A GUIDE TO CONSTRUCTING, OPERATING, AND MAINTAINING HIGHWAY LIGHTING SYSTEMS

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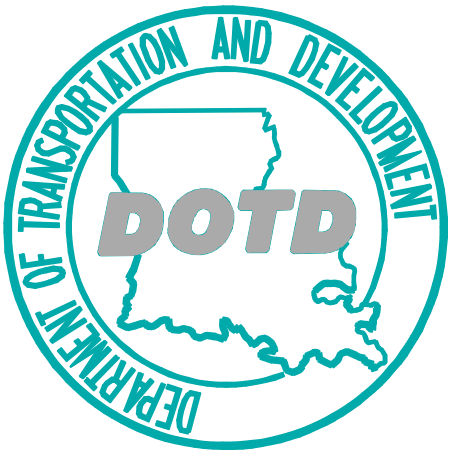

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

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INTRODUCTION

The purpose of this guide is to provide a comprehensive source of information concerning the Department's current policies for new roadway lighting installations on State rights-of-way.

The material presented in this guide establishes uniform procedures and standards for constructing and maintaining new roadway lighting systems on state rights of way.

The illumination requirements are based on the industry consensus of providing maximum illumination benefits at reasonable costs. The illumination requirements in this guide are not necessary for safe driving or seeing and do not set a safety standard.

Light pole location requirements are formulated to minimize the probability of vehicular pole collision. The requirements define the limits of individual designer discretion in the routine locating of new poles. The location requirements do not set a safety standard for placement of poles.

Nothing in this guide mandates, requires, nor obligates any government agency or entity to provide roadway lighting.

The requirements of this guide are not applicable retroactively to existing lighting systems. Requirements for existing systems will continue to be governed by the original agreements and any subsequent amendments to those agreements. All new lighting agreements will incorporate the requirements of this guide.

Because of the following combined factors, unlighted roads are considered safe for traveling under varying local conditions.

1. Roadway design features including geometry, speed limits etc., are set independently of fixed roadway lighting.
2. All vehicles traveling on public roads are required to have headlights.
3. Operators are required to adjust their driving for existing local conditions.

Although the highways are designed to be safe without fixed roadway lighting, fixed roadway lighting may provide increased visibility, better obstacle recognition at higher speeds, and increased driving comfort. This is expected to result in more efficient traffic flow, greater driver security, and economic growth.

This guide has been revised to eliminate the option for requesting DOTD to assume responsibility for repair of underground wiring, and the additional of a requirement for the local political subdivision to pay the federal matching funds.

LIGHTING ON STATE HIGHWAYS

A. The department does not normally provide fixed lighting on state highways because fixed lighting is not essential for safety.
B. Where an existing permitted lighting system is in place and must be adjusted to accommodate DOTD, the department will absorb the cost associated with the required relocation or adjustments.
C. On structures (bridges etc.) in urban areas, the department will provide the necessary prerequisites (mounting bracket and anchor bolts for light poles) as part of the structure.
D. Local political subdivisions may at their own expense, provide roadway lighting on state highway rights-of-way, provided a DOTD permit is obtained prior to installing any equipment. Application for the permit must be made to the DOTD district office. All installations on DOTD rights-of-way must conform to the requirements outlined in "STANDARDS MANUAL FOR ACCOMMODATING UTILITIES, DRIVEWAYS AND OTHER FACILITIES ON HIGHWAYS RIGHTS-OF-WAY". A copy of the section titled, "REQUIREMENTS FOR STREET LIGHTING FACILITIES ON STATE HIGHWAYS", is included in this guide.

LIGHTING ON INTERSTATE HIGHWAYS

A. When requested by the local political subdivision, and where warranted under DOTD and F.H.W.A. policies, the department will design and construct the lighting system.
B. The local political subdivision must agree to pay the federal matching funds (usually 10% of the total construction cost) for construction of the system.
C. The local political subdivision must also agree to assume the legal liability for, and all maintenance and operating cost, associated with the system.
D. Past maintenance performance on existing lighting systems will be considered before additional systems are provided to a political subdivision.

