Chicago Department of
Transportation
Division of Engineering

Electrical Engineering Design Requirements & Guidelines

CURRENT AS OF September 25, 2025

- The main purpose of the guideline is to improve the quality of City Street lighting and traffic signal control designs, to minimize plan review time, and to minimize construction conflicts.

- In the preparation of contract plans which includes the design of street lighting and traffic signal modernization, CDOT requires that the layouts for this work conform to the standard format and nomenclature (Drawing #826) as presented in sample projects by engineering Design Sections, including City title block at the lower right corner. Street lighting plan sheets should be divided into three types of sheets: street light removal plan, conduit and foundation plan, and cable plan. Traffic signal designs can usually be accommodated on one sheet per intersection.

- This format is necessary because the information from the drawings, such as conduit for underground construction is recorded and filed separately from the circuitry, which identifies the circuits loads, controller placement and service points which are entered onto our Edison Atlas and used for billing and maintenance purposes. Also, for traffic signal designs, the new signal cable plan is copied from the drawing and stored in the controller for maintenance.

- All these drawings are used for record retrieval information to the CDOT / Office of Underground Construction in identifying the City's electrical system within a specific project and for locating City electric underground facilities through the Digger System.

- All photometric lighting levels, materials, circuiting and workmanship shall comply with the Division of Engineering's requirements and specifications for material and construction standards.

- All projects that propose the installation of a new street lighting system must be submitted to engineering for review and approval prior to initiating design. After the approval has been obtained, three submittals are required. This is to ensure that proposals are consistent with the current palette of poles and fixtures to be maintained by CDOT-DEO.

- CDOT has an electronic file of material and construction specifications, which are to be incorporated into the contract documents.

- CDOT has standard drawing details available in electronic format. These design standards for foundations, hand holes, manholes, poles, etc. are to be used with no modifications, unless prior approval has been received from the Deputy Commissioner.

- To review and comment effectively on a set of plans, the traffic/lighting design drawings must be included within the plan set at an early percentage of completion. Plan reviews are requested at the following completion milestones:

    1. Preliminary-50%This will include:
        - Preliminary System design with pole location.
        - Project limits & special conditions.
        - Pole & Luminaire type.
        - Utility conflicts.
        - If designer is confident, then Voltage drop calculations including equations used, cable resistance, as depicted by the latest NEC table.
        - Commonwealth Edison service coordination. A letter to ComEd indicating revised or new service locations, including the old loads and the new proposed loads.
        - Photometric calculations, these calculations shall include a performance table, included in this guideline with:
            a. Street width.
            b. Optimum spacing, taking into consideration existing tree location and their drip lines.
            c. Luminaire typically type III or similar, unless indicated otherwise by engr.
            d. Recommended levels as required by IESNA and city of Chicago and contract specified levels.
    2. Pre-Final-80%
        - Refined lighting layout, including Atlas & group number per controller.
        - DEO record number (given by Engineering).
        - Specifications.
    3. Final-100%
        - Two plan sets, including a sheet for “Smart Lighting Node” Field Installation Record and a sheet for Signage Plan are requested with contract specifications at final submittal.
        - Vellum and Electronic copies of layout.

- The CDOT project manager must be present when a meeting with Construction. This way CDOT can fully access the progress of work to meet design timelines and issues that are presented.

- All As-Built Drawings must be submitted on a CD to CDOT on .dgn format Micro-Station. This transmittal must be received by CDOT prior to final acceptance of the electrical facilities for city maintenance.

4. Shop drawings must be submitted with a letter of conformance with CDOT specifications. Any deviation must be outlined.

Illuminance & Luminance for Roadways / City of Chicago:

Arterial Streets, **Residential Streets and Alleys as per latest CDOT Specification.**
Traffic Intersections: As recommended by IESNA and CDOT.

- Roadway Lighting ratios shall conform to recommendations by IESNA.
- Total light loss factor as per respective Specification
- Photometric calculations shall be provided for each project in the provided performance table. Roadway photo-metrics shall be calculated as indicated by IESNA. The calculations shall be submitted for the project limits.

