

DIVISION 26 - ELECTRICAL

SECTION 26 50 00 – INTRODUCTION TO LIGHTING STANDARD

PART 1: GENERAL

1.01 Scope of Standard

- A. This standard provides general guidance concerning the specific preferences of Texas State University for Introduction to Lighting Standard.
- B. Texas State University recognizes that project conditions and requirements vary, thus precluding the absolute adherence to the items identified herein in all cases. However, unless there is adequate written justification, it is expected that these guidelines will govern the design and specifications for Texas State University projects.

1.02 General

- A. PURPOSE: This portion of the STANDARDS has been prepared to address lighting applications across a campus with diverse needs and a wide variety of users. The intent is to make a wide range of lighting design options for the design professional, while meeting quality and quantity requirements. Further, these STANDARDS should provide lighting systems that are easy to maintain and energy efficient.
 - 1. Nothing in these STANDARDS shall be construed as instruction from the University for the design professional to fail to comply with all applicable codes or the design professional's responsibility to exercise good design judgment and standard of care required in the contract for services.
 - 2. Where specific products are required in these STANDARDS, the design professional shall select and specify compatible products. (For example, metal halide downlights shall be compatible with coated lamps.)
- B. UNIVERSITY'S BUILDING PROGRAMMATIC REQUIREMENTS: The University's program (along with these STANDARDS) shall be the basis for establishing project lighting requirements, as outlined in the professional agreement.
 - 1. USERS GROUPS: The requests of USER GROUPS shall be evaluated by the design professional and the impact of their requests shall be evaluated for inclusion in the project. In the event a request from a user conflicts with these STANDARDS, the program requirement (including budget), the design project shall secure written approval of the University prior to proceeding.
- C. COMPLIANCE: It is the design professional's responsibility to comply with all portions of these standards as well as complying with all terms of the contract for professional services. The University will from time to time review the documents provided by the design professional. The University's review and acceptance of the design professional's recommendations shall in

no way be interpreted as approval of any item that fails to meet these STANDARDS or any other codes or projects requirements.

- D. The prime consulting firm of the design professional shall be responsible for coordination the efforts and RESULTS of the other members of the DESIGN TEAM.
- E. ILLUMINANCE STANDARDS: The University recognizes a relationship between lighting QUALITY and QUANTITY. The intent of these STANDARDS, and an expectation of the design professional, is to provide high quality interior and exterior environments with adequate luminance levels.
- F. ENERGY SAVINGS: Lighting and lighting controls shall be designed for energy efficiency and ease of maintenance. See REFERENCED DOCUMENTS AND STANDARDS, below.
- G. OVERLAP: Where two or more STANDARDS or cited references apply to a project or portion of a project, care shall be taken by the design professional to clarify the final design requirements. For example, IESNA RP-3, LIGHTING FOR EDUCATIONAL FACILITIES and IESNA RP-29, LIGHTING FOR HOSPITALS AND HEALTH CARE FACILITIES, will likely affect a classroom for healthcare education.
- H. COMPLIMENTARY: All portions of this STANDARD are to be considered complimentary. No single part of the STANDARD can be interpreted or applied in the absence of or without considering other portions of the STANDARD.
- I. VARIANCES: Should the design profession deem it necessary to vary from these standards, the professional shall submit a written request citing the paragraph of the reference and the reason for the variance. The professional shall obtain the University's written approval prior to proceeding with a variance from the STANDARDS.
 - 1. The variance request shall be submitted using a form approved by the University.
- J. TIMELINESS: Where University's approval or response is required, the design professional shall submit adequate documentation in a timely manner to allow such response within the schedule requirements of the project. The University shall respond within seven business days of receipt of design professional's request.
- K. ALTERNATE PRODUCTS: The design professional shall include requirements in the contract documents for prior written approval for all substituted products that are proposed by a bidder and are not specifically included in this STANDARD.
- L. SCOPE: The design professional shall evaluate all exterior lighting within the limits of the project scope, including preparing recommendations for upgrading to existing lighting to comply with these standards. The design professional shall cooperate with the University when lighting improvements are undertaken outside but adjacent to the project scope.
- M. Care shall be taken to blend with existing surrounding areas.
- N. CHANGES: After the University reviews and accepts of any portion of the project, no changes shall be made without the University's express, written approval.

