Model MSC-AS;* satin finish; 120 V.

3) *Lutron Model MA-AS-277V;* gloss finish; 277 V.

4) *Lutron Model MSC-AS-277V;* satin finish; 277 V.

2.05 WIRED WALLBOX OCCUPANCY SENSORS WITH WIRELESS COMMUNICATION INPUTS

A. 0-10 V Wall Dimmer/Switch Combination Occupancy/Vacancy Sensors with Wireless Communication Inputs*; Lutron Maestro Wireless 0-10 Dimmer Sensor/Maestro Wireless Sensor Switch Series*:

1. Communicates via radio frequency with up to ten compatible wireless occupancy/vacancy sensors, ten wireless control stations, and one wireless daylight sensor.
2. Compatible with sourcing electronic 0-10 V ballasts/drivers, as per IEC 60929 Annex E.2 0-10 V protocol.
3. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and minimum presets).
4. Occupancy/Vacancy Sensors:
   a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
   b. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions*; Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
   c. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area; adjustable timeout settings (1, 5, 15, or 30 minutes).
   e. Adjustable sensitivity (high, medium, low, and minimum presets).
   f. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; when room is vacated, returns to normal automatic-on operation after time delay period.
   g. Selectable walk-through mode to override selected timeout and automatically turn off lights if no motion is detected within 3 minutes after initial occupancy for

applications where space may be briefly occupied.

5. Vacancy-Only Sensors:
   a. Operates only as a vacancy sensor (manual-on and automatic-off)<< *in accordance with California Title 24 requirements*>>.
   b. Adjustable sensitivity (high, medium, low, and minimum presets).
6. Dimmer Features:
   a. Adjustable high/low end trims.
   b. Selectable dimming curve (linear or switched).
   c. Selectable fade on/fade off times (15, 5, 2.5, or 0.75 sec).
   d. Adjustable auto-on light level (fully adjustable from one to 100 percent).
7. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
   a. Rocker raises/lowers light level, with new level becoming the current preset level.
   b. Switch single tap raises lights to preset level or fades lights to off.
   c. Switch double tap raises light to full on level.
8. Switch Control: Switch single tap turns lights on/off.
9. Product(s):
   a. Passive Infrared 0-10 V Wall Dimmer Occupancy/Vacancy Sensor*; Lutron Maestro Wireless 0-10 V Dimmer Sensor/Maestro Wireless Sensor Switch Series*: 0-10 V control for 0-10 V fluorescent ballasts/LED drivers (8 A load at 120-277 V, 50 mA max control current); coverage of 900 square feet (81 sq m) with mounting height of 4 feet (1.2 m); 180 degree field of view; multi-location capability using *Pico* wireless control stations with wallbox mounting adapter.
      1) <<*Type* _____ - >>Sensor dimmer; occupancy/vacancy; *Lutron Model MRF2S-8SD010*.
      2) <<*Type* _____ - >>Sensor dimmer; vacancy-only; *Lutron Model MRF2S-8SDV010*.
      3) <<*Type* _____ - >>Sensor switch; occupancy/vacancy; *Lutron Model MRF2S-8SS*.
      4) <<*Type* _____ - >>Sensor switch; vacancy-only; *Lutron Model MRF2S-8SSV*.

2.06 WIRELESS CONTROL STATIONS

A. Product(s):
   1. <<Type _____ - >>2-Button Control; <<Lutron Pico Wireless Control Model PJ2-2B; or Lutron Pico Wireless Control Module UPJ2-2B (BAA-Buy American Act Compliant)>>.
      a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.
   2. <<Type _____ - >>2-Button Control with Night Light*; Lutron Pico Wireless Control Model PJN-2B*.
   3. <<Type _____ - >>2-Button with Raise/Lower Control; <<Lutron Pico Wireless Control Model PJ2-2BRL; or Lutron Pico Wireless Control Module UPJ2-2BRL (BAA-Buy American Act Compliant)>>.

a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.

4. <<Type _____ - >>3-Button Control; <<Lutron Pico Wireless Control Model PJ2-3B; or Lutron Pico Wireless Control Module UPJ2-3B (BAA-Buy American Act Compliant)>>.
   a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.
5. <<Type _____ - >>3-Button with Raise/Lower Control; <<Lutron Pico Wireless Control Model PJ2-3BRL; or Lutron Pico Wireless Control Module UPJ2-3BRL (BAA-Buy American Act Compliant)>>.
   a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.
6. <<Type _____ - >>3-Button with Raise/Lower Control and Night Light*; Lutron Pico Wireless Control Model PJN-3BRL*.
7. *<<Type* _____ - >>4-Button; <<Lutron Pico Wireless Control Model PJ2-4B; or Lutron Pico Wireless Control Module UPJ2-4B (BAA-Buy American Act Compliant)>>.
   a. Button Marking: <<Zone controls (light); Scene keypads (light); 2-group controllers (lights); 4-group toggle; As indicated on drawings; or _____>>.
8. Single Pedestal*; Lutron Pico Pedestal Model L-PED1*.
9. Double Pedestal*; Lutron Pico Pedestal Model L-PED2*.
10. Triple Pedestal*; Lutron Pico Pedestal Model L-PED3*.
11. Quadruple Pedestal*; Lutron Pico Pedestal Model L-PED4*.
12. Screw Mounting Kit*; Lutron Model PICO-SM-KIT*.
13. Wallbox Adapter*; Lutron Model PICO-WBX-ADAPT*.

B. Quantity: <<As indicated on the drawings; To be determined; provide allowance for _____ control(s); or _____>>.
C. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
D. Does not require external power packs, power or communication wiring.
E. Allows for easy reprogramming without replacing unit.
F. Button Programming:
   1. Single action.
   2. Toggle action.
G. Includes LED to indicate button press or programming mode status.
H. Mounting:
   1. Capable of being mounted with a table stand or directly to a wall under a faceplate.
   2. Faceplates: Provide concealed mounting hardware.
I. Power: Battery-operated with minimum ten-year battery life (3-year battery life for night light models).
J. Finish: <<As specified for wall controls in "Device Finishes" under LIGHTING CONTROLS - GENERAL REQUIREMENTS article above; White; Black; Ivory; Light Almond; White/Grey; As indicated on drawings; To be selected by Architect; or _____>>.

2.07 FLUORESCENT ELECTRONIC DIMMING BALLASTS

A. General Requirements:
   1. Designed for 10 year operational life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
   2. Designed and tested to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
   3. Lamp Starting Method: Programmed rapid start.
   4. Maximum Inrush Current: 7 amperes for 120V ballasts and 3 amperes for 277V ballasts.

5. Current Crest Factor (CCF): Less than 1.7.
6. Comply with ANSI C82.11 and list and label as complying with UL 935.
7. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
8. Inaudible in a 27 dBA ambient.
9. No visible change in light output with a variation of plus or minus 10 percent line voltage input.
10. Actively prevent overheating in T5-HO linear fluorescent lamp applications.
11. Ballasts to track evenly across multiple lamp lengths and all light levels.
12. Comply with IEC 61347-2-3 as applicable.

B. Digital Control:
1. Lights automatically return to the setting prior to power interruption.
2. Unique internal reference number visibly displayed on ballast cover.
3. Averages two independent daylight harvesting inputs internally.
4. When normal power is lost, ballasts fed with emergency power go to emergency mode.
5. Replacement of single ballast during maintenance does not require reprogramming.

C. Product(s):
1. Digital Control, One Percent Dimming*; Lutron Hi-lume 3D*:
a. Dimming Range: 100 percent to less than one percent relative light output for T8, T5 and T5HO, and five percent relative light output for T5 twin-tube lamps.
b. Surge Tolerance: Designed and tested to withstand Category A surges of 6,000 V according to IEEE C62.41.2 without impairment of performance.
c. Total Harmonic Distortion (THD): Less than 10 percent typical (15 percent for select models).
2. Digital Control, One Percent Dimming*; Lutron EcoSystem H-Series*:
a. Dimming Range: 100 to less than one percent relative light output for T8, and one percent relative light output for T5 and T5HO lamps.
b. Surge Tolerance: Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
c. Total Harmonic Distortion (THD): Less than 10 percent typical (15 percent for select models).

2.08 LED DRIVERS

A. General Requirements:
1. Operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
2. Provide thermal fold-back protection by automatically reducing power output (dimming) to protect LED driver and LED light engine/fixture from damage due to over-temperature conditions that approach or exceed the LED driver's maximum operating temperature at calibration point.
3. Provide integral recording of operating hours and maximum operating temperature to aid in troubleshooting and warranty claims.
4. Designed and tested to withstand electrostatic

discharges without impairment when tested according to IEC 61000-4-2.

5. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
6. UL 8750 recognized or listed as applicable.
7. UL Type TL rated or UL Class P listed where possible to allow for easier fixture evaluation and listing of different driver series.
8. Suitable for field replacement as applicable; listed in accordance with UL 1598C or UL 8750, Class P as indicated.
9. Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
10. Class A sound rating; Inaudible in a 27 dBA ambient.
11. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.
12. LED drivers of the same family/series to track evenly across multiple fixtures at all light levels.
13. Offer programmable output currents in 10 mA increments within designed driver operating ranges for custom fixture length and lumen output configurations, while meeting a low-end dimming range of 100 to 0.1 percent, 100 to 1 percent or 100 to 5 percent as applicable.
14. Meet NEMA 410 inrush requirements for mitigating inrush currents with solid state lighting sources.
15. Employ integral fault protection up to 277 V to prevent LED driver damage or failure in the event of incorrect application of line-voltage to communication link inputs.
16. LED driver may be remote located up to 100 feet (30 m) from LED light engine depending on power outputs required and wire gauge utilized by installer.

B. 3-Wire Control:
   1. Provide integral fault protection to prevent driver failure in the event of a mis-wire.
   2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.

C. Digital Control (when used with compatible *Lutron* lighting control systems):
   1. Employ power failure memory; LED driver to automatically return to the previous state/light level upon restoration of utility power.
   2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
   3. Automatically go to 100 percent light output upon loss of control link voltage and lock out system commands until digital control link voltage is restored. Manufacturer to offer UL 924 compliance achievable through use of external *Lutron Model LUT-ELI-3PSH* interface upon request.
   4. When normal power is lost, drivers fed with emergency power go to emergency mode.
   5. Replacement of single driver during maintenance does not require reprogramming.
   6. Digital low-voltage control wiring capable of being wired as either Class 1 or Class 2.

D. Product(s):
   1. Digital Control, 0.1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume Premier 0.1% Constant Voltage (L3D0-Series)*:
      a. Dimming Range: 100 to 0.1 percent

measured output current.

b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.

c. Typically dissipates 0.25 W standby power at 120 V and 0.40 W standby power at 277 V.

d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V and residential applications at 120 V.

e. Total Harmonic Distortion (THD): Less than 20 percent at maximum power; complies with ANSI C82.11.

f. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.

g. Driver outputs to be short circuit protected, open circuit protected, and overload protected.

h. Constant Voltage Drivers:

1) Support for cove and under-cabinet fixtures at 24 V.

(a) Support LED arrays from 2 W to 96 W.

(b) Pulse Width Modulation (PWM) dimming frequency meets IEEE 1789.

(c) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

(d) UL listed.

2. 3-Wire Control, 0.1 Percent Dimming*; Lutron Hi-lume Premier 0.1% Constant Voltage (L3D0-Series):*

a. Dimming Range: 100 to 0.1 percent measured output current.

b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V and residential applications at 120 V.

c. Total Harmonic Distortion (THD): Less than 20 percent at maximum power; complies with ANSI C82.11.

d. UL Class 2 output designed to withstand hot swap of LED loads.

e. Driver outputs to be short circuit protected, open circuit protected, and overload protected.

f. Constant Voltage Drivers:

1) Support for cove and

under-cabinet fixtures at 24 V.
(a) Support LED arrays from 2 W to 96 W.
(b) Pulse Width Modulation (PWM) dimming frequency meets IEEE 1789.
(c) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
(d) UL listed.