WARRANTIES, SYSTEM LIFE, AND RENOVATIONS

A. DOTD does not warranty or guarantee the system whatsoever. The DOTD contractor guarantees all material and work for a period of six months after final acceptance of the project. Standard manufacturers' warranties may be for longer than six months. Upon expiration of the contractor's warranty, the political subdivision will assume the responsibility of repairs to the system, including the correction of defects.
B. System design life is for a minimum of 25 years; however, attainment of design life will not relieve the political subdivision of legal responsibilities for proper maintenance of the system. When alterations and changes are made to the roadway, or because of new technology, programs, and policies, the system is considered functionally obsolete, DOTD will evaluate the system and consider it for renovation. The condition of the basic components of the system (lights,

poles, foundations, and underground wiring) will be considered in the evaluation. Past maintenance performance and the availability of funding will be considered

OPERATING THE SYSTEM

A. The local political subdivision shall develop an operational plan for the requested lighting system. The plan must define the responsibilities for the proper monitoring, inspection, stocking of parts, replacement of lamps, repairs to electrical equipment, and repairs to and replacement of knocked down poles. The plan must include the maintenance agreements between the political subdivision and its maintenance contractors.
B. The political subdivision shall be responsible for all the energy cost of the system.
C. The political subdivision shall monitor the system for non-operating lights on a monthly interval. A detailed inspection of system components shall be conducted yearly and should include a detailed list of defective, damaged and/or deteriorated components. Complaints by motorists, law enforcement personnel or others concerning malfunctioning lights shall be investigated as soon as practical.

STOCKING OF SPARE PARTS

A. The local political subdivision and/or its maintenance contractors shall maintain a stock of spare parts for the system.
B. The minimum stock of parts should be one of each item plus the following:
    1. One percent of each type ground mounted light pole with luminaire support arm(s), excluding poles above 50 feet.
    2. Two percent of each type luminaire.
    3. Four percent of each type lamp.
    4. Two percent of the total transformer bases.
    5. Two percent of the total breakaway coupling assemblies.
    6. Ten percent of the photo-controls.
    7. Two percent of the fused connector assemblies.

MAINTENANCE OF THE SYSTEM

A. The local political subdivision shall assume full responsibility for maintenance of the entire system. Louisiana Revised Statue 48:193 prohibits the state from maintaining “street lighting”.
B. Dangerous or hazardous conditions shall be remedied immediately.
C. All necessary repairs shall be made in a timely manner.
Individual lamp failures should be repaired within 10 days of notification. Knocked down poles should be replaced within 30 days of notification. Failures affecting three or more lights should be repaired within 5 working days of notification except when underground wiring must be replaced. Replacement of underground wiring should be accomplished within 30 days. When lighting is unaffected, and there is no hazard or danger to the public, repairs should be accomplished within six months. Where parts of the system are experiencing consistent and continual failures due to unusual service conditions, the department

may extend or temporarily exempt specific parts from the timely manner repair provisions until the problems can be resolved.

D. Detailed inspection and maintenance records shall be maintained by the local political subdivision. The records shall include monitoring and inspection reports along with repair records. The records shall be in an organized manner and made available to DOTD upon request. See sample report forms.

OPERATING AND MAINTENANCE COST

A. The local governing authority shall assume the operating and maintenance cost of the system. This includes all cost associated with monitoring, inspection, repairs, energy and re-lamping.

B. The local governing authority should consider creating an escrow or special account to ensure that adequate funds are available when needed. The contribution rate to the account should be based upon actual power company charges for energy and re-lamping plus an additional amount to cover cost associated with inspections and repairs. An amount equal to 50% of the energy and re-lamping cost should be sufficient to cover normal inspection and repairs to the system.

PROCEDURE FOR APPLYING FOR ROADWAY LIGHTING

A. Upon written request, DOTD will investigate and determine the acceptability of including the requested roadway lighting in the construction program.

B. If the Department determines that the requested lighting is acceptable for inclusion in the construction program, DOTD will request the local governing authority to furnish an adopted resolution stating that they agree to pay the federal matching cost (usually 10% of the total construction cost), and assume all legal liability for, and all maintenance, energy, and other operating cost of the lighting system. A sample copy of an acceptable resolution is included in this guide.

C. After receipt of the resolution, DOTD will prepare a formal agreement for execution by the local political subdivision and DOTD The agreement will define the detail requirements for obtaining, operating, and maintaining the system.

D. The political subdivision must develop and furnish an operating and maintenance plan for the lighting system before the project is placed under contract.

A. Upon written request, D.O.T.D. will investigate and determine the acceptability of including the requested roadway lighting in the construction program.

D. If the Department determines that the requested lighting is acceptable for inclusion in the construction program, D.O.T.D. will request the local governing authority to furnish an adopted resolution stating that they agree to pay the federal matching funds for construction, assume the legal liability, and be responsible for all maintenance and operating cost associated with the system. A sample copy of an acceptable resolution is included in this guide.

C. After receipt of the resolution, D.O.T.D. will prepare a formal agreement for execution by the local political subdivision and D.O.T.D. The agreement will define the detail requirements for obtaining, operating, and maintaining the system.