1.03 Referenced Documents and Cited Standards

- A. GENERAL INFORMATION: All projects shall be designed to meet or exceed the recommendations/ requirements in the current version of the documents listed below. The current version of the document shall be the last version prior to the date of the contract for professional services.
1. TEXAS STATE UNIVERSITY MASTER PLAN: Lighting shall comply with the current 2006-2015 Texas State University Campus Master Plan.
 2. Lighting levels shall comply with sections 26 51 00 thru 26 56 80.
 3. THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA) LIGHTING HANDBOOK and the following:
 - a. IESNA RP-20, LIGHTING FOR PARKING FACILITIES
 - b. IESNA RP-8, LIGHTING FOR ROADWAYS
 - c. IESNA RP-3, LIGHTING FOR EDUCATIONAL FACILITIES
 - d. IESNA RP-33, LIGHTING FOR EXTERIOR ENVIRONMENTS
 - e. IESNA DG-5, RECOMMENDED LIGHTING FOR WALKWAYS AND CLASS 1 BIKEWAYS
 - f. Other IESNA RECOMMENDED PRACTICES and DESIGN GUIDES as justified by specific project type, lighting application or as cited in this STANDARD
 4. AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS (ASHRAE) STANDARD 90.1 ENERGY STANDARD FOR BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS
 5. NATIONAL ELECTRIC CODE
 6. NATIONAL FIRE PROTECTION AGENCY LIFE SAFETY CODE
 7. UNITED STATES GREEN BUILDING COUNCIL (USGBC) LEED™ GREEN BUILDING RATING SYSTEM
- B. In the event no standard is included above for an aspect of the project, the design professional shall submit a written recommendation to the University. The design professional shall obtain University's written approval prior to proceeding.

1.04 General Lighting Guidelines for all Projects

- A. The University's long-term interest is best served by high value lighting solutions for all projects. As such, the following general guidelines shall be considered by the design professional for all projects:
1. Lighting solutions shall be designed to accommodate the users of each space with comfort. This requires the appropriate level of luminance (not excessively high or low) and successful control of glare. This lighting design goal applies to interior and exterior spaces alike.

2. In task areas, consider lighter architectural finishes to help achieve higher luminance levels at lower wattage densities. Coordinate the design effort with the University to determine applications where users can rely on task lighting.
3. The University recognizes that certain light fixtures can add value to a project based on the design and appearance of the product. However, the selection of special products must remain appropriate for the long-term investment of the university. The design professional shall avoid extravagant, inappropriate fixture selections or design applications.
4. Since all projects will comply with ASHRAE 90.1, total wattage available on any project will be limited. The design professional shall design the entire project with the required balance, avoiding conditions where one portion of the project receives an inordinate amount of wattage in favor of another portion.
5. In any university, maintenance resources are always limited. As a result, the design professional shall design for low maintenance installations.
 - a. Service access to fixtures (interior and exterior) shall be considered and resolved at the design development phase. The general goal is to limit lighting solutions to those serviceable from a 12-foot stepladder.
 - b. Light fixtures shall not be installed above stairs or steps unless approved by the University in writing.
 - c. The variety of lamp and ballast types shall be kept as restricted as possible for each project.
 - d. All fixtures shall be selected with consideration for ease of maintenance. Fixtures designed in a manner that collect dirt or that are inherently difficult to clean or maintain should not be specified.
 - e. Incandescent and halogen are strictly prohibited. LED, CFL (compact fluorescent lamps) and T8's shall be used.
 - f. Downlights require more maintenance than linear fluorescent products. Therefore, downlights included in any project shall be limited to those applications where their use is specifically justified.
6. A primary goal of the University is the safety of all those using the campus and related facilities. The design professional shall consider safety a primary goal of all projects.

PART 2: PRODUCTS

A. Lighting Panelboard Schedule

1. All lighting loads shall be clearly scheduled in the Panelboard schedules with room numbers listed. See applicable STANDARDS for Panelboards.

B. Lighting Fixture Schedule

1. All light fixtures shall be specified in a LIGHT FIXTURE SCHEDULE included in the contract documents. The fixture schedule shall include a designation each fixture. The fixture designation shall be clearly referenced on the lighting documents.
 - a. In addition to the fixture designation, the schedule shall specify the manufacturer and model number, fixture voltage and total wattage, and the quantity and model number of the lamp(s).
 - b. The schedule shall include an unambiguous description of the fixture, including material used in constructing the fixture, lens material (if any), ballast or transformer specification, maximum wattage of the fixtures (for those fixtures which will accommodate multiple lamp types) and any other appropriate features required to clearly specify the product.
- C. Commissioning of Electrical Systems
 1. All lighting and lighting controls shall be commissioned as required elsewhere in these STANDARDS.
- D. Instrumentation and Control for Electrical Systems
 1. Lighting controls will vary from project to project, based on such variables as user requirements, code requirements, budget and complexity of the project. Design professional shall evaluate the project and recommend lighting control components or lighting control system.
 2. Each project may require multiple control strategies, many of which are shown below.
- E. Lighting Control Devices
 1. Exterior lightening shall be ultimately controlled by the use of a single photo-cell on each structure. Any or all zones may be controlled secondly by use of a time clock.
 - a. Any time clock(s) installed shall contain battery back-up for retaining timing functions in the event of power failure.
 2. Interior lighting that is controlled by Occupancy Sensors (such as those made by WATTSTOPPER) shall do so in accordance with ASHRAE 90.1.
- F. Theatrical Lighting Controls
 1. Theatrical lighting control and power distribution shall be designed to comply with latest recommendations of the United States Institute for Theatre Technology (USITT). Control system shall be designed using 'dimmer per circuit' design approach
- G. Lamp and Ballast for All Lighting
 1. Lamp selections shall comply with the following:

- a. The lighting engineer should consider LED type lamps and fixtures, wherever practical, for Energy Code reasons, and for life cycle cost savings.
 - b. The preferred fluorescent lamp for all interior lighting is FO32T8, 48-inch fluorescent lamp with low mercury content. Where required by design application (as in covers), an acceptable lamp is FO25T8, 36-inch version matching the 48-inch lamp. All linear fluorescent lamps shall have a minimum rated life of 24,000 hours.
 - c. The preferred compact fluorescent lamp is F26TBXT4.F32TBXT4 and F42TBXT4 lamps are also acceptable, where required by application.
 - d. All fluorescent lamps shall have a color temperature of 3,500 degrees Kelvin and a color-rendering index of at least 80.
 - e. Metal halide lamps rated at 175 watt and below shall be ED17 type, medium base with a color temperature of 3,200 degrees Kelvin and a color-rendering index of at least 70. Lamp shall be coated or clear, as required by the fixture and the application.
 - f. Metal halide lamps rated at 250 or 400 watt shall have a color temperature of 3,200 degrees Kelvin and a color-rendering index of at least 70. Lamp shall be coated or clear, as required by the fixture and the application.
 - g. Unless required by the application and approved by the University, all interior metal halide down lights below 175 watt shall be specified without lenses. The specified metal halide lamps shall be mogul, base, ED17 and rated for use in open fixtures.
 - h. Ceramic metal halide, pulse start lamps are no longer used on Campus.**
 - i. All discharge lamps shall be low mercury content.
2. Ballast selection shall match the lamp and application, and shall comply with the following:
 - a. All interior fluorescent ballasts shall be electronic with a minimum ballast efficacy factor (BEF) of 10.
 - b. All compact fluorescent lamps shall incorporate end of life (EOL) protection.
 - c. All metal halide ballasts shall be electronic ballasts.
 3. Additional requirements include the following:
 - a. All fixtures shall be compatible with and specifically manufactured for the mounting condition and ceiling type.
 - b. Lens type troffers shall be used in all food service applications, as required by applicable health code. The fixture shall be gasketed and installed with inverted lens to ease surface cleaning. Based on application, other lensed type fixtures (of equal performance/function) may be approved by the University.
- H. The following types of sources and fixtures are prohibited from use on the campus:
1. Eight foot long fluorescent lamps

2. Neon
3. Cold cathode
4. Electroluminescent products
5. Plastic parabolic cube louvers (typically 0.5 inch cube cells)
6. Fixtures with master/slave ballast wiring configuration
7. Self-luminous lighting products except Exit Lights, where power is unavailable
8. Bollards or step lights with metal halide or high pressure sodium lamps
9. Non-cut off wall mounted fixtures (such as wall packs) or wall mounted floodlights for area lighting
10. Metal halide downlights in soffits below 18 feet high
11. **High pressure sodium lamps are no longer used on Campus.**

PART 3: EXECUTION

3.01 Project Deliverables

In addition to the documents require elsewhere in these standards, the design professional shall submit the following documents for review by the University:

A. CONCEPTUAL DESIGN PHASE

1. LIGHTING DESIGN CONCEPT STATEMENT
2. SCHEDULE OF LIGHTING LEVELS AND STANDARDS
3. CONCEPT STATEMENT FOR LIGHTING CONTROLS FOR THE PROJECT
4. CONCEPT STATEMENT FOR ACCESSIBILITY AND SERVICEABILITY OF ALL LIGHTING PRODUCTS
5. DESCRIPTION OF ALL NON-STANDARD LIGHTING AND CONTROL APPLICATIONS

B. DESIGN DEVELOPMENT PHASE

1. LIGHTING PLANS AND SCHEDULES
2. POINT-BY-POINT ILLUMINANCE MODEL OF ALL EXTERIOR SPACES
3. POINT-BY-POINT ILLUMINANCE MODELS OF REPRESENTATIVE INTERIOR SPACES
4. PRODUCT DATA SHEETS OF LIGHTING AND LIGHTING CONTROL EQUIPMENT
5. WATTAGE DENSITY CALCULATIONS
6. COST ESTIMATE BY FIXTURE TYPE AND LIGHTING CONTROL SYSTEM COMPONENTS
7. OUTLINE OF SPECIFICATIONS