3. Digital Control, 0.1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume Premier 0.1% Constant Current (PEQ0-Series)*:
   a. Dimming Range: 100 to 0.1 percent measured output current.
   b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.
   c. Typically dissipates less than 0.5 W standby power at 120/277 V.
   d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120/277 V.
   e. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
   f. Driver outputs to be short circuit protected and open circuit protected.
   g. Constant Current Drivers:
      1) Support for downlights and pendant fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
         (a) Support LED arrays up to 20 W.
         (b) Constant Current Reduction (CCR) dimming method.
         (c) UL listed Class P.
         (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaire

s Version 2.0.

2) Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
   (a) Support LED arrays up to 20 W.
   (b) Constant Current Reduction (CCR) dimming method.
   (c) UL listed Class P.
   (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

4. Digital Control, 1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume Premier 1% Constant Current (PEQ1-Series)*:
   a. Dimming Range: 100 to 1 percent measured output current.
   b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.
   c. Typically dissipates less than 0.5 W standby power at 120/277 V.
   d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120/277 V.
   e. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
   f. Driver outputs to be short circuit protected and open circuit protected.
   g. Constant Current Drivers:
      1) Support for downlights and pendant fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
         (a) Support LED arrays up to 20 W.
         (b) Constant Current Reduction (CCR) dimming method.
         (c) UL listed Class P.
         (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for

Luminaires Version 2.0.

2) Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
   (a) Support LED arrays up to 20 W.
   (b) Constant Current Reduction (CCR) dimming method.
   (c) UL listed Class P.
   (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

5. Forward Phase (Neutral Wire Required), One Percent Dimming*; Lutron Hi-lume 1% (LTE-Series)*:
   a. Dimming Range: 100 to one percent relative light output.
   b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial and residential applications at 120 V.
   c. Total Harmonic Distortion (THD): Less than 20 percent at full output for 40 W loads; complies with ANSI C82.11.
   d. Constant Current Drivers:
      1) Support for downlights and pendant fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
         (a) Support LED arrays up to 53 W.
         (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
         (c) UL listed Class P.
         (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
      2) Support for troffers, linear pendants, and linear recessed

fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
(c) UL listed Class P.
(d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

3) Support for cove and under-cabinet fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
(c) UL listed.
(d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

e. Constant Voltage Drivers:
1) Support for downlights and pendant fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) dimming method.
(c) UL listed Class P.
(d) Meets solid state requirem

ents for power factor, transient protectio n, start time, and operating frequenc y in Energy Star for Luminaire s Version 2.0.

2) Support for troffers, linear pendants, and linear recessed fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
   (a) Support LED arrays up to 40 W.
   (b) Pulse Width Modulati on (PWM) dimming method.
   (c) UL listed Class P.
   (d) Meets solid state requirem ents for power factor, transient protectio n, start time, and operating frequenc y in Energy Star for Luminaire s Version 2.0.
3) Support for cove and under-cabinet fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
   (a) Support LED arrays up to 40 W.
   (b) Pulse Width Modulati on (PWM) dimming method.
   (c) UL listed.
   (d) Meets solid state requirem ents for power factor, transient protectio n, start time, and operating frequenc y in Energy Star for Luminaire s Version 2.0.

6. 3-Wire and Digital Control, One Percent Dimming*; Lutron Hi-lume 1% (L3D-Series):*
   a. Dimming Range: 100 to one percent relative light output.
   b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120 V or 277 V.
   c. Total Harmonic Distortion (THD): Less than 20 percent at full output for loads greater than 25 W typical (higher for

select models); complies with ANSI C82.11.

d. Constant Current Drivers:
   1) Support for downlights and pendant fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
      (a) Support LED arrays up to 53 W.
      (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
   2) Support for troffers, linear pendants, and linear recessed fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
      (a) Support LED arrays up to 40 W.
      (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
   3) Support for cove and under-cabinet fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
      (a) Support LED arrays up to 40 W.
      (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
      (c) UL listed.

e. Constant Voltage Drivers:
   1) Support for downlights and pendant fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
      (a) Support LED arrays up to 40 W.
      (b) Pulse Width Modulation (PWM) dimming method.
   2) Support for troffers, linear pendants, and linear recessed fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
      (a) Support LED

arrays up to 40 W.
(b) Pulse Width Modulation (PWM) dimming method.

3) Support for cove and under-cabinet fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) dimming method.
(c) UL listed.

7. Digital Control, Five Percent Dimming*; Lutron 5-Series (LDE5-Series):*
a. Dimming Range: 100 to five percent measured output current.
b. Typically dissipates 0.2 W standby power at 120 V and 0.3 W standby power at 277 V.
c. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V.
d. Constant Current Reduction (CCR) dimming method.
e. Total Harmonic Distortion (THD): Less than 21 percent at full load; complies with ANSI C82.11.
f. Constant Current Drivers:

1) Lutron K-Case Form Factor: Support for downlights and pendant fixtures in currents from 220 mA to 1.4 A to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) UL listed Class P.

2) Lutron M-Case Form Factor: Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 2.1 A to ensure a compatible driver exists.
(a) Support LED arrays up to 75 W.
(b) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
(c) Models available to meet

the DesignLights Consortium (DLC) power line quality requirements.

(d) UL listed Class P.

8. Digital Control, One Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume 1% Soft-on Fade-to-Black (LDE1-Series):*
   a. Dimming Range: 100 to one percent measured output current.
   b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.
   c. Typically dissipates 0.2 W standby power at 120 V and 0.3 W standby power at 277 V.
   d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V.
   e. Employs true Constant Current Reduction (CCR) dimming method from 100 to five percent light level and Pulse Width Modulation (PWM) dimming method from five percent to off.
   f. Pulse Width Modulation (PWM) frequency of 240 Hz.
   g. Total Harmonic Distortion (THD): Less than 20 percent at full output for drivers greater than 25 W; complies with ANSI C82.11.
   h. UL Class 2 output.
   i. Driver outputs to be short circuit protected, open circuit protected, and overload protected.
   j. Constant Current Drivers:
      1) Lutron K-Case Form Factor: Support for fixtures from 220 mA to 1.4 A over multiple operating ranges.
         (a) Support LED arrays up to 40 W.
         (b) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
         (c) UL listed Class P.
      2) Lutron M-Case Form Factor: Support for fixtures from 150 mA to 2.1 A over multiple operating ranges.

(a) Support LED arrays up to 75 W.
(b) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
(c) Models available to meet the DesignLights Consortium (DLC) power line quality requirements.
(d) UL listed Class P.

2.09 POWER INTERFACES
A. Provide power interfaces as indicated or as required to control the loads as indicated.
B. General Requirements:
1. Phase independent of control input.
2. Dimmer to meet limited short circuit test as defined in UL 508.
3. Utilize air gap off to disconnect the load from line supply.
4. Diagnostics and Service: Replacing power interface does not require re-programming of system or processor.
C. Product(s):
1. Phase-Adaptive Power Module*; Lutron PHPM-PA*: Provides interface for phase control input to provide full 16 A circuit output of forward/reverse phase control for compatible loads.
2. 3-Wire Fluorescent Power Module*; Lutron PHPM-3F*: Provides interface for phase control input to provide full 16 A circuit output for compatible line-voltage control fluorescent electronic dimming ballasts or LED drivers.
3. Switching Power Module*; Lutron PHPM-SW*: Provides interface for phase control or switched input to provide full 16 A circuit output of switching for compatible non-dim loads.
4. Ten Volt Interface*; Lutron GRX-TVI*: Provides interface for phase control input to provide full 16 A circuit output of switching and 0-10 V low voltage control for compatible fluorescent electronic dimming ballasts or LED drivers.

2.10 EXAMINATION
A. Verify that field measurements are as shown on the drawings.
B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
C. Verify that mounting surfaces are ready to receive system components.
D. Verify that conditions are satisfactory for installation prior to starting work.

2.11 PREPARATION
A. System and Network Integration Consultation*; Lutron LSC-INT-VISIT*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to conduct meeting with facility

representative and other related equipment manufacturers to discuss equipment and integration procedures.

1. Coordinate scheduling of visit with Lighting Control Manufacturer. Manufacturer recommends that this visit be scheduled early in construction phase, after system purchase but prior to system installation.

2.12 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130<<, except for mounting heights specified in those standards;, including mounting heights specified in those standards unless otherwise indicated; or _____>>.

B. Install products in accordance with manufacturer's instructions.

C. Sensor Locations:

1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", locate sensors in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, locate sensors in accordance with Drawings.
2. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.

D. Ensure that daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.

E. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

F. Lamp Lead Lengths: Do not exceed 3 feet (0.9 m) for T4 4-pin compact and T5 BIAX lamps and 7 feet (2.1 m) for T5, T5-HO, T8 U-bend, and T8 linear fluorescent lamps.

G. LED Light Engine/Array Lead Length: Do not exceed 100 feet (31 m).

H. Identify system components in accordance with Section 26 0553.

2.13 FIELD QUALITY CONTROL

A. See Section 01 4000 - *Quality Requirements*, for additional requirements.

B. Manufacturer's Full-Scope Start-Up Service <<is not required; is required; or _____>>.

C. Manufacturer's Programming Service:

1. Product(s):
   a. On-site programming, 8-hour block*; Lutron LSC-OS-PROG8-SP*.
   b. On-site programming, 4-hour block*; Lutron LSC-OS-PROG4-SP*.
   c. Remote programming, 4-hour block*; Lutron LSC-RMT-PROG4-SP*.
2. Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for manufacturer to perform <<on-site; remote; or _____>> programming tasks for <<8 hours; or _____>>.
3. Furnish unit prices for each available programming time interval.

D. Manufacturer's Full-Scope Start-Up Service: <<Utilize manufacturer's

Remote Full-Scope Start-Up Service where possible. Provide On-Site Full-Scope Start-Up Service where required by manufacturer; Provide manufacturer's On-Site Full-Scope Start-Up Service; or _____>>.

1. Remote Full-Scope Start-Up Service*; Lutron LSC-RMT-SU-VIVE*: When available in accordance with manufacturer's guidelines, provide access to manufacturer's certified remote startup technician to provide instruction and guidance for complete system functional test.
2. On-Site Full-Scope Start-Up Service*; Lutron LSC-OS-SU-VIVE*: Manufacturer's authorized Service Representative to conduct site visit upon completion of lighting control system installation to perform system startup and verify proper operation:
   a. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", authorized Service Representative to verify sensor locations, in accordance with layout provided by Lighting Control Manufacturer; Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
   b. Verify connection of power wiring and load circuits.
   c. Verify connection and location of controls.
   d. Energize wireless hubs.
   e. Associate occupancy/vacancy sensors, daylight sensors, wireless remotes, and wall stations to load control devices.
   f. Provide initial rough calibration of sensors; fine-tuning of sensors is responsibility of Contractor unless provided by Lighting Control Manufacturer as part of Sensor Layout and Tuning service where specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS".
   g. Program timeclock schedules per approved sequence of operations.
   h. Configure load shed parameters per approved sequence of operations.
   i. Verify system operation control by control.
   j. Obtain sign-off on system functions.
   k. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".
3. After Hours Startup*; Lutron LSC-AH-SU*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs to perform manufacturer's start-up procedures outside normal working hours (Monday through Friday, 7am to 5pm).

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

2.14 ADJUSTING

A. On-Site Scene and Level Tuning*; Lutron LSC-AF-VISIT*: Include <<as part of the base bid; as an alternate

to the base bid; or _____>> additional costs for Lighting Control Manufacturer to visit site to conduct meeting with <<Engineer; Owner's representative; Lighting Designer; or _____>> to make required lighting adjustments to the system for conformance with original design intent.

B. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, Contractor to provide fine-tuning of sensor calibration.

2.15 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

2.16 COMMISSIONING

A. See Section *01 9113* for commissioning requirements.

B. Title 24 Acceptance Testing Service*; Lutron LSC-SPV-DOC-T24*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to perform lighting control acceptance testing in accordance with CAL TITLE 24 P6. Submit required documentation.

2.17 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - *Closeout Submittals*, for closeout submittals.

B. See Section 01 7900 - *Demonstration and Training*, for additional requirements.

C. Training:

1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site system start-up services.
2. Customer-Site Solution Training Visit*; Lutron LSC-TRAINING-SP*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to provide <<one; or _____>> day(s) of additional on-site system training.