Residential Street Lighting Design:

The residential street lighting system must consist of the following design elements:

Plan Layout:	Conduit and foundation plan to be drawn 1"= 30ft. scale. Cable, and removal Plan may be drawn not to scale; however, it must be legible even if reduced.
Foundations:	Helix foundation 5 ft, 10" bolt circle (Drawing No. 936).
Conduit:	1.25" schedule 80 unit duct, direct bored. For open trench use 2" schedule 80 PVC.
Poles:	Aluminum 18'-0"mounting height davit (Drwg.#940) or as directed by Commissioner, with 8' MA. Fixture: LED-240 volts, with piggyback acorn fixture (Drwg.#958-959) or as directed by Commissioner. Installation shall be in a staggered lighting pattern.
Circuitry:	Each side of streetlights shall be fed from a separate street light controller.
Branch Cable:	3TC, 2-#6 & 1-#8 conductors, or as per Engineering specifications
Controller:	60 amp / with 2-30 amp-2P branch circuit breakers or as directed by Commissioner. Design capacity @ 80%.
Splicing:	No underground splicing allowed.
Cable:	All cable must be racked, trained, and tagged in all manholes and hand holes with approved materials.
Handhole:	Required at: every service feed from the alley for circuitry purposes; For OEMC, every 325 feet for cable pulling purposes.
Grounding:	System ground and equipment ground must be implemented as per NEC Article 250, as well as in Engineering Specifications.

Arterial – Ornamental Street Lighting System

The standard arterial street lighting system must consist of the following design elements:

Plan Layout: Conduit and foundation plan to be drawn 1"= 30ft. scale. Cable, and Removal Plan will not be drawn to scale; however, it must be legible even if reduced.

Foundations: Concrete, or Helix as directed by Commissioner with reference standard drawing for diameter, depth, and anchor bolts. Minimum 3' from face of curb to center line of pole, U.N.O.

Conduit: Standard 2"PVC/ sch. 80. If applicable, use it for both the lighting and the outlet circuits.

Poles: Aluminum 35'-0" davit (Drwg.#971) with 8' MA. (Drwg.#948) Ornamental pole as indicated by the Deputy Commissioner. Installation shall be opposite lighting pattern or as approved staggered by the Division of Engineering. Alternative poles may be used in accordance with the City of Chicago Street Lighting Master Plan, as determined by Commissioner.

Street Light Circuit One street light controller shall be installed for each lighting service. Lighting controllers shall be 200A with four branch circuits. Each branch circuit should be as equal in length and load as possible. Each controller shall have a manhole or handhole adjacent to it. For two-sided lighting another handhole must be installed on the opposite side of the street to accommodate the two lighting branch circuits for that side. All street lighting and pedestrian lighting in one direction shall be on a single branch circuit. No alternating circuits will be allowed unless approved by the Department.

Street Light Cable: (3TC) 2#6 & 1-#8 conductors. Three individual triplexed conductors. The two hot conductors shall be red and black. The ground shall be green.

Festoon Circuits: If festoon lighting receptacles on light poles, outlets in planters, irrigation systems, clocks, etcetera are present, these items must be metered. A separate controller cabinet with 100-amp main breaker shall be provided. This cabinet shall be located next to the street lighting cabinet and shall share the same ComEd feed. All systems that require 24/7 power shall be wired in the cabinet to bypass the photocell. Festoon lighting receptacles shall be 120 volts. For design purposes each receptacle will be considered to have a 1.5-amp maximum load. It will be acceptable to alternate circuits in one direction.

Festoon Cable: Each receptacle circuit shall consist of one hot and one neutral wire. Receptacle circuits shall not share neutrals. Wiring should be #6. Hot wires should be black. Neutrals should be white.

Photocell: Inside controller or as directed by Commissioner.

Service Cable: 3-1/C, # 1/0 for 100-amp controller or 3-1/C, #2/0 for 200 amps controller for single phase. In three phase four wire system shall be implemented.