D. The political subdivision must develop and furnish an operating and maintenance plan for the lighting system before the project is placed under contract.

SAMPLE RESOLUTION

RESOLUTION No. _____ of 200___

This resolution authorizes the Mayor to enter into an agreement with the LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT obligating the City to pay 10% of the construction cost, and assume all legal liability for, and all maintenance and operating cost, of the subject lighting system.

RESOLUTION

WHEREAS, the Louisiana Department of Transportation will provide for the installation of roadway lighting on _____ and,

WHEREAS, prior to installation of said lighting system, the City of _____ must enter into an agreement with the Louisiana Department of Transportation which obligates the City to pay 10% of the construction cost, and take the garde, and assume all legal liability for, and all maintenance and energy cost, of said system; and

WHEREAS, in order to proceed with the design of said roadway lighting system, the Department of Transportation and Development requires that the governing authority authorize the Mayor to execute the subject agreement on behalf of the City.

BE IT RESOLVED by _____of the City of _____, that Mayor _____ is hereby authorized to execute on behalf of the City of _____, an agreement with the Louisiana Department of Transportation and Development which obligates the City to pay 10% of the construction cost, take the garde, and assume all legal liability for, and all maintenance and operating cost, of the subject lighting system.

BE IT FURTHER RESOLVED that if any portion or item of this resolution or the application thereof is held invalid, such invalidity shall not affect other provisions, items or applications of this resolution which can be given effect without invalid provisions, items or applications and to this end the provisions of this resolution are hereby declared severable.

BE IT FURTHER RESOLVED that all resolutions or parts thereof in conflict herewith are hereby repealed.

The forgoing motion was offered by _____
seconded by _____,
and put to a vote on this _____day of _____ 200_____

The vote was as follows:
YEAS:_____
NAYS:_____
ABSENT:_____

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
OFFICE OF HIGHWAYS

STATE PROJECT No. _____-____-____

FEDERAL AID PROJECT No. ____-____-___ (_____)_____

ROADWAY LIGHTING

ROUTE _____

_____ PARISH

THIS AGREEMENT, made and executed in three (3) original copies on this _____ day of _____, 200____, by and between the Department of Transportation and Development, hereinafter called the "DOTD", and the (Parish/ City) of _____, a political subdivision of the State of Louisiana, hereinafter called the "(Parish/ City)";

WITNESSETH: That;

WHEREAS, the DOTD proposes to construct and install a roadway lighting system at the Route_____ provided that upon completion of the system, the (Parish/ City) will pay 10% of the construction cost , and assume all legal liability for, and all the maintenance and operation cost, of said system in accordance with the provisions set forth hereinafter; and

WHEREAS, the (Parish/ City) is agreeable to the installation of the roadway lighting system and, upon its completion, to pay 10% of the construction cost , and assume all legal liability for, and all the maintenance and operation cost, of the system;

NOW, THEREFORE, in consideration of the premises and mutual dependent covenants herein contained, the parties hereto agree as follows:

ARTICLE I

For the purpose of identification, the construction and installation of the proposed lighting system will be designated as State Project No. _____-____-____ and Federal Aid Project No._____.

ARTICLE II

The DOTD shall, at its expense, prepare complete plans and specifications for the proposed lighting system within the limits established in the preamble; will advertise for

and receive bids for the construction and/or installation of the system; and will enter into a contract and supervise the construction and/or installation of the system.

ARTICLE III

Prior to the receipt of bids for the construction and/or installation of the lighting system, the (Parish/ City) shall submit, for DOTD approval, a copy of its Operational Plan which covers managing, financing, inspecting, and repairing the system, all as outlined in the _____ edition of the DOTD publication "A GUIDE TO CONSTRUCTING, OPERATING, AND MAINTAINING HIGHWAY LIGHTING SYSTEMS.

ARTICLE IV

Following the completion and final acceptance of the lighting system by the DOTD, the (Parish/ City) will promptly pay DOTD 10% of the total construction cost of the system, and assume the legal responsibility for, and the energizing and maintaining of the system, including the repair and/or replacement of any elements of the system which may malfunction or become damaged.

ARTICLE V

This agreement shall be binding upon and inure to the benefit of the hereto, their successors and assigns for a period of not less than 25 years. However, legal liability for the proper operation and maintenance will remain with the (Parish/City) until the system is disconnected and/or removed from operation, or replaced with a new system.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their respective officers' thereunto duly authorized as of the day and year first written.

