



Design Guidance for LCDOT Traffic Plans

Effective 10/15/2016

In general, designers should follow the latest version of the IDOT District 1 Traffic Signal Design Guidelines (IDOT D1 Design Guide), currently the 2009 version, and other IDOT District 1 design requirements, except as noted below. Designers should be aware that certain project specific requirements may dictate deviations from the IDOT guidelines or this guidance.

Plan Submittals for review – In general, LCDOT requires 2 sets of 11"x17" plans for review. Confirm with LCDOT Traffic prior to submittal.

Specifications – LCDOT Traffic has a special provision usage sheet available for designers generally indicating which IDOT District 1 and LCDOT special provisions should be used for LCDOT projects. The usage sheet is updated periodically as IDOT or LCDOT release updated special provisions. Confirm with LCDOT Traffic that you have the latest version.

Plan Sheet Preparation – Survey Data – Plans for intersections on LCDOT roadways should be prepared using state plane coordinates and with LCDOT stationing for the county highway. Please contact LCDOT Traffic or the LCDOT Project Manager to obtain the necessary stationing information prior to beginning your design. An alignment and ties sheet should be included in the plans showing coordinates for the alignment and three permanent control points near each intersection where underground work is proposed. At each intersection corner where there are proposed improvements, the plan sheets should include station and offset references for the R.O.W. corner, or the PT and PC in the cases of a R.O.W. corner radius, as well as the center point of the curve, to facilitate field layout.

Plan Sheet Preparation – Cable Plans – In general, LCDOT cable plans follow the IDOT format, except that the length should be shown for all cables and the LCDOT Electrical Service Requirements table should be used. As sample cable plan can be provided by LCDOT Traffic upon request.

Plan Sheet Preparation – Interconnect Schematics – Due to the large scale of the PASSAGE system, the designer should limit the scope of the interconnect schematics to include only the signals within the project limits. Connections to signals outside the project limits can be shown with double arrows and clear labels indicating the fiber type and the name of the adjacent interconnected intersection.

Signal Heads – LCDOT uses the 1-Face pay item for all traffic signal heads.

Traffic Signal Placement – LCDOT installs signal heads along the lane lines consistent with the IDOT D1 Design Guide.

Vehicle Detection – For new construction, LCDOT utilizes video detection equipment mounted on combination mast arms. Loops should only be used when the proposed improvements do not include modernizing the entire intersection or when special far back detection is needed. Radar and microwave detection should not be used unless directed by LCDOT Traffic. Confirm with LCDOT Traffic prior to proposing loop detection at new construction.

Control Equipment – Controllers installed within Lake County must be NTCIP compliant and compatible with the LCDOT PASSAGE system, regardless of the agency, in order to communicate with the county’s Centrac system. Some existing controllers can be integrated into the PASSAGE system with a software upgrade. Contact LCDOT Traffic to determine the scope of work required for each location. In general, the following NTCIP note is required on plans where controller equipment is proposed.

THE TRAFFIC SIGNAL CONTROL EQUIPMENT FOR THIS PROJECT SHALL BE NTCIP (LATEST VERSION).

Controller Cabinets – LCDOT uses a special controller cabinet. The dimensions are detailed in the LCDOT Traffic specifications. The designer should use the latest specs and design details for proposed cabinets. The pay item should include “SPECIAL.” LCDOT does not use “Super P” or “Super R” cabinets.

Signal Posts – LCDOT uses a special traffic signal post for new construction and full modernization projects. When the proposed improvements call for replacing only a portion of the existing equipment, the designer should match the existing equipment to remain, using the appropriate pay items and specs. All signal posts for vehicular signals at LCDOT intersections shall be 16 feet tall unless a taller post is indicated by the IDOT D1 Design Guide, in which case an 18-foot post should be proposed. Pedestrian signal head posts shall be 10 feet. The pay item should include “SPECIAL.”

Mast Arms – LCDOT uses a special mast arm for new construction and full modernization projects. When the proposed improvements call for replacing only a portion of the existing equipment, the designer should match the existing equipment to remain, using the appropriate pay items and specs. All new mast arms should be designed with combination lighting arms and 250W HPS lighting units. Combination arms are required even when lighting is not proposed to accommodate the video detection and PTZ equipment. Mast arm lengths and placement follow the IDOT D1 Design Guide. The pay item should include “SPECIAL.”