D. On-Site Warranty Audit Visit*; Lutron LSC-WNTY-AUD*: Where Manufacturer On-Site Full-Scope Start-Up Service is not provided, include services of manufacturer to perform on-site verification that system meets manufacturer's requirements as necessary for validation of specified enhanced warranty.

2.18 MAINTENANCE

A. See Section 01 7000 – *Execution and Closeout Requirements*, for additional requirements relating to maintenance service.

B. System Optimization Visit*; Lutron LSC-SYSOPT-SP*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control System Manufacturer to visit site <<six months; or _____>> after system start-up to evaluate system usage and discuss opportunities to make efficiency improvements that will fit with the current use of the facility.

2.19 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

DOCUMENT 00 91 13

ADDENDA

ADDENDUM NUMBER [__2__]

DATE: [___**11/8/22**_____]

PROJECT: E.C.I.S.D. Villarreal Elementary School – Gym

PROJECT NUMBER: 23-24

OWNER: Edinburg CISD

ARCHITECT: Negrete & Kolar Architects, LLP

TO: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated ___10/192022___, with amendments and additions noted below.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

This Addendum consists of ___42___ pages and the following Drawings:

No.	Drawing Title	Issue Date
1	EX.01 – Interior Elevation	11/7/2022
2	S4.0 – Roof Framing Plan	11/8/2022
3	S6.1 – Framing Details	11/8/2022

CHANGES TO THE PROJECT MANUAL

Specification Section 01 20 00 Price and Payment Procedures Paragraph 1.3 Structural Material Allowances:

- Remove Items 2. $10,000 Existing Frame Reinforcing allowance
- Remove Item 3. Additional allowance of $8,000 to be used as directed by the structural engineer.

Specification Section 07 95 13 Expansion Joint Cover Assemblies:

- Include into the project manual Section 07 95 13 Expansion Joint Cover Assemblies and apply to locations indicated in drawings.

Specification Section 260529 – Lighting Controls

- The lighting control acceptable manufacturer shall be Lutron, wireless system. Refer to drawings for devices models. No substitution. Revise specification, see attached.

CHANGES TO THE DRAWINGS:

EX.01 – Interior Elevation; Contractor to Coordinate with Owner location for Dedicatory Plaque
S4.0 – Roof Framing Plan; Replacement of Sheet
S6.1 – Framing Details; Replacement of Sheet

CLARIFICATION ITEMS:

1.) **Correction to Proposal Form Bidders Bond on page 10 of instructions to bidders. <u>A bid bond will be required for each gym project.</u>**

END OF DOCUMENT

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contingency allowances.

B. Structural material allowances.

C. Schedule of values.

D. Applications for payment.

E. Change procedures.

F. Defect assessment.

G. Alternates.

1.2 CONTINGENCY ALLOWANCES

A. Include in the Contract, a stipulated sum/price of $25,000.00 (Twenty-five Thousand Dollars) for use upon Architect's instruction.

B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

C. Contractor shall provide detailed line-item breakdown of costs associated with Allowance request.

D. Funds will be drawn from Contingency Allowance only by Change Order.

E. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.3 STRUCTURAL MATERIAL ALLOWANCES

A. Include in the Contract, the cost of providing all materials and labor and attributable overhead and profit, for the installation as directed by the Architect and/or Structural Engineer. Refer to Structural Drawings.

1. Reinforcing Steel:
   a. 100 feet of #4 bars.
   b. 100 feet of #5 bars.
   c. 100 feet of #6 bars.
   d. Unused balance credited back to Owner at $1.25/pound.
2. N.A.
3. N.A.
4. N.A.

1.4 SCHEDULE OF VALUES

A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702.

B. Submit Schedule of Values in duplicate within 15 working days after date established in Notice to Proceed.

C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify material and labor as separate line items. Include site mobilization, bonds and insurance.

D. Include amount of Allowances specified in this section as a separate line item.

E. Include direct proportional amount of Contractor's overhead and profit to coincide with the progress of the Work as a separate line item.

F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.5 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment. Provide dollar value in each column for each line item for portion of work performed and for stored products.

C. Submit updated construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement.

E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.

F. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Partial release of liens from major subcontractors and vendors.
2. Affidavits attesting to off-site stored products.
3. Construction progress schedules revised and current as specified.

1.6 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on Architect developed form.

C. The Architect/Engineer may issue a Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time

during which the requested price will be considered valid. Contractor will prepare and submit estimate within 10 calendar days.

D. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 01 60 00 - Product Requirements.

E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.

F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material or Force Account Change Order.

G. Construction Change Directive: Architect may issue directive, signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

H. Time and Material or Force Account Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents. Provide full information required for evaluation of proposed changes to substantiate costs for changes in the Work.

I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.

K. Change Order Forms: AIA G701.

L. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

M. Correlation Of Contractor Submittals:
1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.7 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Architect/Engineer and Owner.

D. Defective Work not accepted will not be funded. Work found to be defective after partial progress funding may be reduced to its appropriate level of value or to zero based on the evaluation of the Architect

E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of Architect and Owner to assess defects and identify payment adjustments is final.

G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected products.

1.8 ALTERNATES

1.9 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work.

C. Schedule of Alternates:

1. Alternate No. 1: Epoxy primer and semi-gloss water-based coating at New Addition Restroom wet areas as indicated in sheet A.106B: Specification Section 09 90 00 Painting and Coating Part Three paragraph 3.7 Schedule – Interior Surfaces Concrete Floors (Alternate No. 1)
   a. Base Bid Item: 2x2 porcelain mosaic mat as selected by Architect. Refer to Detail 1/A.106, and 1/A.300 and other associated diagrams in the Construction Drawings, and Specification Section 09 30 00 – Tiling.
2. Alternate No. 2: Specification Section 07 21 16 Simple Saver System - fiberglass thermal batt insulation: Thermal Design, Inc; WMP-10, R30: Lamtec
   a. Facing Composition: Metalized Polypropylene with Bursting Strength of 65 psi.
   b. Facing Color: White

   **To be used in conjunction with:
3. Insul-Basket Insulation Support Grid: Heavy gauge galvanized steel grid, installed between purlins and conforming to the following:
   a. Manufacturer: Bay Insulation Systems; Green Bay WI; (920) 406-4000; www.bayinsulation.com
   b. Size: 5'x12'x10"-depth as appropriate for conditions of the project.
   c. For use with R30 thermal batts, sized to fit basket width & length.
   d. For use with Lamtec Corporation Gymgaurd Facing. Lamtec Corporation Bartley-Chester Road P.O. Box 37 Flanders, New Jersey 07836-0037 USA
   e. Phone: (973) 584-5500
   f. Install additional thermal protection at underside of existing roof and integrated with the existing metal building blanket insulation to achieve R30 or higher as required by code.
   g. Base Bid Item: Existing to remain metal building thermal insulation system between and above existing purlins.

H. PRODUCTS - NOT USED

I. EXECUTION - NOT USED

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

CHANIN
ENGINEERING, LLC

November 8, 2022

ECISD Villarreal Elementary School Gym Addition
Addendum No. 2

CE Project No.:22-143

The following changes, additions, and/or deletions are hereby made a part of the Construction Documents for the above noted project, fully and completely as if the same were fully contained therein. All other terms, conditions, and specifications of the original Invitation to Bid remain unchanged and is included in the contract.

PLEASE NOTE CHANGES AS FOLLOWS:

A. **Replacement of (2) 24"x36" sheets:**

- **S4.0**
- **S6.1**

End of – Addendum #2

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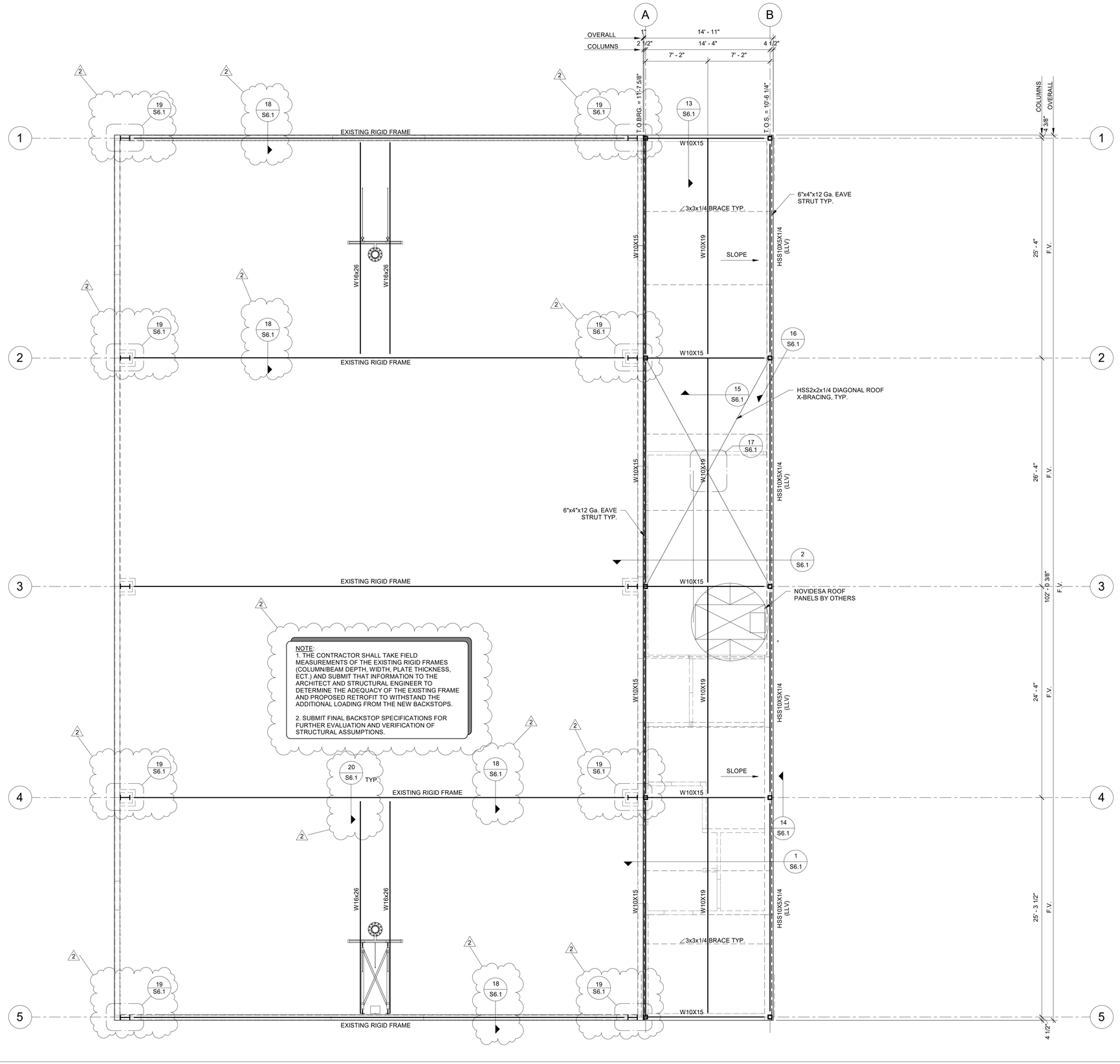
T: (956) 687-9421 | F: (956) 687-3211
ChaninEngineering.com
TBPE Firm Registration No. F-9369



FRAMING NOTES:

1. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH ARCHITECTURAL PLANS BEFORE COMMENCING WORK.
2. REFER TO ARCHITECTURAL DRAWINGS FOR ANY ADDITIONAL DIMENSIONS.
3. ALL COLUMNS TO BE HSS 6x6x1/4, U.N.O.
4. CONTRACTOR TO COORDINATE ALL MECHANICAL,ELECTRICAL AND PLUMBING COMPONENTS SUPPORTED BY THE STRUCTURE WITH THE STRUCTURE MANUFACTURER. THIS INCLUDES COORDINATING EXACT WEIGHT AND LOCATION, AND ALL NECESSARY ATTACHMENTS.
5. CONTRACTOR TO COORDINATE EXACT LOCATION AND SIZE OF ANY AND ALL ROOF HATCHES WITH ARCH'L DRAWINGS.