WITNESSES:

_____
(Witness for First Party)

_____
(Witness for First Party)

_____
(Witness for the Second Party)

_____
(Witness for the Second Party)

STATE OF LOUISIANA PARISH OF

_____

BY: _____

TITLE: _____

STATE OF LOUISIANA
DEPARTMENT OF
TRANSPORTATION
AND DEVELOPMENT

BY: _____
Secretary

RECOMMENDED FOR APPROVAL

BY:_____
Chief Engineer

SAMPLE ROADWAY LIGHTING SYSTEM OPERATIONAL PLAN

MANAGING THE SYSTEM

The City has designated the system manager to be:

Name _____
Address _____

Phone No. (__) _____- _____

The manager will be responsible for the proper operation and maintenance of the system.

The manager will compile and submit a yearly budget to the City for the proper maintenance and operation of the system.

The manager will maintain the maintenance records required by DOTD. The manager will schedule the inspections and will arrange for any necessary repairs.

The manager will file an updated the Operational Plan annually.

FINANCING THE OPERATION

The City has budgeted $_____ for the operation and $_____ for the maintenance of the system for 19___. Future budgets will reflect the actual cost history of the system along with any projected additional system costs.

SAMPLE MAINTENANCE AGREEMENT

The City has designated _____ as the maintenance contractor responsible for accomplishing any necessary repairs to the system.

The maintenance contractor will stock the required parts, make the necessary repairs, and maintain the repair records.

The maintenance contractor will complete the repairs and file a completed repair form along with the required invoices.

The maintenance contractor will maintain, or otherwise have ready access to, the following stock of spare parts:

1. _____ground mounted light poles, single arm.
2. _____ground mounted light poles, twin ___' arms.
3. _____structure mounted light poles, single arms.
4 _____structure mounted light poles, twin arms.
5. _____250 watt HPS roadway luminaires
6. _____150 watt HPS underpass luminaires
7. _____250 watt HPS lamps
8. _____150 watt HPS lamps
9. _____Breakaway transformer bases
10. _____Breakaway coupling assemblies.
11. _____photocontrols.
12. _____fused watertight connectors.

The maintenance contractor will perform the following

1. replace lamp within 10 days of notification.
2. replace poles within 30 days of notification.
3. replace or repair luminaire within 10 days of notification.
4. replace circuit fuses and other minor repairs within 5 working days of notification.
5. investigate, diagnose and isolate defective wiring within 5 working days of notification.
6. replace or repair underground or structure wiring within 20 days of order to proceed.

SAMPLE REPAIR REPORT

Date of reported malfunction - **12-14-89**

Location of Malfunction - pole no **156B16 WB-I10**

Type of reported malfunction - **Pole down**

Individual reporting - **State Police**

Date repair personnel notified - **12-15-89**

Name of repair personnel - **LOWRATE POWER & LIGHT INC.**

Findings - pole down

Cause of problem - **pole struck by vehicle**

Action taken - **removed pole, taped exposed conductors and scheduled replacement for 12-20-89**

Date that malfunction was corrected - **12-21-89**

Amount paid for repairs - **$750.00**

SAMPLE MONITORING AND INSPECTION REPORT

Date - **12-18-89** Inspector - **Willie C. Problems**

Pole or Equipment	Deficiency
156B16	pole down
156B17	light out
156B18	light out
.....	.....
.....	.....
16010	handhole cover missing
.....	.....
Service Pt.5	overgrown with trees
.....	.....

Monthly monitoring should consist of a nighttime ride-through inspection. The inspection should concentrate on easily identifiable deficiencies such as non-operating lights, missing poles, etc.

The yearly inspection should consist of a more comprehensive walk-through inspection. It should concentrate on identifying some of the less obvious deficiencies. Except for lighting towers, removal of covers or opening of doors should not be necessary.

The yearly inspection should include the following:

1. Inspect poles for damage to breakaway couplings or transformer bases, pole shafts, and foundations.
   Note missing handhole covers and doors, plumb of pole, and alignment of luminaire.
   Look for ground erosion or ground settlement around foundations.
2. Inspect lighting towers for corrosion and cracks near the pole base and at the joints. Also inspect power cords, and tower lowering device, cables and components.
3. Inspect service controller for missing locks and hardware, damaged enclosure, overgrowth of weeds and vegetation, etc.
4. Inspect junction boxes for damage and missing hardware.
5. Inspect structure-mounted conduits for damage and missing hardware.