Foundations – Diameters for Type E foundations should be based on IDOT Highway Standards. LCDOT requires the following depths for the various foundations:

<u>Foundation Type</u>	<u>Required Minimum Depth</u>
Type A, C, D	4 Feet
Type E	15 feet minimum (deeper foundations required when indicated by IDOT Highway Standards)

Conduit Size – In general, follow the IDOT D1 Design Guide, but use the following minimum sizes:

<u>Conduit Application</u>	<u>Conduit Size</u>
Service Installation, Controller to RR Cabinet, Pedestrian Signal Post, Interconnect	2”
Signal Post	2.5”
Mast Arm Foundation	3.5”
Double Handhole to Controller & Main Conduit Crossings	4”

Temporary Traffic Signals – The design typically follows the IDOT D1 Design Guide. The designer should be aware of how to maintain communications with the county’s existing PASSAGE system while the temporary signal is in operation. Typically, temporary fiber optic interconnect is required to transmit the PASSAGE system video. If the designer is requesting alternative interconnect technologies, they should coordinate with LCDOT Traffic as early as possible.

Maintenance of Existing Traffic Signal – In general, the pay item for MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION should be included for all signal installations in the project limits that are not being removed and replaced with a temporary or permanent signal, as well as at intersections where fiber work is

proposed. This includes downstream or upstream intersections where fiber is being removed and reinstalled between the intersections, even when the designer does not anticipate the contractor would need to access the cabinet to do their work. This allows flexibility during construction for the county and the contractor. In certain cases, where the project duration is expected to be very long, a SPECIAL version of the Maintenance item may be utilized for interconnected intersections, allowing for a short term maintenance transfer. Designers with this type of project should contact LCDOT Traffic for the spec and for approval. In cases where terminations and splices are the only work being done at an intersection, maintenance of the traffic signal is not typically required.

Traffic Signal Systems – Fiber Optic Equipment – All fiber optic cable used for traffic signal interconnect in Lake County should include a minimum of 24 single mode fibers. LCDOT interconnect cable typically does not include multi-mode fiber. Multi-mode should only be included if requested by IDOT or another agency, or if directed by LCDOT Traffic. Fiber Optic Transceivers are not required for LCDOT cabinets unless multimode fiber is being used for the system communication.

Traffic Signal Systems – Controller Communications – The LCDOT PASSAGE system uses Ethernet based communication. In order to receive data and video over the system, most cabinets require a Layer II (Datalink) Switch. In certain cases, LCDOT Traffic may direct the designer to relocate an existing Layer II switch to a proposed temporary or permanent traffic signal. The network also includes Layer III (Network) Switches. Designers should not include Layer III switches or communications cabinets in their plans unless directed by LCDOT. Additional media converters and SFP or GBIC equipment may be necessary in certain projects. The designer should not include these items unless directed. In general, LCDOT does not use Master controllers, Intersection Monitors, or POTS lines to communicate with field controllers. Unless otherwise directed, do not include Master controller or telephone service on LCDOT projects.

Traffic Signal Systems – Fiber & Cabinet Diagrams, Terminations, Splices – LCDOT has a network integration consultant who handles the technical aspects of configuring and managing the PASSAGE Network. As of 2016, the consultant is Parsons. When changes are made to a signal on the PASSAGE system, or a signal is to be added to PASSAGE, the design plans will require a Fiber Splicing Diagram (FSD) sheet, Cabinet Detail (CD) sheet, and a table of the fiber terminations and splices. The designer should contact LCDOT Traffic to request the FSD and CD sheets. LCDOT Traffic staff will work with Parsons to determine what the network configuration will be and LCDOT will provide the sheets to the designer when they become available. Note that this is different from past practice where designers had to coordinate directly with the network integrator. The designer should be aware that under the LCDOT specs, splices and terminations on new fiber optic cables are included in the cost of the item, while terminations and splices on existing cables are paid for separately, all of which are to be summarized in the splice and termination table. The designer is responsible for preparing the sheet with the splice and termination table, a sample of which can be obtained from LCDOT Traffic upon request. The specs should be included according to the usage sheet. When non-LCDOT specs are used, the designer must confirm the method of measurement and basis of payment for splices and terminations and adjust their quantities, summary table, and notes accordingly.

Traffic Signal Systems – Wireless Communications – In general, wireless interconnect should not be proposed for permanent signal installations unless directed by LCDOT. There are a variety of design and specification considerations that must be taken into account. For temporary interconnect applications, wireless should not be proposed unless temporary or permanent fiber optic interconnect cannot be used. The use of temporary wireless interconnect is subject to LCDOT approval and may require field testing.

Pan Tilt Zoom Video Cameras (Remote Controlled Video System) – LCDOT requires installation of Pan-Tilt-Zoom (PTZ) cameras at many intersections throughout the County. The camera shall be installed in the intersection quadrant that has the most visibility. The designer should check the lines-of-sight to determine the best location for the PTZ camera. New installations call for IP addressable cameras, which use Outdoor Rated Network Cable to operate the camera. Older systems use video encoders and various cable configurations, which may require additional pay items if they are being relocated. PTZ cameras should be mounted on the luminaire arm, if present, or on the vertical shaft of the combination mast arm if no luminaire arm is available. If combination mast arms are not provided, a camera mounting assembly should be provided, unless there is a

utility conflict. In some instances, such as interchanges, a separate light pole is installed, with or without a cabinet, to mount the camera. In most case, existing cameras will be relocated to temporary traffic signals and new cameras will be installed for the permanent signal improvements.

UPS – All proposed traffic signal installations should include UPS equipment according to the latest usage sheet.

Equipment Removal – In general, the following equipment should be returned to LCDOT by the contractor unless it is being relocated as part of the project: EVP Amplifier, EVP Light Detector, Layer II or III Switch, Terminal Server, Video Encoder, Remote Controlled Video System, Video Detection System, Bluetooth detector, Master Controller, Wireless Transmission System, Controller and Cabinet. All other equipment should be salvaged unless directed otherwise by LCDOT Traffic.

Traffic Signal Timing & Optimization – Most traffic signal modernization jobs should include re-optimization or optimization pay items following the guidance in the IDOT D1 Design Guide. The designer should coordinate with LCDOT Traffic to determine the actual pay item and scope of timing changes that will be needed. Designers should be aware that due to the nature of the PASSAGE and Centracs systems, there are no longer defined “systems” throughout most of Lake County. To avoid confusion in construction, designers should include a list of the traffic signals that will be optimized or re-optimized on the interconnect schematic sheet.

Emergency Vehicle Preemption – LCDOT installs EVP equipment at all county owned traffic signals. The designer does not need to contact the municipality or fire district unless directed by LCDOT.

Street Name Signs – LCDOT typically installs internally illuminated lighted street name signs. In certain cases, aluminum signs are permitted – the designer should confirm with LCDOT Traffic. Sign design should follow the IDOT D1 Design Guide and the specs indicated in the latest LCDOT usage sheet. FHWA Highway Gothic Series D font should be used. Clearview font is not allowed per FHWA.

Roadway Lighting – In general, LCDOT signal installations should include combination lighting. Independent County-owned roadway lighting systems are not typically installed as part of LCDOT traffic signal design projects. If a project will impact existing lighting systems along a county route, the designer must evaluate their proposed design following IDOT District 1 procedures. Contact LCDOT Traffic or the LCDOT Project Manager if your project includes roadway lighting.

Other County Equipment – Terminal Servers – Terminal servers, also known as Digis, are used to convert serial data to Ethernet based communications. In general, terminal servers are used at locations where a master controller was previously used and the intersection controllers still communicate using the controller’s serial protocol over multi-mode fiber.

Other County Equipment – Bluetooth Detectors – LCDOT has a network of Bluetooth detection equipment installed around the county. If directed to install a Bluetooth detector by LCDOT Traffic, the designer should review the current spec to determine the mounting and cabling requirements. The designer should discuss the proposed placement with LCDOT Traffic.

Other County Equipment – Adaptive – LCDOT has Rhythm InSync adaptive control equipment installed at several intersections. If adaptive equipment is in use, the designer should coordinate with LCDOT to ensure the intersection operation is properly accounted for throughout all design stages. In general, adaptive equipment will not be used when a temporary traffic signal is installed at an intersection.