1 ROOF FRAMING PLAN
3/16" = 1'-0"

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NEGRETE & KOLAR ARCHITECTS LLP
WWW.NEKOARCH.COM

STATE OF TEXAS
MIGUEL CHANIN
93127
LICENSED PROFESSIONAL ENGINEER
10-20-22

Project #22143

E.C.I.S.D.
VILLARREAL ELEMENTARY
Edinburg, Texas 78541

DRAWN BY: EC

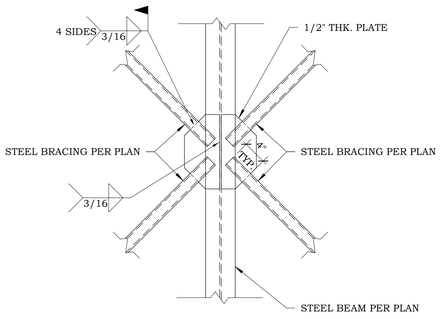
ISSUED DATE: 10/20/22

REVISION / ADDENDA

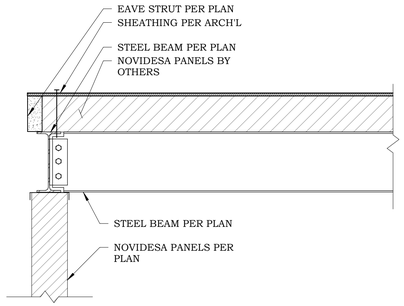
NO.	DATE	DESCRIPTION
2	11/08/22	Addendum #2

ROOF FRAMING PLAN

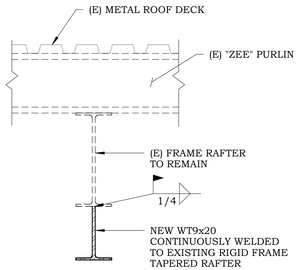
S4.0



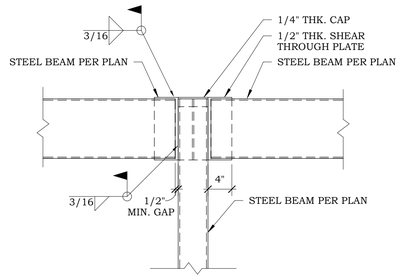
HSS BRACE TO STEEL BEAM | 17



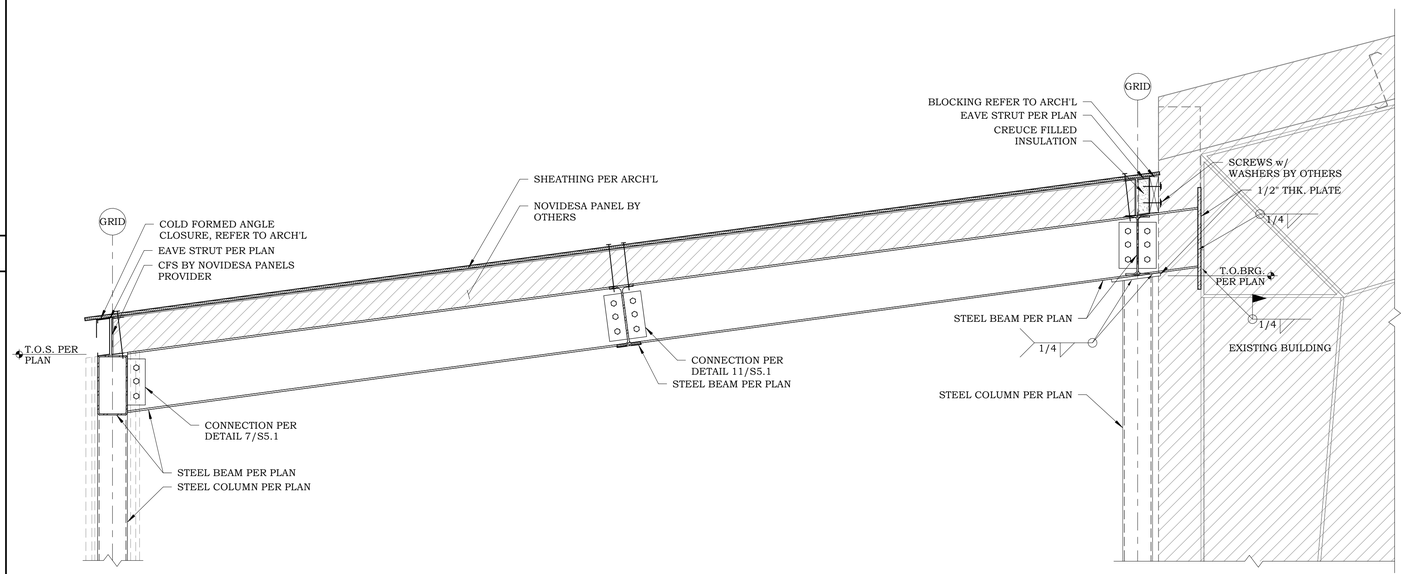
STEEL BEAM TO STEEL BEAM | 13



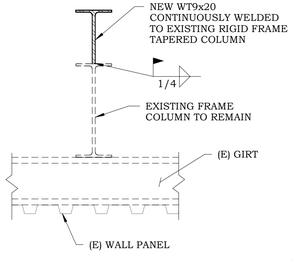
RIGID FRAME RAFTER DETAIL | 18



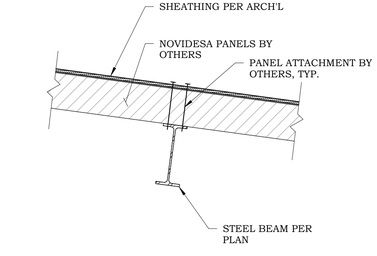
STEEL BEAM TO STEEL COLUMN | 14



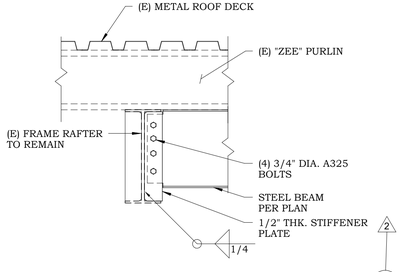
STEEL BEAM TO STEEL BEAM | 2



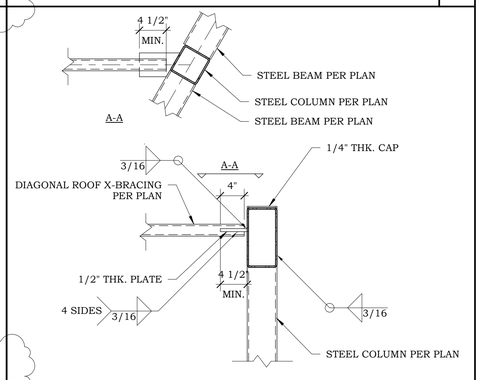
RIDGID FRAME COLUMN DETAIL | 19



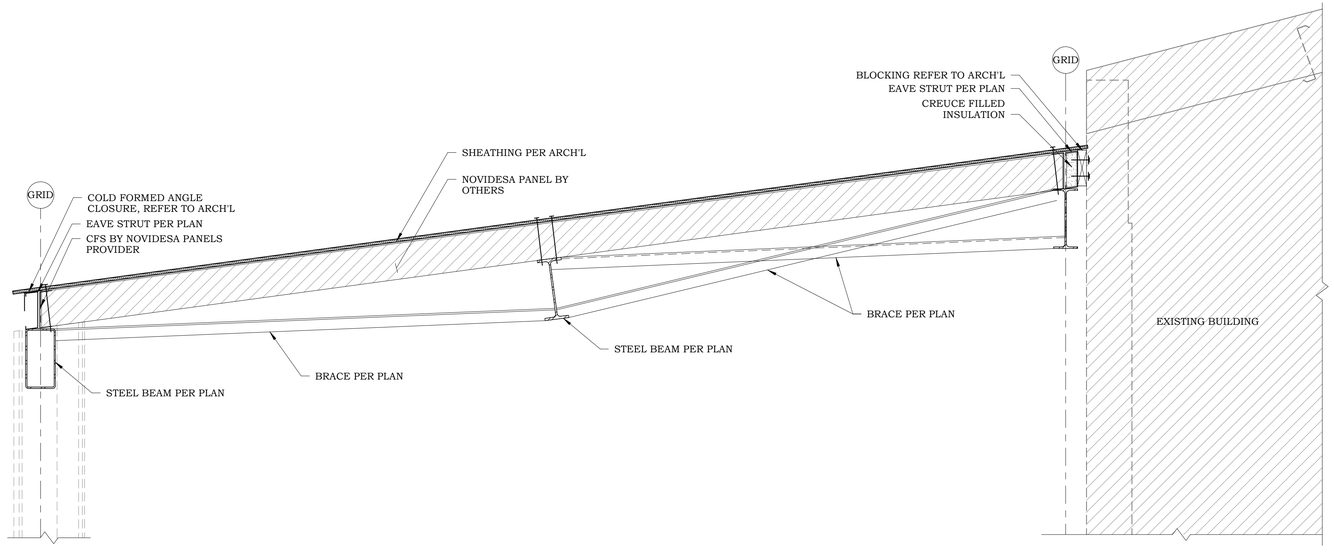
PANELS TO STEEL BEAM | 15



STEEL BEAM TO FRAME RAFTER | 20



STEEL BRACE TO STEEL COLUMN | 16



STEEL BEAM TO STEEL BEAM | 4

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STATE OF TEXAS
MIGUEL CHANIN
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LICENSED PROFESSIONAL ENGINEER
10-20-22

Project #22143

E.C.I.S.D.
VILLARREAL ELEMENTARY
Edinburg, Texas 78541

DRAWN BY: EC
ISSUED DATE: 10/20/22

REVISION / ADDENDA

NO.	DATE	DESCRIPTION
2	11/08/22	Addendum #2

FRAMING DETAILS

S6.1

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:
   1. Expansion and seismic joint systems for building interiors.
   2. Expansion and seismic joint systems for building exteriors.

1.2 RELATED WORK

A. Related work that is specified elsewhere:
   1. Section 03300: Cast-In-Place Concrete.
   2. Section 04200: Unit Masonry.
   3. Section 05120: Structural Steel.

1.3 DEFINITIONS

A. Nominal Joint Width: The width of the expansion joint opening as specified in the project documents, at which the expansion joint will be constructed, and the cover will be installed.
B. Maximum Joint Width: The widest expansion joint width which the joint cover is required to accommodate without damage to its components.
C. Minimum Joint Width: The narrowest expansion joint width which the joint cover is required to accommodate without damage to its components.
D. Movement Capability: The amount of movement in a single direction (open or close), given as a percentage of the nominal joint width, that the joint cover is required to accommodate without damage to its components.
E. Lateral Shear: Movement horizontally and parallel to the expansion joint.
F. Vertical Shear: Movement vertically and parallel to the expansion joint.

1.4 SUBMITTALS

A. Submittals shall contain the following as required for each specified system:
   1. Shop Drawings showing complete fabrication details for all joint covers, including required anchorage to surrounding construction, recesses, blocking, backing, and connections between similar and dissimilar joint cover assemblies
   2. Manufacturer's product data including product details, installation instructions, maintenance and cleaning instructions, and Safety Data Sheets.

1.5 QUALITY ASSURANCE

A. Manufacturer: Obtain joint cover assemblies through one source from a single manufacturer.
   1. Manufacturer shall have a third-party certified ISO 9001 quality management system.
   2. Manufacturer shall have a minimum of ten (10) years of experience in the fabrication of joint cover assemblies.
B. Installer: All products listed in this section shall be installed by a single installer with demonstrated experience in installing products of the same type and scope as specified.

1.6 COORDINATION

A. Submittals shall be completed and approved prior to fabrication and shipment of material to the jobsite.
B. Schedule for the work of this section shall be planned to allow sufficient time for manufacturer's production and delivery scheduling.
C. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful and proper installation.
D. Coordinate installation of exterior joint assemblies to ensure that transitions are watertight.
E. Verify product types, quantities, dimensions, and attachment methods shown on shop drawings against field conditions prior to releasing materials for fabrication by the manufacturer.
F. Communicate necessary changes on the manufacturer's shop drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary protective cover on anodized aluminum, stainless steel, and bronze finished surfaces.
B. Deliver joint covers to jobsite in clean, unopened crates of sufficient size and strength to protect materials during transit.
C. Store components in original containers in a clean, dry location.