LIGHTING DESIGN STANDARDS FOR INTERSTATE ROADS AND INTERCHANGES

A. Average maintained illumination on the roadway shall be designed for greater than 0.6 footcandles and less than 0.8 footcandles.
B. Uniformity ratio shall be designed for less than or equal to 3:1.
C. Lighting calculations shall use a maintenance factor of 0.70.
D. Where tower lighting is used, average illumination need not be considered. The design should provide for a minimum maintained illumination of 0.3 footcandles on the roadway. Calculations shall not include the illumination contributed by the backside luminaire.
E. Initial lamp lumens used in lighting calculations shall be as follows:
    a. 16,000 lumens for 150 watt HPS lamps.
    b. 27,500 lumens for 250 watt HPS lamps.
    c. 50,000 lumens for 400 watt HPS lamps.
    d. 140,000 lumens for 1000 watt HPS lamps.
F. Mounting heights of roadway luminaires shall preferably be 40’ for poles and 100’ for towers.
G. Underpass luminaires shall be 150 watt HPS.
H. Structure mounted poles shall be located as close as practical to bridge bents.
I. Electrical service shall be 480/240 volts, single phase, center grounded.
J. Roadway lighting branch circuit voltage drops shall be limited to 6.0 % maximum.
K. Light poles shall be located not closer than 15’ from edge of traveled roadways except where poles are located behind barrier curbs, this distance may be reduced to 6’.
L. Light poles shall be located on the inside radius of roadway curves unless protected from vehicular collision.

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
STANDARDS MANUAL
FOR ACCOMMODATING UTILITIES, DRIVEWAYS AND OTHER FACILITIES ON
HIGHWAY RIGHTS-OF-WAY
SEPTEMBER 1994

REQUIREMENTS FOR STREET LIGHTING FACILITIES ON STATE HIGHWAYS

h. Requirements for street lighting facilities on state highways are as follows:

i. Construction shall conform to all applicable codes, standards, and specifications.

ii. Illumination-Roadway should be lighted in continuous lengths without intervening unlit areas; Average initial level of illumination shall not be less than 0.8 FC on the roadway; The ratio of average initial illumination to minimum initial illumination at any point on the roadway shall not be greater than 4:1; Luminaire mounting heights shall be 30 feet minimum, preferably higher.

iii. Light Poles & Foundations-Light poles shall be manufactured from steel, aluminum, fiberglass or other corrosion resistant materials. Wood poles are not acceptable; however, lights may be installed on existing wood utility poles provided the system conforms to all illumination requirements of these standards; Poles and foundations shall be designed to withstand wind velocities for the area where the poles are installed. The design wind velocities shall be for the 25 year mean recurrence interval; Pole foundations shall be flush with the existing ground. On slopes, the longitudinal centerline shall be flush with the existing ground; A 6 foot diameter X 4" thick concrete mowing apron shall be placed around each light pole. The apron shall be constructed flush with the ground line; Light poles located within 40 feet of the roadway shall conform to AASHTO criteria for breakaway supports or shall be located such that they are protected from vehicular collision. The above may be excepted by the DOTD where a greater hazard would be created by falling poles.

iv. Light Pole Locations-Light poles shall not be located between the traveled roadway and guard rails or barriers; Light poles shall not be located

within 15 feet from the edge of the traveled lane except when the posted speed limit is below 40 mph, poles may be located 10 feet minimum from the traveled road, where poles are located behind barrier curbing, they may be installed six (6) feet minimum behind the curb, when poles are located on urban routes that routinely have on-street parking, they may be placed two (2) feet minimum behind the curb, and where the right-of-way is insufficient to allow compliance, minimum clearances may be reduced to that of the right-of-way.

v. Wiring-The electrical system shall conform to the National Electrical Code; An equipment grounding conductor shall be installed with each new circuit and shall be connected to each new light pole and fixture; where lights are connected phase to phase, the branch circuit overcurrent device shall disconnect both phases upon a single line to ground fault; All new light poles shall be served by underground wiring conforming to the following conditions: Non-metallic conduit, duct and direct buried cables shall be buried 3 feet minimum (preferably 4 feet) below the ground, Rigid steel conduit shall be buried 3 feet when possible, and 2 feet minimum, Electrical marker tape shall be installed above all new underground electrical facilities. The tape shall be installed 8" to 12" below the ground, The buried depths may be reduced 1 foot from that given provided the cable and/or raceway is encased in 3" minimum of red concrete, Under roadway, crossings shall be installed through jacked crossings located 4 feet minimum below the roadway. Excavation shall not take place closer than 4 feet from edge of shoulder and water shall not be used in the jacking process, The ends of the under roadway ducts or casings shall be marked with surface markers. See attached detail for recommended markers.

vi. Plans & Drawings-Permit request shall include fully dimensional and detailed plans and design calculations; After construction is completed, detailed drawings showing the exact locations of all newly installed underground cables shall be provided to the DOTD.