8. DETAILS FOR EXTERIOR POLE HEIGHTS AND FOOTINGS
- C. CONTRACT DOCUMENT PHASE
 1. ALL DOCUMENTS REQUIRED FOR DESIGN DEVELOPMENT PHASE, UPDATED FOR THE FINAL DESIGN OF THE PROJECT
 2. SPECIFICATION REQUIREMENT FOR UNIT PRICING FOR ALL LIGHTING PRODUCTS AND LIGHTING CONTROL SYSTEM COMPONENTS
 3. DESCRIPTION OF ALL NON-STANDARD LIGHTING AND CONTROL APPLICATIONS, WITH UNIVERSITIES APPROVAL FOR EACH APPLICATION
 - D. BIDDING AND NEGOTIATION
 1. APPROPRIATE BID FORM FOR UNIT PRICING REQUIREMENT ABOVE
 - E. CONTRACT ADMINISTRATION
 1. AS REQUIRED BY PROJECT

3.02 Document Format

- A. Documents submitted for University's review or for record purposes shall be submitted in a quantity and format(s) required by the professional agreement. Electronic documents shall be submitted in AutoCAD version 2005 format (with .DWG file name extension) and Adobe Acrobat Reader (with .PDF file name extension).

3.03 Miscellaneous Requirements

- A. Specifications for all new projects shall include requirements for replacement parts to be furnished by the contractor for the University's use in maintenance of the project. Additional components shall be provided in manufacturer's original box/container (or other approved packaging) and delivered to the University in an approved manner.
 1. Lamps and ballasts
 2. Relays and contactors for lighting controls
 3. Dimmer modules
 4. Wall box dimmers
- B. Additional components shall be provided for the following items. Other items may be appropriate, based on the specific project. Quantity of components shall be determined on a project-by-project basis.

3.04 Project Review Checklist

Project Review Checklist

Texas State University

INSERT DATE CHECKED AND THE NAME OF THE PERSON REVIEWING THE DOCUMENTS ONLY AFTER THE DOCUMENTS ARE FOUND TO COMPLY WITH LIST OF DELIVERABLES.

<i>CONCEPTUAL DESIGN PHASE</i>	<i>DATE CHECKED</i>	<i>CHECKED BY</i>
CONCEPT STATEMENT		
SCHEDULE OF LIGHTING LEVELS AND STANDARDS		
CONCEPT STATEMENT FOR LIGHTING CONTROLS FOR THE PROJECT		
CONCEPT STATEMENT FOR ACCESSIBILITY AND SERVICEABILITY OF ALL LIGHTING PRODUCTS		
DESCRIPTION OF ALL NON-STANDARD LIGHTING AND CONTROL APPLICATIONS		

<i>DESIGN DEVELOPMENT PHASE</i>	<i>DATE CHECKED</i>	<i>CHECKED BY</i>
LIGHTING PLANS AND SCHEDULES		
POINT-BY-POINT ILLUMINANCE MODEL OF ALL EXTERIOR SPACES		
POINT-BY-POINT ILLUMINANCE MODELS OF REPRESENTATIVE INTERIOR SPACES		
PRODUCT DATA SHEETS OF LIGHTING AND LIGHTING CONTROL EQUIPMENT		
WATTAGE DENSITY CALCULATIONS		
COST ESTIMATE BY FIXTURE TYPE AND LIGHTING CONTROL SYSTEM COMPONENTS		
OUTLINE OF SPECIFICATIONS		
DETAILS FOR EXTERIOR POLE HEIGHTS AND FOOTINGS		

Project Review Checklist

Texas State University

INSERT DATE CHECKED AND THE NAME OF THE PERSON REVIEWING THE DOCUMENTS ONLY AFTER THE DOCUMENTS ARE FOUND TO COMPLY WITH LIST OF DELIVERABLES.

<i>CONTRACT DOCUMENT PHASE</i>	<i>DATE CHECKED</i>	<i>CHECKED BY</i>
ALL DOCUMENTS REQUIRED FOR DESIGN DEVELOPMENT PHASE, UPDATED FOR THE FINAL DESIGN OF THE PROJECT		
SPECIFICATION REQUIREMENT FOR UNIT PRICING FOR ALL LIGHTING PRODUCTS AND LIGHTING CONTROL SYSTEM COMPONENTS		
DESCRIPTION OF ALL NON-STANDARD LIGHTING AND CONTROL APPLICATIONS, WITH UNIVERSITIES APPROVAL FOR EACH APPLICATION		

<i>BIDDING AND NEGOTIATION</i>	<i>DATE CHECKED</i>	<i>CHECKED BY</i>
APPROPRIATE BID FORM FOR UNIT PRICING REQUIREMENT ABOVE		

<i>CONTRACT ADMINISTRATION</i>	<i>DATE CHECKED</i>	<i>CHECKED BY</i>

END OF SECTION 26 50 00