1.8 WARRANTY

A. Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than one (1) year when installed in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Balco, Inc. (Basis of Design); Wichita, KS; phone: (800) 767-0082.
B. Inpro; Muskego WI; phone: (800) 222-5556.
C. Construction Specialties; Lebanon NJ; phone: (800) 233-8493.
D. Substitutions: Section 01 60 00 - Product Requirements.

2.2 EXPANSION AND SEISMIC JOINT SYSTEMS

A. Interior Expansion and Seismic Joint Systems:
    1. Floor Expansion Joint Systems: Balco BHS-2 & BHSL-2.
        a. Joint Width: 2".
        b. Movement per ASTM E1399: Expansion / Contraction 25%.
        c. Load Capacity: Pedestrians, Gurney / Bed, X-Ray, Slow Vehicular.
        d. Fire Rating per UL 2079/ASTM 1966: Not less than the fire rating of the adjacent construction.
        e. Finish: Mill finish aluminum extrusions, AA-M10. All surfaces in contact with concrete or masonry shall be protected by a factory-applied coating.
    2. Wall and Ceiling Expansion Joint Systems: Balco WDC-1.
        a. Joint Width: 2".
        b. Movement per ASTM E1399: Expansion / Contraction 50%.
        c. Fire Rating per UL 2079/ASTM 1966: Not less than the fire rating of the adjacent construction.
        d. Finish: Clear anodized aluminum, Class II, AA-M12 C22 A31. All surfaces in contact with concrete or masonry shall be protected by a factory-applied coating.
B. Exterior Expansion Joint Systems:
    1. Wall Expansion Joint Systems: Balco CMXL-1.5-3.
        a. Joint Width: 3".
        b. Movement per ASTM E1399: Expansion / Contraction 50%.
        c. Fire Rating per UL 2079/ASTM 1966: Not less than the fire rating of the adjacent construction.
        d. 45 Mil EPDM water barrier.
        e. Finish: Mill finish aluminum extrusions, AA-M10. All surfaces in contact with concrete or masonry shall be protected by a factory-applied coating.

2.3 MATERIALS

A. Metals
    1. Aluminum extrusions: ASTM B221, alloys 6063-T5, 6005A-T6, 6061-T6.
    2. Aluminum plate and sheet: ASTM B209, alloys 6061-T6, 5052-H32.
    3. Steel: ASTM A36 Plate.
    4. Stainless steel: ASTM A666, type 304.
    5. Bronze extrusions: ASTM B455, alloy C38500.
    6. Bronze sheet and plate: ASTM B36, C28000 Muntz metal.
B. PVC Vinyl: 90 Shore A, ASTM D2240.
C. Silicone: ASTM D 2000 4GE 709 M.
D. Santoprene:
    1. 75 shore A durometer, 15 sec, ISO 868.
    2. Face seals to be installed in exterior conditions shall be UV resistant.
E. Abrasive: Two (2) part Epoxy combined with aluminum oxide grit.

F. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum).
G. Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover by an independent, nationally recognized testing entity in accordance with UL 2079, or ASTM E1966, including hose stream test, where applicable, at the full rated period. Assemblies shall be listed with an independent, nationally recognized testing and listing entity.
H. Standard fasteners required for assembly and installation shall be included.
I. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.

2.4 FINISHES

A. Aluminum:
   1. Floors: Mill finish extrusions, AA-M10.
   2. Interior Walls and Ceilings: Clear anodized, Class II, AA-M12 C22 A31.
   3. Exterior Walls and Roofs: AA-M10.
   4. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.
B. Steel:
   1. Galvanized steel plate shall meet ASTM 123.
   2. Galvanized sheet metal shall meet ASTM A65 G90.
   3. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.
C. Elastomeric Seals: Color as selected and approved from manufacturer's samples.
D. Foam seals with silicone face: Color as selected and approved from manufacturer's samples.
E. Abrasive: Black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer shall examine conditions under which work is to be performed and shall notify the contractor in writing of unsatisfactory conditions. Installer shall not proceed until all unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 PREPARATION

A. Prepare surfaces using methods recommended by the manufacturer for achieving the required results within project conditions.
B. Corner blockouts should be square, level, free of spalling or laitance, and meet the dimensions shown on shop drawings. Repairs should be made using appropriate materials as recommended by concrete repair material manufacturer, based on project-specific conditions.
C. Concrete repair material must be applied and allowed to cure in accordance to the manufacturer of the product recommendations and instructions.
D. Clean dirt, debris, and other contaminants from both the blockout and joint opening.
E. Mask areas adjacent to the joint as required to achieve neat, clean joint lines. Remove masking prior to the curing process.

3.3 INSTALLATION

A. Install expansion and seismic joint covers in accordance with the manufacturer's instructions.
B. Centering bars shall be fully engaged with base members.
C. Locate fasteners at interval recommended by manufacturer as shown on shop drawings.
D. Floor systems: Where shimming is required, provide continuous support for base members to prevent vertical deflection when in service.
E. Heavy-duty floor systems: Repair or grout blockouts as required for continuous frame support. Bring base

members to proper level; shimming is not allowed.

F. Fire-rated joint covers: Install fire rated covers in accordance with requirements of applicable fire rated product. Install fire barriers and flame sealant as shown on shop drawings and in accordance with installation instructions.

G. Water barrier: Install water barriers at exterior joints and where called for on shop drawings. Provide drainage fittings where called for on shop drawings.

3.4 PROTECTION AND CLEANING

A. Protect the installation from damage by work of other sections.

B. Where required, remove and store cover plates and install temporary protection over joints and re-install cover plates prior to substantial completion of work.

C. Do not remove protective coverings until finish work in adjacent areas is complete.

D. Prior to project closeout, clean exposed surfaces with a suitable cleaner as recommended by manufacturer.

3.5 SCHEDULE

A. Interior Floor: Provide and install expansion joint cover at interior expansion joint located at floor along new addition to existing gym floor and foundation.

END OF SECTION 07 95 13

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11-09-22

ADDENDUM

Project Name: ECISD Guerra Villareal Gym Renovation
Project Number: 22.2.30
Architect: NEGRETE & KOLAR ARCHITECTS LLP
Date: 11/9/2022

Note: The work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

I. Specifications:
   A. Section 260529 – The lighting control acceptable manufacturer shall be Lutron, wireless system. Refer to drawings for devices models. No substitution. Revise specification, see attached.

II. General:

III. Mechanical:

IV. Electrical:

I. Plumbing:

II. Fire Protection: N/A

SECTION 26 09 26

LIGHTING CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single space wireless lighting control systems and associated components:
   1. Wireless occupancy/vacancy sensors.
   2. Wireless daylight sensors.
   3. Wired load control modules with wireless communication inputs.
      a. Includes fixture control modules with wired occupancy/vacancy/ daylight sensors.
   4. Wired receptacles with wireless communication inputs.
   5. Wireless fixture control components factory-installed in luminaires not specified in this section.
   6. Wired wall dimmers and switches with wireless communication inputs.
   7. Wired wallbox occupancy sensors with wireless communication inputs.
   8. Wireless control stations.
   9. Fluorescent electronic dimming ballasts.
   10. LED Drivers.
   11. Power interfaces.
   12. Digital dimming ballast modules.

B. Wireless hub(s) for centralized control, monitoring, and system integration.

C. Software data and analytics dashboard, including server requirements.

1.02 RELATED REQUIREMENTS

A. Section <<_____>>: Building automation system, for interface with lighting control system.

B. Section 26 0553 - *Identification for Electrical Systems*: Identification products and requirements.

C. Section 26 *2726 - Wiring Devices - Lutron*:
   1. Finish requirements for wall controls specified in this section.
   2. Accessory receptacles and wallplates, to match lighting controls specified in this section.

D. Section 26 *5133 - Luminaires, Ballasts, and Drivers - Lutron*.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; *current edition*.

B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; *2011*.

C. ANSI/ESD S20.20 - Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices); *2014*.

D. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; *2002a (Reapproved 2010)*.

E. CAL TITLE 24 P6 – California Code of Regulations, Title 24, Part 6 (California Energy Code); *2013*.

F. CSA C22.2 No. 223 – Power Supplies with Extra-low-voltage Class 2 Outputs; *2015*.

G. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; *2015*.

H. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; *2008*.

I. IEC 61347-2-3 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. and/or D.C. Supplied Electronic Control Gear for Fluorescent Lamps; *2011, with Amendments, 2016*.

J. IEEE 1789 - Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers*; 2015*.

K. IEEE C62.41.2 - Recommended Practice on Characterization of

Surges in Low-Voltage (1000 V and less) AC Power Circuits; *2002 (Cor 1, 2012)*.

L. ISO 9001 - Quality Management Systems-Requirements; *2008*.

M. NECA 1 - Standard for Good Workmanship in Electrical Construction; *2015*.

N. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; *2010*.

O. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; National Electrical Manufacturers Association; *2015*.

P. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; *1999 (R 2015)*.

Q. NFPA 70 - National Electrical Code; National Fire Protection Association; *Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements*.

R. UL 20 - General-Use Snap Switches; *Current Edition, Including All Revisions*.

S. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc.; *Current Edition, Including All Revisions*.

T. UL 924 - Emergency Lighting and Power Equipment; *Current Edition, Including All Revisions*.

U. UL 935 - Fluorescent-Lamp Ballasts; *Current Edition, Including All Revisions*.

V. UL 1310 – Class 2 Power Units; *Current Edition, Including All Revisions*.

W. UL 1472 - Solid-State Dimming Controls; *Current Edition, Including All Revisions*.

X. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; *Current Edition, Including All Revisions*.

Y. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; *Current Edition, Including All Revisions*.

Z. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; *Current Edition, Including All Revisions*.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate the placement of wall controls with actual installed door swings.
3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Pre-Wire Meeting*; Lutron LSC-PREWIRE*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to conduct on-site meeting prior to commencing work. Manufacturer to review with installer:

1. Low voltage wiring requirements.
2. Separation of power and low voltage/data wiring.
3. Wire labeling.
4. Wireless hub locations and installation.
5. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS",

sensor locations to be reviewed in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.

6. Control locations.
7. Computer jack locations.
8. Load circuit wiring.
9. Network wiring requirements.
10. Connections to other equipment.
11. Installer responsibilities.

C. Sequencing:
1. Do not install sensors and wall controls until final surface finishes<< and painting>> are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - *Administrative Requirements* for submittal procedures.

B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations.

C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.
2. Wall Dimmers: Include derating information for ganged multiple devices.

D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. System Performance-Verification Documentation*; Lutron LSC-SPV-DOC*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for manufacturer's enhanced documentation detailing start-up performance-verification procedures and functional tests performed along with test results.

F. Title 24 Acceptance Testing Documentation: Submit Certification of Acceptance and associated documentation for lighting control acceptance testing performed in accordance with CAL TITLE 24 P6, as specified in Part 3 under "COMMISSIONING".

G. Project Record Documents: Record actual installed locations and settings for lighting control system components.

H. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

I. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications:
1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.
2. Registered to ISO 9001, including in-house engineering for product design activities.
3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.

4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1. Basis of Design System Requirements - *Lutron*, Unless Otherwise Indicated:

a. Ambient Temperature:

1) Lighting Control System Components, Except Fluorescent Electronic Dimming Ballasts: Between 32 and 104 degrees F (0 and 40 degrees C).

2) Fluorescent Electronic Dimming Ballasts: Between 50 and 140 degrees F (10 and 60 degrees C).

b. Relative Humidity: Less than 90 percent, non-condensing.

c. Protect lighting controls from dust.

1.09 WARRANTY

A. See *Section 01 7800 - Closeout Submittals*, for additional warranty requirements.

--CHOOSE ONLY ONE OF THE TWO STANDARD WARRANTIES BELOW ACCORDING TO WHETHER OR NOT MANUFACTURER FULL-SCOPE START-UP SERVICES WILL BE SPECIFIED IN PART 3--

B. Manufacturer's Standard Warranty, Without Manufacturer Full-Scope Start-Up:

1. Manufacturer Lighting Control System Components, Except Wireless Sensors, Ballasts/Drivers and Ballast Modules: One year 100 percent parts coverage, no manufacturer labor coverage.