Controller:	100-amp/with 2-50 amp-2P branch circuit breakers. Design capacity @ 80% (Drg.876) 200-amp/with 4-50 amp-2p branch circuit breakers. Design capacity @ 80% (Drg.880)
Fusing:	No in-line fuses.
Splicing:	No underground splicing allowed.
Cable:	All cable must be racked, trained, and tagged in all manholes and hand holes with approved materials.
Handhole:	Required at: every service feed from the alley; at most every ninety-degree angle turn. Up to five ducts shall be the norm for a 30" HH. Up to ten ducts for a 36" HD HH. More than ten ducts a Manhole is to be used. For OEMC, every 325 feet, for cable pulling purposes a Hand hole is used, whereas this requirement may change depending upon the OEC cable size.
Grounding:	System ground and equipment ground must be implemented as per NEC Article 250, as well as in the Division of Engineering Specifications.

CDOT LUMINAIRE PERFORMANCE TABLE

GIVEN CONDITIONS		
ROADWAY DATA	Width, face to face	
	Number of Lanes	
	I.E.S. Surface Classification	
	Segment Limits	
	Sidewalk width	
LIGHT POLE DATA	Mounting Height	
	Mast Arm Length	
	Pole Set-Back from Face of Curb	
LUMINAIRE DATA	Type & Wattage	
	Lumens	
	I.E.S. File Number	
	LLD (at 60,000 hours, per TM-21-11)	
	LDD	
	Total Light Loss Factor, LLF	
LAYOUT DATA	Spacing	
	Configuration	
	Luminaire Overhang over Face of Curb	

NOTE: Variations from the above specified I.E.S. distribution pattern may be requested, and acceptance of variations will be subject to review by the Engineer based on how well the performance requirements are met.

PERFORMANCE REQUIREMENTS VS. RESULTS

NOTE: These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

		Per Specification Requirements	Results
ILLUMINATION	Average Horizontal Illumination, E_{AVE}		
Intersect. Or Sidewalk	Uniformity Ratio, E_{AVE}/E_{MIN}		
LUMINANCE	Average Luminance, L_{AVE}		
	Uniformity Ratio, L_{AVE}/L_{MIN}		
	Uniformity Ratio, L_{MAX}/L_{MIN}		
	Max. Veiling Luminance Ratio, L_V/L_{AVE}		

Calculations shall be performed in conformance with the latest I.E.S. RP-8 recommended procedures.

Traffic Signal System

The standard traffic signal system must consist of the following design elements:

Plan Layout:	Conduit and foundation plan to be drawn 1"= 20 ft. scale. Cable and signal Plan may be drawn not to scale; however, it must be legible. Removal plan shall be not to scale. Corresponding street lighting must be included in the plans.
Foundations:	Concrete, reference standard drawing for diameter, depth, and anchor bolts.
Conduit:	Standard (4) 3"PVC / sch.80, at street crossings MH to MH (minimum). If crossing will include fire alarm cable, install (4) 3" PVC schedule 80. Conduit from HH or MH to combination traffic/street light pole foundation to be (2) 3" PVC sch 80, 1-3" to traffic pedestal. For service 2" GRS from ComEd pole to 1st HH, thereafter 2" or as required pvc to Cabinet.
Manhole:	On quadrant where traffic controller is be installed use MH 3' x4'x 4'(Drg.#730). All manholes shall have 24" frames and covers.
Handhole:	Required at: a quadrant, other than where traffic controller is to be installed. At every service feed from the alley; at most every ninety-degree angle turn. For long conduit runs(such as signal interconnect) every 325 feet for cable pulling purposes.
Poles:	Corten steel. Poles to have a junction box (Drg.#954) with a terminal strip for 19/C cable connections. Poles adjust to intersection photometrics.
Signal Cable:	#14-19/C EPR / Low smog Zero Halogen Jacket from TS controller to junction box on pole. Each quadrant shall have a 19/C, with 20% spares and 2 neutrals. #16-8/C SO cord from junction box to signal heads.
Service Cable:	Service cable to controller - 3/C #4 (min.).
TS Req.:	All signal timing, head locations, mast arm positions and pole placements must be approved by the Division of Traffic Safety.
Splicing:	No underground splicing allowed.
Cable:	All cable must be racked, trained, and tagged in all manholes and hand holes with approved materials.
Signals:	All signal and pedestrian heads to be polycarbonate with 12" LED lenses.
Equipment:	All traffic signal equipment to be gloss black in color.
Actuation:	Hemispherical video detection camera system shall be installed for any actuated traffic movements. Detector loops or video detection to be used only through Commissioner's approval.
Controller:	ATC traffic controller in a 16 bay - P cabinet for all traffic signals. All traffic signal controllers at railroad crossings shall have UPS systems. Circuit breaker 120v-1P-70Amp.
Base Found:	When TS controller is on a fiber optic interconnect system, the furthest conduit on the left shall be reserved for the fiber optic cable placement.
Grounding:	System ground and equipment ground must be implemented as per NEC Article 250, as well as in Engineering Specifications.

APPENDIX A

Street lighting & Traffic Signal CADD Guidelines

UNDERGROUND CONDUIT FACILITIES

IF LEVEL SYMBOLOGY IS USED: Use gray scale as described below.

IF PEN TABLE IS USED:
Gray Scale:

- It shall be used within the 3rd row of colors in CADD MicroStation V8, color Numbers 32-47.
- All utilities lines with their respective identification, size of pipes, ducts. Fonts shall be the same as all other height:2, width:2.
- All trees are scaled exactly with trunk & drip line, color #34.
- All other appurtenances such as CTA Bus shelters, Kiosks must be shown to scale.
- All commercial signs hanging from nearby properties near the proposed traffic or lighting pole must be noted on the plan with their size & height.

Black Scale:	Style	Weight
• Curb Lines	0	3
• Sidewalk Lines	0	1
• ROW-Property Line	Dashed(Cust)	1
• Conduits, MH	Dashed(#2)	5
• Equipment Symbols	0(per 826)	4
• Conduit Identification	0	2
• Dimension, 2 coordinates	0	2
• All fronts: Engineering, H:2, W:2	0	3

INSTALLATION OF CABLE & SIGNAL PLAN

• All black scale, except vegetation or trees		
• Curbs	0	3
• Equipment & signals (Code 826)	0	4
• Cable Dashed	(2)	3
• Dimension & ID	0	3

STREET LIGHTING & TRAFFIC SIGNAL REMOVAL PLAN

• Equipment	0(as per 826)	2
• Cable	0(as per 826)	2

LEVEL ASSIGMENTS

Default	(Reference file frames)
Level 4-Vegetation	(All trees, bushes, shrubs, etc.)
Level 5-Body of Water	(Streams, rivers, ponds, etc.)
Level 6-R.O.W.	(Existing Right of way)
Level 8-Non-Roadway Improvements	(Buildings, fences, mailboxes, signs, benches, bike racks, bus shelters, etc)
Level 14-Utility-Existing-CDOT	(Existing Hand holes, Manholes, conduit, cable, splice boxes, controllers, etc.)
Level 14-Utility-(Description)	(Water, Gas, ComEd, DEO, etc.) i.e. Each utility is to be assigned its own level.
Level 14-2n-Cable	(Direct burial cable)
Level 14-2w-Cable	(Aerial cable)
Level 14-Existing Light-Pole	(Existing light poles and luminaries)
Level 25-Roadside Features	(Sidewalks, driveways, entrances)
Level 27-Curb	(All curb represented as face of curb)
Level 38-Railroad	(Railroads)
Level 39-Structures	(Bridges)
Level 44-Proposed-Utilities-BOE-DEO	(Proposed Hand holes, Manholes, conduit, cable, splice boxes, foundations, poles, luminaries, controllers, etc.)
Level 54-Removal-Items	(Hatching for sidewalk/pavement removal)
Level 55-Lighting Notes	(All notes, borders, dimensions, existing utility dimensions should be placed on the corresponding level, additional notes needed for other items should be placed on the corresponding level as well)

APPENDIX B
CDOT-Division of Engineering Personnel Contacts

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