2. Wireless Sensors: Five years 100 percent parts coverage, no manufacturer labor coverage.

3. Ballasts/Drivers and Ballast Modules: Three years 100 percent parts coverage, no manufacturer labor coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: *Lutron Electronics Company, Inc; Vive; www.lutron.com*.

B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 LIGHTING CONTROLS - GENERAL REQUIREMENTS

A. Sensor Layout and Tuning:

1. Lighting Control Manufacturer to take full responsibility for wired or wireless occupancy/vacancy and daylight sensor layout and performance for sensors provided by Lighting Control Manufacturer.

2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.

3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.

4. Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits, within one calendar year from Date of Substantial Completion to fine-tune sensor calibration per the agreed upon sequence of operations.

B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.

C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.

D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C) and 90 percent non-condensing relative humidity.

E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

F. Power Failure Recovery: When power is interrupted for periods up to <<10 years; or _____>> and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.

G. Wireless Devices:
1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.
2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).
3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).
4. System does not require a factory technician to set up or program the system.
5. Capable of diagnosing system communications.
6. Capable of having addresses automatically assigned to them.
7. Receives signals from other wireless devices and provides feedback to user.
8. Capable of determining which devices have been addressed.
9. RF Range: 60 feet (18 m) line-of-sight or 30 feet (9 m) through typical construction materials between RF transmitting devices and compatible RF receiving devices.
10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 15, for Class B application.

H. Wireless Network:
1. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
a. Wireless sensors, wireless wall stations and wireless load control devices do not operate in the noisy 2.4 GHz frequency band where high potential for RF interference exists.
b. Wireless devices operate in an uncongested frequency band

providing reliable operation.
c. Fixed network architecture ensures all associated lights and load controls respond in a simultaneous and coordinated fashion from a button press, sensor signal, or command from the wireless hub (i.e. no popcorning).
2. Distributed Architecture: Local room devices communicate directly with each other. If the wireless hub is removed or damaged, local control, sensing, and operation continues to function without interruption.
3. Local room devices communicate directly with each other (and not through a central hub or processor) to ensure:
a. Reliability of system performance.
b. Fast response time to events in the space (e.g. button presses or sensor signals).
c. Independent operation in the event of the wireless hub being removed or damaged.

I. Device Finishes:

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

1. Wall Controls: Match finishes for Wiring Devices in Section 26 2726, unless otherwise indicated.
2. Wall Controls: White; Black; Ivory; Light Almond; To be selected by Architect
3. Standard Colors: Comply with NEMA WD1 where applicable.
4. Color Variation in Same Product Family: Maximum delta E of 1, CIE L*a*b color units.
5. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

2.03 WIRELESS SENSORS

A. General Requirements:
1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.
2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
3. Does not require external power packs, power wiring, or communication wiring.
4. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:
1. General Requirements:
a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions*; Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
d. Provide optional, readily accessible, user-adjustable controls for timeout,

automatic/manual-on, and sensitivity.

e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.

f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.

g. Color: White.

h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.

i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.

j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.

k. Ceiling-Mounted Sensors:

1) Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.

2) Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.

l. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.

2. Wireless Combination Occupancy/Vacancy Sensors:

a. Ceiling-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one footcandle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).

b. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).

c. Product(s):

1) <<Type _____ - >>Ceiling-Mounted Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OCR2B-P-WH; or Lutron Radio

Powr Savr Series, Model ULFR2-OCR2B-P-WH (BAA-Buy American Act Compliant)>>: Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

2) <<Type _____ - >>Wall-Mounted Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OWLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-OWLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.

3) <<Type _____ - >>Corner-Mounted Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OKLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-OKLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1225 square feet (113.8 sq m) and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 90 degree field of view.

4) <<Type _____ - >>Hallway Occupancy/Vacancy Sensor; << Lutron Radio Powr Savr Series, Model LFR2-OHLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-OHLB-P-WH (BAA-Buy American Act Compliant)>>: Major motion coverage of up to 150 feet (45.7 m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); narrow field of view.

3. Wireless Vacancy-Only Sensors:
   a. Operates only as a vacancy sensor (manual-on and automatic-off)<< in accordance with CAL TITLE 24 P6 requirements>>.
   b. Product(s):
      1) <<Type _____ - >>Ceiling-

Mounted Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VCR2B-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VCR2B-P-WH (BAA-Buy American Act Compliant)>>: Coverage from 324 square feet (30.2 sq m) to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

2) <<Type _____ - >>Wall-Mounted Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VWLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VWLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1500 square feet (139.4 sq m) and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 180 degree field of view.

3) <<Type _____ - >>Corner-Mounted Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VKLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VKLB-P-WH (BAA-Buy American Act Compliant)>>: Minor motion coverage of 1225 square feet (113.8 sq m) and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); 90 degree field of view.

4) <<Type _____ - >>Hallway Vacancy-Only Sensor; << Lutron Radio Powr Savr Series, Model LFR2-VHLB-P-WH; or Lutron Radio Powr Savr Series, Model ULFR2-VHLB-P-WH (BAA-Buy American Act Compliant)>>: Major motion coverage of up to 150 feet (45.7 m) with mounting height of 6 to 8 feet (1.8 to 2.4 m); narrow field of view.

C. Wireless Daylight Sensors:
   1. Product: *Lutron Radio Powr Savr Series, Model LFR2-DCRB-WH*.

2. Open-loop basis for daylight sensor control scheme.
3. Stable output over temperature from 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C).
4. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
5. Provide linear response from 2 to 150 footcandles.
6. Color: White.
7. Mounting:
   a. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
   b. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
   c. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.

2.04 WIRED WALL DIMMERS AND SWITCHES WITH WIRELESS COMMUNICATION INPUTS

A. General Requirements:
1. Provide air gap service switch to disconnect power to load for safe lamp replacement, accessible without removing faceplate.
2. Operates at the rated capacity across the full ambient temperature range including modified capacities for ganged configurations which require removal of fins.
3. Provide radio frequency interference suppression.
4. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 200 amps according to IEEE C62.41.2 without impairment to performance.
5. Dimmers: Provide full range, continuously variable control of light intensity.
6. Dimmers for Electronic Low Voltage (ELV) Transformers:
   a. Provide circuitry designed to control the input of electronic (solid-state) low voltage (ELV) transformers. Do not use dimmers that utilize standard phase control.
   b. Provide resettable overload protection that provides automatic shut-off when dimmer capacity is exceeded. Do not use protection methods that are non-resettable or require device to be removed from outlet box.
   c. Designed to withstand a short, per UL 1472, between load hot and either neutral or ground without damage to dimmer.
7. Dimmers for Magnetic Low Voltage (MLV) Transformers:
   a. Provide circuitry designed to control and provide a symmetrical AC waveform to input of magnetic low voltage transformers per UL 1472.
   b. Magnetic low voltage transformers to operate below rated current or temperature.
8. Electronic Switches:
   a. Listed as complying with UL 20, UL 508, and UL 1472.

B. Preset Smart Wall Dimmers and Switches with Wireless Communication Inputs*; Lutron Maestro Wireless Series:*
   1. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.
   2. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
      a. Rocker raises/lowers light level, with new level becoming the current preset level.
      b. Switch single tap raises lights to preset level or fades lights to off.
      c. Switch double tap raises light to full on level.
      d. Switch tap and hold slowly fades lights to off over period of 10 seconds.
      e. LEDs adjacent to tap switch indicate light level when dimmer is on, and function as locator light when dimmer is off.
   3. Switch Control: Switch single tap turns lights on/off.
   4. Dimmer High End Trim:
      a. Incandescent Dimmers: Minimum of 92 percent of line voltage.
      b. Dimmers for Electronic Low Voltage (ELV) Transformers: Minimum of 95 percent of line voltage.
      c. Dimmers for Magnetic Low Voltage Transformers: Minimum of 92 percent of line voltage.
   5. Product(s) - Preset Smart Dimmers with Wireless Communication Inputs:
      a. <<Type _____ - >>Preset Smart Dimmer*; Lutron Maestro Wireless Series*: Incandescent/halogen (600 W, 120 V), magnetic low voltage (600 VA/450 W, 120 V), dimmable CFL/LED (150 W, 120 V); multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
         1) *Lutron Model MRF2S-6CL;* single pole/multi-location; 120 V.
      b. <<Type _____ - >>Preset Smart Dimmer*; Lutron Maestro Wireless Series*: Electronic low voltage (600 W, 120 V); neutral required; multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
         1) *Lutron Model MRF2S-6ELV-120;* single-pole/multi-location; 120 V.
      c. <<Type _____ - >>Preset Smart Dimmer*; Lutron Maestro Wireless Series*: Incandescent (600 W, 120 V), magnetic low voltage (600 VA/450 W, 120 V); neutral required; multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
         1) << Lutron Model MRF2S-6ND-120;

or Lutron Model UMRF2S-6ND-120 (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120 V.

d. <<Type _____ - >>Companion Dimmer: Provides multi-location capability for compatible *Lutron Maestro Wireless Series* dimmers.
   1) <<Lutron Model MA-R; or Lutron Model UMA-R (BAA-Buy American Act Compliant)>>; gloss finish; 120 V.
   2) *Lutron Model MSC-AD;* satin finish; 120 V.
   3) *Lutron Model MA-R-277V;* gloss finish; 277 V.
   4) *Lutron Model MSC-AD-277V;* satin finish; 277 V.

6. Product(s) - Electronic Switches with Wireless Communication Inputs:
   a. <<Type _____ - >>Electronic Switch*; Lutron Maestro Wireless Series*: 6 A lighting/3 A fan (120 V); neutral required; multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
      1) *Lutron Model MRF2S-6ANS;* single-pole/multi-location; 120 V.
   b. <<Type _____ - >>Electronic Switch*; Lutron Maestro Wireless Series*: 8 A lighting/5.8 A fan (120 V); neutral required; multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
      1) << Lutron Model MRF2S-8ANS-120; or Lutron Model UMRF2S-8ANS-120 (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120 V.
   c. <<Type _____ - >>Electronic Switch*; Lutron Maestro Wireless Series*: 8 A lighting/3 A fan (120 V); 8 A lighting (277 V); multi-location capability using companion switches (up to nine companion switches may be connected); minimum load requirement.
      1) <<Lutron Model MRF2S-8S-DV; or Lutron Model UMRF2S-8S-DV (BAA-Buy American Act Compliant)>>; single-pole/multi-location; 120-277 V.
   d. <<Type _____ - >>Companion Switch: Provides multi-location capability for compatible *Lutron Maestro Wireless Series* electronic switches.
      1) <<Lutron Model MA-AS; or Lutron

Model UMA-AS (BAA-Buy American Act Compliant)>>; gloss finish; 120 V.

2) *Lutron Model MSC-AS;* satin finish; 120 V.

3) *Lutron Model MA-AS-277V;* gloss finish; 277 V.

4) *Lutron Model MSC-AS-277V;* satin finish; 277 V.

2.05 WIRED WALLBOX OCCUPANCY SENSORS WITH WIRELESS COMMUNICATION INPUTS

A. 0-10 V Wall Dimmer/Switch Combination Occupancy/Vacancy Sensors with Wireless Communication Inputs*; Lutron Maestro Wireless 0-10 Dimmer Sensor/Maestro Wireless Sensor Switch Series*:

1. Communicates via radio frequency with up to ten compatible wireless occupancy/vacancy sensors, ten wireless control stations, and one wireless daylight sensor.
2. Compatible with sourcing electronic 0-10 V ballasts/drivers, as per IEC 60929 Annex E.2 0-10 V protocol.
3. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and minimum presets).
4. Occupancy/Vacancy Sensors:
   a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
   b. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions*; Lutron XCT Technology*. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
   c. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
   d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area; adjustable timeout settings (1, 5, 15, or 30 minutes).
   e. Adjustable sensitivity (high, medium, low, and minimum presets).
   f. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; when room is vacated, returns to normal automatic-on operation after time delay period.
   g. Selectable walk-through mode to override selected timeout and automatically turn off lights if no motion is detected within 3 minutes after initial occupancy for

applications where space may be briefly occupied.

5. Vacancy-Only Sensors:
   a. Operates only as a vacancy sensor (manual-on and automatic-off)<< *in accordance with California Title 24 requirements*>>.
   b. Adjustable sensitivity (high, medium, low, and minimum presets).
6. Dimmer Features:
   a. Adjustable high/low end trims.
   b. Selectable dimming curve (linear or switched).
   c. Selectable fade on/fade off times (15, 5, 2.5, or 0.75 sec).
   d. Adjustable auto-on light level (fully adjustable from one to 100 percent).
7. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
   a. Rocker raises/lowers light level, with new level becoming the current preset level.
   b. Switch single tap raises lights to preset level or fades lights to off.
   c. Switch double tap raises light to full on level.
8. Switch Control: Switch single tap turns lights on/off.
9. Product(s):
   a. Passive Infrared 0-10 V Wall Dimmer Occupancy/Vacancy Sensor*; Lutron Maestro Wireless 0-10 V Dimmer Sensor/Maestro Wireless Sensor Switch Series*: 0-10 V control for 0-10 V fluorescent ballasts/LED drivers (8 A load at 120-277 V, 50 mA max control current); coverage of 900 square feet (81 sq m) with mounting height of 4 feet (1.2 m); 180 degree field of view; multi-location capability using *Pico* wireless control stations with wallbox mounting adapter.
      1) <<*Type* _____ - >>Sensor dimmer; occupancy/vacancy; *Lutron Model MRF2S-8SD010*.
      2) <<*Type* _____ - >>Sensor dimmer; vacancy-only; *Lutron Model MRF2S-8SDV010*.
      3) <<*Type* _____ - >>Sensor switch; occupancy/vacancy; *Lutron Model MRF2S-8SS*.
      4) <<*Type* _____ - >>Sensor switch; vacancy-only; *Lutron Model MRF2S-8SSV*.

2.06 WIRELESS CONTROL STATIONS

A. Product(s):
   1. <<Type _____ - >>2-Button Control; <<Lutron Pico Wireless Control Model PJ2-2B; or Lutron Pico Wireless Control Module UPJ2-2B (BAA-Buy American Act Compliant)>>.
      a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.
   2. <<Type _____ - >>2-Button Control with Night Light*; Lutron Pico Wireless Control Model PJN-2B*.
   3. <<Type _____ - >>2-Button with Raise/Lower Control; <<Lutron Pico Wireless Control Model PJ2-2BRL; or Lutron Pico Wireless Control Module UPJ2-2BRL (BAA-Buy American Act Compliant)>>.

a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.

4. <<Type _____ - >>3-Button Control; <<Lutron Pico Wireless Control Model PJ2-3B; or Lutron Pico Wireless Control Module UPJ2-3B (BAA-Buy American Act Compliant)>>.
   a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.
5. <<Type _____ - >>3-Button with Raise/Lower Control; <<Lutron Pico Wireless Control Model PJ2-3BRL; or Lutron Pico Wireless Control Module UPJ2-3BRL (BAA-Buy American Act Compliant)>>.
   a. Button Marking: <<Light (icons); As indicated on drawings; or _____>>.
6. <<Type _____ - >>3-Button with Raise/Lower Control and Night Light*; Lutron Pico Wireless Control Model PJN-3BRL*.
7. *<<Type* _____ - >>4-Button; <<Lutron Pico Wireless Control Model PJ2-4B; or Lutron Pico Wireless Control Module UPJ2-4B (BAA-Buy American Act Compliant)>>.
   a. Button Marking: <<Zone controls (light); Scene keypads (light); 2-group controllers (lights); 4-group toggle; As indicated on drawings; or _____>>.
8. Single Pedestal*; Lutron Pico Pedestal Model L-PED1*.
9. Double Pedestal*; Lutron Pico Pedestal Model L-PED2*.
10. Triple Pedestal*; Lutron Pico Pedestal Model L-PED3*.
11. Quadruple Pedestal*; Lutron Pico Pedestal Model L-PED4*.
12. Screw Mounting Kit*; Lutron Model PICO-SM-KIT*.
13. Wallbox Adapter*; Lutron Model PICO-WBX-ADAPT*.

B. Quantity: <<As indicated on the drawings; To be determined; provide allowance for _____ control(s); or _____>>.
C. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
D. Does not require external power packs, power or communication wiring.
E. Allows for easy reprogramming without replacing unit.
F. Button Programming:
   1. Single action.
   2. Toggle action.
G. Includes LED to indicate button press or programming mode status.
H. Mounting:
   1. Capable of being mounted with a table stand or directly to a wall under a faceplate.
   2. Faceplates: Provide concealed mounting hardware.
I. Power: Battery-operated with minimum ten-year battery life (3-year battery life for night light models).
J. Finish: <<As specified for wall controls in "Device Finishes" under LIGHTING CONTROLS - GENERAL REQUIREMENTS article above; White; Black; Ivory; Light Almond; White/Grey; As indicated on drawings; To be selected by Architect; or _____>>.

2.07 FLUORESCENT ELECTRONIC DIMMING BALLASTS

A. General Requirements:
   1. Designed for 10 year operational life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
   2. Designed and tested to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
   3. Lamp Starting Method: Programmed rapid start.
   4. Maximum Inrush Current: 7 amperes for 120V ballasts and 3 amperes for 277V ballasts.

5. Current Crest Factor (CCF): Less than 1.7.
6. Comply with ANSI C82.11 and list and label as complying with UL 935.
7. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
8. Inaudible in a 27 dBA ambient.
9. No visible change in light output with a variation of plus or minus 10 percent line voltage input.
10. Actively prevent overheating in T5-HO linear fluorescent lamp applications.
11. Ballasts to track evenly across multiple lamp lengths and all light levels.
12. Comply with IEC 61347-2-3 as applicable.

B. Digital Control:
1. Lights automatically return to the setting prior to power interruption.
2. Unique internal reference number visibly displayed on ballast cover.
3. Averages two independent daylight harvesting inputs internally.
4. When normal power is lost, ballasts fed with emergency power go to emergency mode.
5. Replacement of single ballast during maintenance does not require reprogramming.

C. Product(s):
1. Digital Control, One Percent Dimming*; Lutron Hi-lume 3D*:
a. Dimming Range: 100 percent to less than one percent relative light output for T8, T5 and T5HO, and five percent relative light output for T5 twin-tube lamps.
b. Surge Tolerance: Designed and tested to withstand Category A surges of 6,000 V according to IEEE C62.41.2 without impairment of performance.
c. Total Harmonic Distortion (THD): Less than 10 percent typical (15 percent for select models).
2. Digital Control, One Percent Dimming*; Lutron EcoSystem H-Series*:
a. Dimming Range: 100 to less than one percent relative light output for T8, and one percent relative light output for T5 and T5HO lamps.
b. Surge Tolerance: Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
c. Total Harmonic Distortion (THD): Less than 10 percent typical (15 percent for select models).

2.08 LED DRIVERS

A. General Requirements:
1. Operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
2. Provide thermal fold-back protection by automatically reducing power output (dimming) to protect LED driver and LED light engine/fixture from damage due to over-temperature conditions that approach or exceed the LED driver's maximum operating temperature at calibration point.
3. Provide integral recording of operating hours and maximum operating temperature to aid in troubleshooting and warranty claims.
4. Designed and tested to withstand electrostatic

discharges without impairment when tested according to IEC 61000-4-2.

5. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
6. UL 8750 recognized or listed as applicable.
7. UL Type TL rated or UL Class P listed where possible to allow for easier fixture evaluation and listing of different driver series.
8. Suitable for field replacement as applicable; listed in accordance with UL 1598C or UL 8750, Class P as indicated.
9. Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
10. Class A sound rating; Inaudible in a 27 dBA ambient.
11. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.
12. LED drivers of the same family/series to track evenly across multiple fixtures at all light levels.
13. Offer programmable output currents in 10 mA increments within designed driver operating ranges for custom fixture length and lumen output configurations, while meeting a low-end dimming range of 100 to 0.1 percent, 100 to 1 percent or 100 to 5 percent as applicable.
14. Meet NEMA 410 inrush requirements for mitigating inrush currents with solid state lighting sources.
15. Employ integral fault protection up to 277 V to prevent LED driver damage or failure in the event of incorrect application of line-voltage to communication link inputs.
16. LED driver may be remote located up to 100 feet (30 m) from LED light engine depending on power outputs required and wire gauge utilized by installer.

B. 3-Wire Control:
   1. Provide integral fault protection to prevent driver failure in the event of a mis-wire.
   2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.

C. Digital Control (when used with compatible *Lutron* lighting control systems):
   1. Employ power failure memory; LED driver to automatically return to the previous state/light level upon restoration of utility power.
   2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
   3. Automatically go to 100 percent light output upon loss of control link voltage and lock out system commands until digital control link voltage is restored. Manufacturer to offer UL 924 compliance achievable through use of external *Lutron Model LUT-ELI-3PSH* interface upon request.
   4. When normal power is lost, drivers fed with emergency power go to emergency mode.
   5. Replacement of single driver during maintenance does not require reprogramming.
   6. Digital low-voltage control wiring capable of being wired as either Class 1 or Class 2.

D. Product(s):
   1. Digital Control, 0.1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume Premier 0.1% Constant Voltage (L3D0-Series)*:
      a. Dimming Range: 100 to 0.1 percent

measured output current.

b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.

c. Typically dissipates 0.25 W standby power at 120 V and 0.40 W standby power at 277 V.

d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V and residential applications at 120 V.

e. Total Harmonic Distortion (THD): Less than 20 percent at maximum power; complies with ANSI C82.11.

f. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.

g. Driver outputs to be short circuit protected, open circuit protected, and overload protected.

h. Constant Voltage Drivers:

1) Support for cove and under-cabinet fixtures at 24 V.

(a) Support LED arrays from 2 W to 96 W.

(b) Pulse Width Modulation (PWM) dimming frequency meets IEEE 1789.

(c) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

(d) UL listed.

2. 3-Wire Control, 0.1 Percent Dimming*; Lutron Hi-lume Premier 0.1% Constant Voltage (L3D0-Series):*

a. Dimming Range: 100 to 0.1 percent measured output current.

b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V and residential applications at 120 V.

c. Total Harmonic Distortion (THD): Less than 20 percent at maximum power; complies with ANSI C82.11.

d. UL Class 2 output designed to withstand hot swap of LED loads.

e. Driver outputs to be short circuit protected, open circuit protected, and overload protected.

f. Constant Voltage Drivers:

1) Support for cove and

under-cabinet fixtures at 24 V.
(a) Support LED arrays from 2 W to 96 W.
(b) Pulse Width Modulation (PWM) dimming frequency meets IEEE 1789.
(c) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
(d) UL listed.

3. Digital Control, 0.1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume Premier 0.1% Constant Current (PEQ0-Series)*:
a. Dimming Range: 100 to 0.1 percent measured output current.
b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.
c. Typically dissipates less than 0.5 W standby power at 120/277 V.
d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120/277 V.
e. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
f. Driver outputs to be short circuit protected and open circuit protected.
g. Constant Current Drivers:
1) Support for downlights and pendant fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
(a) Support LED arrays up to 20 W.
(b) Constant Current Reduction (CCR) dimming method.
(c) UL listed Class P.
(d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaire

s Version 2.0.

2) Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
   (a) Support LED arrays up to 20 W.
   (b) Constant Current Reduction (CCR) dimming method.
   (c) UL listed Class P.
   (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

4. Digital Control, 1 Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume Premier 1% Constant Current (PEQ1-Series)*:
   a. Dimming Range: 100 to 1 percent measured output current.
   b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.
   c. Typically dissipates less than 0.5 W standby power at 120/277 V.
   d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120/277 V.
   e. Class 2 output designed to withstand hot swap of LED loads; meets UL 1310 and CSA C22.2 No. 223.
   f. Driver outputs to be short circuit protected and open circuit protected.
   g. Constant Current Drivers:
      1) Support for downlights and pendant fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
         (a) Support LED arrays up to 20 W.
         (b) Constant Current Reduction (CCR) dimming method.
         (c) UL listed Class P.
         (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for

Luminaires Version 2.0.

2) Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 1.05 A to ensure a compatible driver exists.
   (a) Support LED arrays up to 20 W.
   (b) Constant Current Reduction (CCR) dimming method.
   (c) UL listed Class P.
   (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

5. Forward Phase (Neutral Wire Required), One Percent Dimming*; Lutron Hi-lume 1% (LTE-Series)*:
   a. Dimming Range: 100 to one percent relative light output.
   b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial and residential applications at 120 V.
   c. Total Harmonic Distortion (THD): Less than 20 percent at full output for 40 W loads; complies with ANSI C82.11.
   d. Constant Current Drivers:
      1) Support for downlights and pendant fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
         (a) Support LED arrays up to 53 W.
         (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
         (c) UL listed Class P.
         (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
      2) Support for troffers, linear pendants, and linear recessed

fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
(c) UL listed Class P.
(d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

3) Support for cove and under-cabinet fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
(c) UL listed.
(d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

e. Constant Voltage Drivers:
1) Support for downlights and pendant fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) dimming method.
(c) UL listed Class P.
(d) Meets solid state requirem

ents for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

2) Support for troffers, linear pendants, and linear recessed fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
   (a) Support LED arrays up to 40 W.
   (b) Pulse Width Modulation (PWM) dimming method.
   (c) UL listed Class P.
   (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.
3) Support for cove and under-cabinet fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
   (a) Support LED arrays up to 40 W.
   (b) Pulse Width Modulation (PWM) dimming method.
   (c) UL listed.
   (d) Meets solid state requirements for power factor, transient protection, start time, and operating frequency in Energy Star for Luminaires Version 2.0.

6. 3-Wire and Digital Control, One Percent Dimming*; Lutron Hi-lume 1% (L3D-Series):*
   a. Dimming Range: 100 to one percent relative light output.
   b. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120 V or 277 V.
   c. Total Harmonic Distortion (THD): Less than 20 percent at full output for loads greater than 25 W typical (higher for

select models); complies with ANSI C82.11.

d. Constant Current Drivers:
   1) Support for downlights and pendant fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
      (a) Support LED arrays up to 53 W.
      (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
   2) Support for troffers, linear pendants, and linear recessed fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
      (a) Support LED arrays up to 40 W.
      (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
   3) Support for cove and under-cabinet fixtures from 200 mA to 2.1 A to ensure a compatible driver exists.
      (a) Support LED arrays up to 40 W.
      (b) Pulse Width Modulation (PWM) or Constant Current Reduction (CCR) dimming methods available.
      (c) UL listed.

e. Constant Voltage Drivers:
   1) Support for downlights and pendant fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
      (a) Support LED arrays up to 40 W.
      (b) Pulse Width Modulation (PWM) dimming method.
   2) Support for troffers, linear pendants, and linear recessed fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
      (a) Support LED

arrays up to 40 W.
(b) Pulse Width Modulation (PWM) dimming method.
3) Support for cove and under-cabinet fixtures from 10 V to 60 V (in 0.5 V steps) to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) Pulse Width Modulation (PWM) dimming method.
(c) UL listed.

7. Digital Control, Five Percent Dimming*; Lutron 5-Series (LDE5-Series):*
a. Dimming Range: 100 to five percent measured output current.
b. Typically dissipates 0.2 W standby power at 120 V and 0.3 W standby power at 277 V.
c. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V.
d. Constant Current Reduction (CCR) dimming method.
e. Total Harmonic Distortion (THD): Less than 21 percent at full load; complies with ANSI C82.11.
f. Constant Current Drivers:
1) Lutron K-Case Form Factor: Support for downlights and pendant fixtures in currents from 220 mA to 1.4 A to ensure a compatible driver exists.
(a) Support LED arrays up to 40 W.
(b) UL listed Class P.
2) Lutron M-Case Form Factor: Support for troffers, linear pendants, and linear recessed fixtures from 150 mA to 2.1 A to ensure a compatible driver exists.
(a) Support LED arrays up to 75 W.
(b) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
(c) Models available to meet

the DesignLights Consortium (DLC) power line quality requirements.

(d) UL listed Class P.

8. Digital Control, One Percent Dimming with Soft-On and Fade-to-Black Low End Performance*; Lutron Hi-lume 1% Soft-on Fade-to-Black (LDE1-Series):*
   a. Dimming Range: 100 to one percent measured output current.
   b. Features smooth fade-to-on and fade-to-black *(Lutron Soft-On, Fade-to-Black™)* low end dimming performance for an incandescent-like dimming experience.
   c. Typically dissipates 0.2 W standby power at 120 V and 0.3 W standby power at 277 V.
   d. Complies with FCC requirements of CFR, Title 47, Part 15, for commercial applications at 120-277 V.
   e. Employs true Constant Current Reduction (CCR) dimming method from 100 to five percent light level and Pulse Width Modulation (PWM) dimming method from five percent to off.
   f. Pulse Width Modulation (PWM) frequency of 240 Hz.
   g. Total Harmonic Distortion (THD): Less than 20 percent at full output for drivers greater than 25 W; complies with ANSI C82.11.
   h. UL Class 2 output.
   i. Driver outputs to be short circuit protected, open circuit protected, and overload protected.
   j. Constant Current Drivers:
      1) Lutron K-Case Form Factor: Support for fixtures from 220 mA to 1.4 A over multiple operating ranges.
         (a) Support LED arrays up to 40 W.
         (b) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
         (c) UL listed Class P.
      2) Lutron M-Case Form Factor: Support for fixtures from 150 mA to 2.1 A over multiple operating ranges.

(a) Support LED arrays up to 75 W.
(b) Meets solid state requirements for power factor, transient protection, standby power consumption, start time, and operating frequency in ENERGY STAR for Luminaires Version 2.0.
(c) Models available to meet the DesignLights Consortium (DLC) power line quality requirements.
(d) UL listed Class P.

2.09 POWER INTERFACES
A. Provide power interfaces as indicated or as required to control the loads as indicated.
B. General Requirements:
1. Phase independent of control input.
2. Dimmer to meet limited short circuit test as defined in UL 508.
3. Utilize air gap off to disconnect the load from line supply.
4. Diagnostics and Service: Replacing power interface does not require re-programming of system or processor.
C. Product(s):
1. Phase-Adaptive Power Module*; Lutron PHPM-PA*: Provides interface for phase control input to provide full 16 A circuit output of forward/reverse phase control for compatible loads.
2. 3-Wire Fluorescent Power Module*; Lutron PHPM-3F*: Provides interface for phase control input to provide full 16 A circuit output for compatible line-voltage control fluorescent electronic dimming ballasts or LED drivers.
3. Switching Power Module*; Lutron PHPM-SW*: Provides interface for phase control or switched input to provide full 16 A circuit output of switching for compatible non-dim loads.
4. Ten Volt Interface*; Lutron GRX-TVI*: Provides interface for phase control input to provide full 16 A circuit output of switching and 0-10 V low voltage control for compatible fluorescent electronic dimming ballasts or LED drivers.

2.10 EXAMINATION
A. Verify that field measurements are as shown on the drawings.
B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
C. Verify that mounting surfaces are ready to receive system components.
D. Verify that conditions are satisfactory for installation prior to starting work.

2.11 PREPARATION
A. System and Network Integration Consultation*; Lutron LSC-INT-VISIT*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to conduct meeting with facility

representative and other related equipment manufacturers to discuss equipment and integration procedures.

1. Coordinate scheduling of visit with Lighting Control Manufacturer. Manufacturer recommends that this visit be scheduled early in construction phase, after system purchase but prior to system installation.

2.12 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130<<, except for mounting heights specified in those standards;, including mounting heights specified in those standards unless otherwise indicated; or _____>>.

B. Install products in accordance with manufacturer's instructions.

C. Sensor Locations:

1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", locate sensors in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, locate sensors in accordance with Drawings.
2. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.

D. Ensure that daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.

E. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

F. Lamp Lead Lengths: Do not exceed 3 feet (0.9 m) for T4 4-pin compact and T5 BIAX lamps and 7 feet (2.1 m) for T5, T5-HO, T8 U-bend, and T8 linear fluorescent lamps.

G. LED Light Engine/Array Lead Length: Do not exceed 100 feet (31 m).

H. Identify system components in accordance with Section 26 0553.

2.13 FIELD QUALITY CONTROL

A. See Section 01 4000 - *Quality Requirements*, for additional requirements.

B. Manufacturer's Full-Scope Start-Up Service <<is not required; is required; or _____>>.

C. Manufacturer's Programming Service:

1. Product(s):
   a. On-site programming, 8-hour block*; Lutron LSC-OS-PROG8-SP*.
   b. On-site programming, 4-hour block*; Lutron LSC-OS-PROG4-SP*.
   c. Remote programming, 4-hour block*; Lutron LSC-RMT-PROG4-SP*.
2. Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for manufacturer to perform <<on-site; remote; or _____>> programming tasks for <<8 hours; or _____>>.
3. Furnish unit prices for each available programming time interval.

D. Manufacturer's Full-Scope Start-Up Service: <<Utilize manufacturer's

Remote Full-Scope Start-Up Service where possible. Provide On-Site Full-Scope Start-Up Service where required by manufacturer; Provide manufacturer's On-Site Full-Scope Start-Up Service; or _____>>.

1. Remote Full-Scope Start-Up Service*; Lutron LSC-RMT-SU-VIVE*: When available in accordance with manufacturer's guidelines, provide access to manufacturer's certified remote startup technician to provide instruction and guidance for complete system functional test.
2. On-Site Full-Scope Start-Up Service*; Lutron LSC-OS-SU-VIVE*: Manufacturer's authorized Service Representative to conduct site visit upon completion of lighting control system installation to perform system startup and verify proper operation:
   a. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", authorized Service Representative to verify sensor locations, in accordance with layout provided by Lighting Control Manufacturer; Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.
   b. Verify connection of power wiring and load circuits.
   c. Verify connection and location of controls.
   d. Energize wireless hubs.
   e. Associate occupancy/vacancy sensors, daylight sensors, wireless remotes, and wall stations to load control devices.
   f. Provide initial rough calibration of sensors; fine-tuning of sensors is responsibility of Contractor unless provided by Lighting Control Manufacturer as part of Sensor Layout and Tuning service where specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS".
   g. Program timeclock schedules per approved sequence of operations.
   h. Configure load shed parameters per approved sequence of operations.
   i. Verify system operation control by control.
   j. Obtain sign-off on system functions.
   k. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".
3. After Hours Startup*; Lutron LSC-AH-SU*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs to perform manufacturer's start-up procedures outside normal working hours (Monday through Friday, 7am to 5pm).

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

2.14 ADJUSTING

A. On-Site Scene and Level Tuning*; Lutron LSC-AF-VISIT*: Include <<as part of the base bid; as an alternate

to the base bid; or _____>> additional costs for Lighting Control Manufacturer to visit site to conduct meeting with <<Engineer; Owner's representative; Lighting Designer; or _____>> to make required lighting adjustments to the system for conformance with original design intent.

B. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, Contractor to provide fine-tuning of sensor calibration.

2.15 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

2.16 COMMISSIONING

A. See Section *01 9113* for commissioning requirements.

B. Title 24 Acceptance Testing Service*; Lutron LSC-SPV-DOC-T24*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to perform lighting control acceptance testing in accordance with CAL TITLE 24 P6. Submit required documentation.

2.17 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - *Closeout Submittals*, for closeout submittals.

B. See Section 01 7900 - *Demonstration and Training*, for additional requirements.

C. Training:

1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site system start-up services.
2. Customer-Site Solution Training Visit*; Lutron LSC-TRAINING-SP*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control Manufacturer to provide <<one; or _____>> day(s) of additional on-site system training.

D. On-Site Warranty Audit Visit*; Lutron LSC-WNTY-AUD*: Where Manufacturer On-Site Full-Scope Start-Up Service is not provided, include services of manufacturer to perform on-site verification that system meets manufacturer's requirements as necessary for validation of specified enhanced warranty.

2.18 MAINTENANCE

A. See Section 01 7000 – *Execution and Closeout Requirements*, for additional requirements relating to maintenance service.

B. System Optimization Visit*; Lutron LSC-SYSOPT-SP*: Include <<as part of the base bid; as an alternate to the base bid; or _____>> additional costs for Lighting Control System Manufacturer to visit site <<six months; or _____>> after system start-up to evaluate system usage and discuss opportunities to make efficiency improvements that will fit with the current use of the facility.

2.19 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION