

Kane County Division of Transportation

Design Guidance for KDOT Traffic Plans

Effective: 09/01/2020

Foreword

In general, designers should follow the latest version of the IDOT District 1 Traffic Signal Design Guidelines ([IDOT D1 Traffic Signal Design Guidelines](#)), currently the October 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 Format

In general KDOT traffic staff will review PDF copies of entire plan sets. Designers shall coordinate with their designated County project manager or permit administrator with specific hard copy submittal requirements but a PDF copy should be provided and be internally distributed for review. The following plan sheets shall also be created on any design project involving relevant scope of work:

1.4.6.2 Geometric Plan – ADA Crosswalk details

- Plan shall include point elevations, cross slopes, and running slopes of each quadrant containing a crosswalk or ramp.
- Detail plan view typically scaled at 1"=10'
- Demonstrate proposed signal equipment, sidewalk pavement, driving pavement, pavement markings, and button locations.
- See Example in [Appendix A](#)

1.4.8.3 System Interconnect – Cabinet & Fiber Termination Details.

- Schematic Detail shall be provided for each signal or I.T.S. Cabinet or Splice enclosure on a project.
- Each Detail shall demonstrate the schematic connections between a fiber optic network switch and every network connectable piece of signal cabinet or I.T.S. Hardware. These connections typically labeled with "CAT 6" connections
- Each Detail shall demonstrate each fiber cable entering cabinet. Listing the type and number of fibers and shall demonstrate if each fiber is terminated, spliced through, or Tied and Bundled (T&B). A schematic connection demonstrating a jumper cable shall be made between the fiber termination panel and the Fiber switch.
- Each Detail shall provide sufficient detail to accurately depict the usage of splice trays, and pre-connectorized fiber optic pig-tails if called for in project specification.
- Fiber optic switch shall be labeled as either: Type 1 or Type 2 depending on number of fiber cables being terminated at location.
- See Example in [Appendix B](#)

Signal Heads and Signal Head Placement

All signal heads shall have backplates. Location and number of signal heads shall conform to one signal head per travel lane located at the center of each travel lane. Where there is only one travel lane at a signal approach, follow MUTCD guidance (placing one signal head on either edge line of the travel lane). KDOT specifications shall be used to indicate our preference for extended warranty LEDs (currently rated at 15 years at time of publication of this document).

Vehicle Detection

Allowable vehicle detection technologies for use in traffic signal design are Induction loops, Video Detection, and Microwave Detection. Magnetometers may be allowed upon special request for system detection purposes only.

Typical detector layout is to have stop bar presence detection on all left turn lanes. Minor volume street should have stop bar presence detection for all through lanes and right turn lanes. Major volume street shall have only “far back” detection for all through (and right turn lanes if directed by KDOT staff). Every lane shall have a dedicated detector channel, in the case for loops, this means a separate loop cable per lane. When loops are used for stop bar detection, typically at least 3 loops or more is desired, sometimes elongated in the direction of travel to get adequate coverage in front of and behind the stopbar. Where stop bar presence detection is required, a minimum of 21 feet of detection coverage is required on the approach side of the stop bar; or explained in another way, two full detector loops laid out to IDOT standards behind the stop bar.

County preference is full non-intrusive Detection (Video and/or Microwave) for stop bar and far back detection on interconnected traffic signals with Pan, Tilt, Zoom cameras and interconnected detector unit user interface. Where there is no interconnect, County preference is to install loops. Consult with County’s traffic engineer on a project by project basis to confirm this intent and always incorporate latest county specifications on non-intrusive detection based projects.

Control Equipment

Controllers installed within Kane County must be NTCIP compliant and compatible with KDOT’s installation of Transcore’s TranSuite system. Some Controllers can be integrated into TranSuite with a software upgrade. Contact KDOT Traffic to determine the scope of work required for each location. In General, the following NTCIP note is required on the plans where controller equipment is proposed:

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

Controller Cabinets and UPS

KDOT generally matches IDOT guidelines with the use of “Super P” and “Super R” cabinets (Type IV, Type V compartmentalized single shell cabinet for Traffic Signal Control and UPS). Any proposed traffic signal or ITS interconnect cabinet housing switches on the fiber backbone shall also be installed with back-up power. Designer shall ensure cabinet is not installed in or near areas designed to hold water such as an elevation low spot, drainage ditch, or wetland. When possible, controller cabinets shall be located as close to the right-of-way line as possible.

Mast Arms

All new mast arms should be designed with combination lighting arms and 190W LED lighting Units utilizing 25 foot long luminaire arms unless photometric calculations determine alternate lengths or if other constraints make combination lighting impractical. Combination arms are required even when lighting is not proposed to accommodate ITS equipment, such as for PTZ cameras. Mast arm lengths, Luminaire arm length, foundation diameter, and foundation depth shall be called out for each plan location. Where possible, mast arms shall be offset at greater lengths from the edge of traveled way to accommodate future roadway widening.

Temporary Traffic Signals

The design typically follows IDOT D1 Design guidelines. Where temporary signals are installed near existing Kane County Fiber optic cable, the signal controller shall be compatible with and be interconnected to communicate with KDOT's TransSuite system. This design involving interconnect will typically require NTCIP compliant controllers, fiber optic switches, and a PTZ camera to be specified. Temporary Traffic signals, when used, should not be paired with the use of STOP signs at the turning islands unless specifically allowed by KDOT traffic. Temporary traffic signals should be installed with at least two 400W HPS luminaire arms and EVP equipment. When 5 section, protected-permissive left turn heads are used there shall be at least 2 signal indications per movement and be directly across from the left turn lane or straddle the inner and outside lane lines.

Maintenance of Existing Traffic Signals (& Lighting Systems)

In general, the pay item for MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION should be included for all signal installations in 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 upstream and downstream locations where fiber is being removed and reinstalled between intersections. Designers should pay special attention to the existing configuration of any roadway lighting systems adjacent to, or integrated as part of, the traffic signal. In cases where a traffic signal's combination luminaire is powered off of a lighting controller (not part of the signal control cabinet) the plans shall include provisions for MAINTENANCE OF EXISTING LIGHTING SYSTEM. Work at traffic signals limited to typical roadway pavement resurfacing, resulting in the need for detector loop removal and replacement, a Maintenance transfer is not typically required.

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 KDOT 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 Transcore's TransSuite system, there are no longer defined "systems" throughout most of Kane 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 and/or within the specifications which define the pay item related to signal re-timing.

Service Installations (Signal, Lighting, ITS, Etc.), Excluding Solar power

All new service connections shall be metered and called out as such on the signal plans and cable plans. Ground Mount shall be used unless otherwise directed by KDOT staff (Utility power Service providers do not typically allow pole mount equipment to their poles).

Pedestrian Push Button and Ramp Design

Kane County desires specific design attention with respect to push button placement and button orientation with respect to the sidewalk or multi-use path and the alignment of the sidewalk ramp and crosswalk striping the button is designed for. Crosswalk striping shall not have any kinks and be aligned with the direct projections of the orientation of the curb ramps they connect. Typical design will include the detailed design of point elevations, cross-slopes, running slopes, and level landings around each curb ramp to ensure ADA requirements are being satisfied.

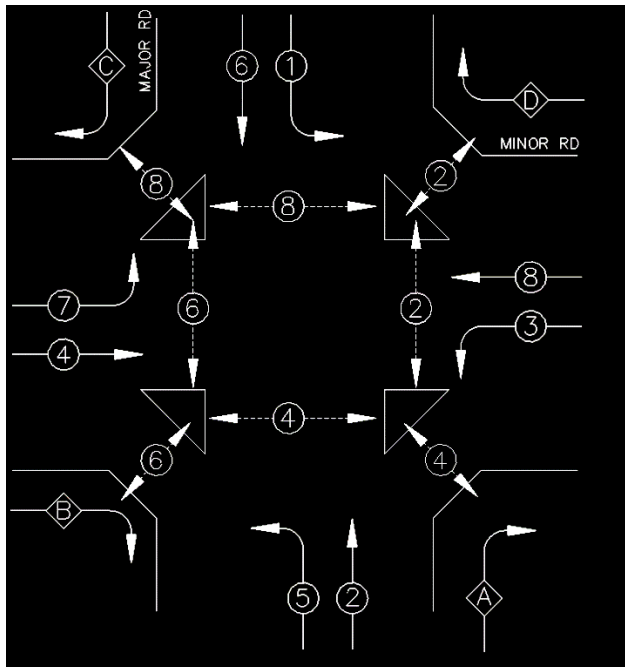
Push buttons shall be positioned directly above at least a 4 foot by 4 foot pad of sidewalk or path. The push button assembly is typically installed with a descriptive sign (R10-3e, for example) which includes the message “PUSH BUTTON → TO CROSS”, the intent of design is for every button to be oriented with this sign panel/button assembly to be properly oriented with the crosswalk ramp and striping. Additional sidewalk or path pavement may be required to meet these requirements.



R10-3e

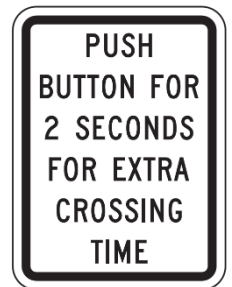
Any signal post or pole involving the installation of multiple buttons should consider the feasibility of meeting the orientation requirements. Separate push button posts may be required to ensure proper implementation of design. Only Pedestrian Push button Post, Type A shall be installed when required (see District One standard, TS-05). Do not use IDOT Highway standard 876001 for signal hardware guidance. Crosswalk ramp design shall seek a perpendicular ramp crossing design whenever possible (see IDOT Highway standard, 424001), Diagonal and Corner curb ramp designs shall be avoided whenever possible (IDOT Highway standards, 424006 and 424011/424021 respectively). Diagonal and Corner designs can promote heavy vehicle wider turns and is less intuitive in orienting a handicapped user to crossing properly.

Pedestrian Crosswalk phases shall typically be “Single stage” meaning a single signal cycle can allow the pedestrians to cross all travel lanes and get to the other side. This design shall not be intercepted by any median or change in direction until it hits the far side curb ramp. When Intersections become large, “two-stage” crossings or “extended press” designs should be considered:



Two Stage: Through use of “Pedestrian Refuge” areas, typically geometrically created corner/right turn islands or concrete center medians of 8 foot or wider, a pedestrian crossing phase can be broken up into multiple stages in order to cumulatively allow a pedestrian safe passage across the intersection. The phase diagram to the left demonstrates one approach.

Extended Press: Another technique to better manage large intersections with long crosswalks is by use of the R10-32P sign. Signal Timing practices allow for a calculated walking speed of 4.0 feet per second instead of 3.5 feet per second when this sign is posted, and programmable function is implemented into the crosswalk system. “APS” push buttons and modern signal controllers are required for this feature.



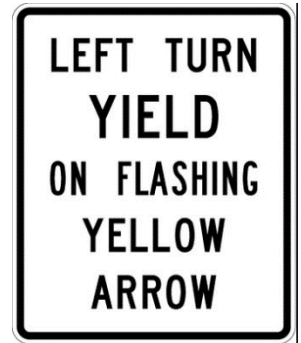
R10-32P

Flashing Yellow Arrow Design

Generally, use of flashing yellow arrow (FYA) signalization is being implemented on a corridor based improvement or extension of an existing adjacent improvement of FYA. FYA signalization is generally in reference to the 4 section protected-permissive signal head but the permissive only 3 section FYA head is also allowed where optimal signal phasing and intersection geometrics allow. Seek county staff recommendation on if a project location is a candidate for FYA signalization. Use 7C cables for 4 section heads and 5C cables for 3 section heads involving FYA.

Where FYA signal heads are installed, each signal head shall be installed adjacent to a “LEFT TURN YIELD ON FLASHING YELLOW ARROW” SIGN. See **Appendix C** for the Sign detail.

In Retrofit projects, where FYA is installed on an existing traffic signal location, ensure there are provisions in the contract documents to update the controller firmware, and CMU/MMU to a FYA compatible system. Ensure the designer checks the load switch capacity with the proposed phase diagram to ensure the standard 16 channel signal cabinet will be adequate to control the required signal outputs. Should more than 16 channels be required, work with County staff on writing an appropriate specification to cover the required work in the Controller and Cabinet Modification.

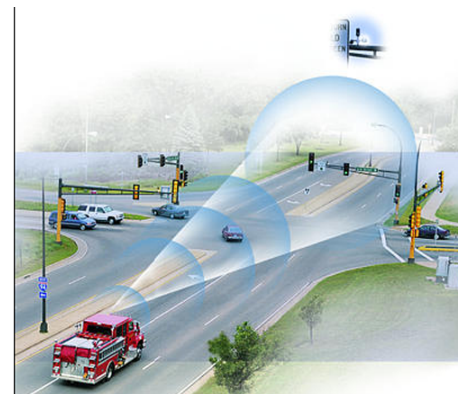


Pre-emption design for FYA shall be a “2 channel” approach, whereby a pre-emption phase provides bidirectional circular green indications alongside a FYA indication on one street, with the same function provided for the side street under the 2nd channel. Should design dictate a desire for alternate pre-emption design, additional contract provisions will be required to avoid pre-emption induced “yellow traps” and County staff should provide approvals on any design differing from the “2 channel” approach.

Emergency Vehicle Pre-emption (EVP) Design

In general, all proposed permanent and temporary traffic signals should be designed with EVP unless otherwise directed by KDOT.

If there are any line of sight obstructions or significant horizontal or vertical curves in advance of the stopbars of a traffic signal approach within a quarter mile, it is advised that the signal designer consider the need for an additional emergency vehicle pre-emption detector (no need for additional confirmation beacon). A common visual aid associated with Infrared (IR) based EVP design is that emergency vehicle emitters are typically rigidly/statically mounted on the front of the vehicle and any integrated IR emitter sends out a conical beam of IR light towards our Traffic signal EVP detector (the black tunnel visor).



Designers should consider any such project/location specific concern which might suggest the need for additional EVP detectors. Other such considerations could be anticipated back of queues during peak hours or special event traffic. Designs incorporating a detector which can pick up emergency signals under such conditions is a desirable feature.

Wattage Chart (as shown on cable plans)

See **Appendix D** for preferred values to use in this table, not all devices need to be shown in plans if design does not include said device.

Interconnect and Intelligent Transportation System (ITS) Design

All new Interconnect conduits shall be 4 inch coilable nonmetallic Conduit, as defined under IDOT's standard specifications. The specific material is defined as a continuous high density polyethylene (HDPE) conduit and is ideal for interconnect applications. Minimum cover depth of these conduits shall be 42 inches with a maximum handhole spacing of 600 feet. This cover depth shall be noted on each sheet of the interconnect plans.

Designer shall either call out Schedule 40 sections as typical with schedule 80 sections called out as is required for under pavement and sidewalk sections; alternatively, having handholes on either end of a pavement crossing and use rigid steel conduit, 4 Inch, for just pavement crossings are an approved option.

All new interconnect conduits shall also be designed with inclusion of a 3-cell fabric innerduct. The innerduct length shall be slacked in each handhole to the same standard slack lengths as cables and wires. A detail shall be included to demonstrate that the innerduct shall be installed with cells left vacant so that they may be available for future servicing needs. An example innerduct is shown to the right.



A typical interconnect design will involve the expansion of one of our existing Ethernet based layer 2 networks which lead back to our central servers which house our traffic management software, TransSuite. New traffic signals attempting to interconnect into these networks should incorporate the following items: Layer 2 Switch (Type 1 or 2), Fiber optic cable (36SM or higher), Network Configuration, and 3-cell fabric innerduct. In most cases, items related to Outdoor Rated Network cable, and PTZ camera will also be included. Designer shall inquire to KDOT traffic for every project to request the latest specifications, prior to final submittal, and plan sheets detailing the fiber optic cable terminations, and cabinet device interconnection shall be provided. Typical terminations should demonstrate fibers 1-12 being terminated for local use, while fibers 13-36 shown as either tied and bundled, or spliced through if directed by KDOT Traffic. Typical cabinet devices being interconnected to Ethernet switch include: Controller, MMU, UPS, PTZ, Detection unit, and in many cases, an Ethernet enabled power strip. Plan Notes regarding NTCIP required firmware or compatibility for the controller shall also be present on the signal plan and cable plan sheets.

Kane County Division of Transportation (KDOT) interconnect conduits used for traffic signal communication is often shared for use with Kane County's Information Technology (Kane IT) department in also containing separate fiber optic cable. Typically, 144 Single mode fiber is installed for Kane County's I.T. department and 36 single mode fiber cable for KDOT system use is typical for most of the existing Kane County Interconnect system. While new construction is unlikely to be impacted by the existing Kane IT fiber, Reconstruction or developments near existing interconnected locations may require more extensive levels of staging the interconnect communication or in proving a temporary hard-wired interconnect throughout the duration of the project as impacts to both KDOT and Kane IT communications can be managed to a higher level of service than what may have previously been acceptable for signal control only temporary interconnects.

In the typical "impact to interconnect" scenario involving Kane I.T. Fiber, design will incorporate wood poles and above ground (aerial spans), weather rated fiber cable to span the length of the limits of the project and splice into special oversized handholes at the limits of the project. A coordinated review between KDOT, Kane IT, and the design team will review for logical break points of the existing Kane IT fiber and a determination on the sizing of the oversized handholes (sized to store all slack) will be provided for each leg of the interconnect being impacted. Within these oversized handholes, filled with slacked cable, a temporary outdoor rated fiber cable will be spliced into both Kane IT and KDOT fiber cables to span the length of the project and establish necessary KDOT system and Kane IT system communication. Typical project implementation as the construction contractor building the wood pole interconnect, installing the aerial KDOT Traffic Design Guidance

fiber cable as designed, and bringing the cable to the designated termination points throughout the project. “Work done by others”, meaning Kane IT’s designated fiber contractor, will perform the necessary fiber terminations and splices to satisfy the desired communication needs for both signal and Kane IT systems, typically done during overnight hours. Special plan notes detailing the need for this staged and coordinated effort will be required. An alternative to wood pole interconnect would be the ability to build the proposed interconnect conduit system and have the “crossover” be done to the permanent instead of requiring a temporary system.

Work with County staff early and often throughout the design of any project or improvement which may impact an existing interconnect. Avoiding any such impacts to existing interconnect conduits is always preferred.

Wireless Interconnect and Communication Design

In general, wireless communication or interconnect should not be proposed for permanent signal installations unless directed by KDOT. For Temporary interconnect applications, wireless communications are not recommended and often require extensive study for reasonable reassurances on the feasibility of performance and reliability of the communication link. If impacts to Kane IT fiber, wireless will not be an option; if only KDOT fiber is impacted, considerations such as length of temporary interconnect and characteristics of the section of the network which will be designed to go over the wireless link such as controller only data or data plus video will be considered.

Light Pole and Lighting Controller Identification Stickers

All proposed light poles and lighting controllers shall be labeled with identification stickers, following KDOT Details. See **Appendix F**. All proposed Luminaires shall be installed with a safety cable assembly matching IDOT D1 Standard BE-701.

Pan Tilt Zoom Video Cameras (PTZ, Remote Controlled Video System)

KDOT requires installation of PanTilt-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 (Category 6a) to operate the camera, use latest KDOT Specification. Older cameras use video encoders and various cable configurations and are currently obsolete in current KDOT operations. Any older PTZ camera, not IP addressable, should not be relocated and instead be designed to be replaced with a new IP based PTZ camera. PTZ cameras should be mounted on the luminaire arm, if present, or on the vertical shaft of the combination mast arm assembly if no luminaire arm is available. If combination mast arms are not provided, a camera (20 foot riser) 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. Designers should always check to ensure cable lengths are less than 100 meters (328 feet) for network cable to ensure reliable performance of the IP/Ethernet equipment.

Street Name Signs & other Signal mounted signs

KDOT typically uses IDOT standard sign panels for street name signs. The one exception is in the design of the Letter heights of 12" capitol letters with 9" lowercase letters, FHWA Gothic Series "D" font (Clearview font not allowed per FHWA). Designer should reference IDOT District one detail TS-02 as a primary guide with IDOT highway standard 720016 (Style e) as an option to best fit the names of streets on a sign. Design of signs are limited to IDOT highway standard 877001 and 877002 limitations on overall square footage of sign. Maxed at 20 square feet. The design methodology is spelled out in TS-02's general note number 4.

Plan notes should be added to the signal plan outlining the need for supporting stiffening channels to be included on every sign mounted to a signal pole, post, or arm. These supporting channels are further detailed on IDOT's Highway standard 72001. Supporting channels are designed to be installed perpendicular to the direction of the support the sign is being mounted to. Note that the cost of these supports are to be included in the cost of the Sign panel being installed.

Pavement Marking and Recessed Markers

KDOT prefers to use Modified Urethane pavement marking materials and Recessed Reflective markers, See detail in **Appendix E**. IDOT Raised reflective markers shall not be used without KDOT approval. KDOT prefers to also stripe crosswalks using "bars" at 12 Inch stripe, 24 Inch gaps. Outside white edge lines should not be used when curb and gutter is present at the outside edge of traveled way.

Other County Equipment - Adaptive

KDOT has Rapid Flow Surtrac adaptive control equipment installed at several signalized intersections. If adaptive equipment is in use, the designer should coordinate with KDOT 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. *(At time of publication, Randall Road between Big Timber Road to Huntley Road include Surtrac adaptive control equipment)*

Other County Equipment

KDOT has deployed Dynamic message Signs (DMS), Roadway Weather Information Stations (RWIS), Driver Feedback Speed limit (Your speed is) signs, side-fire radar system detectors, Bluetooth travel time sensors, among other technologies. If directed to install any of the above technologies by KDOT Traffic, the designer should review the current spec to determine the mounting and cabling requirements. The designer should discuss the proposed placement with KDOT Traffic.

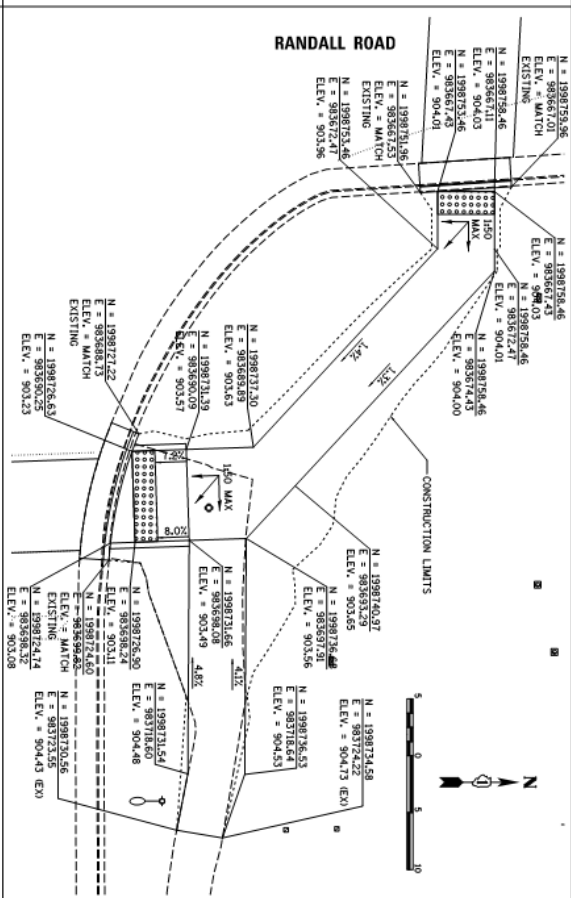
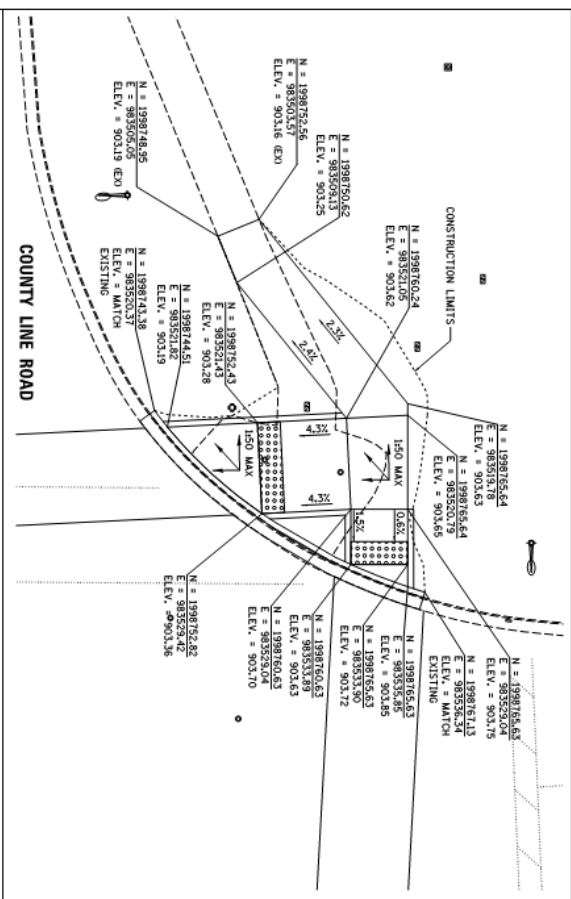
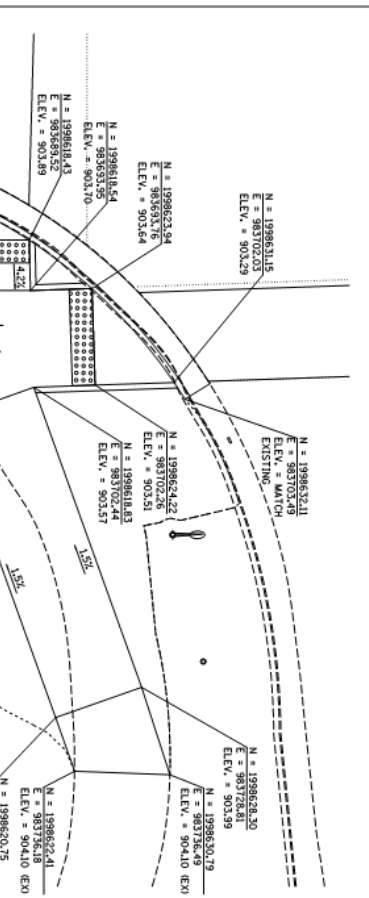
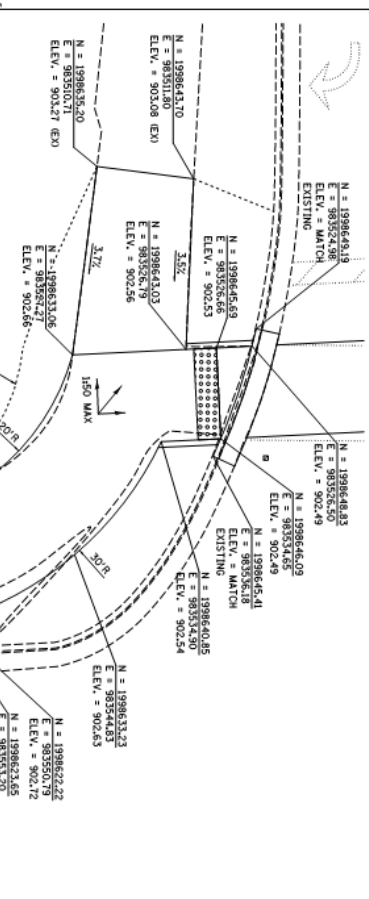
Appendix A

ADA Crosswalk Details

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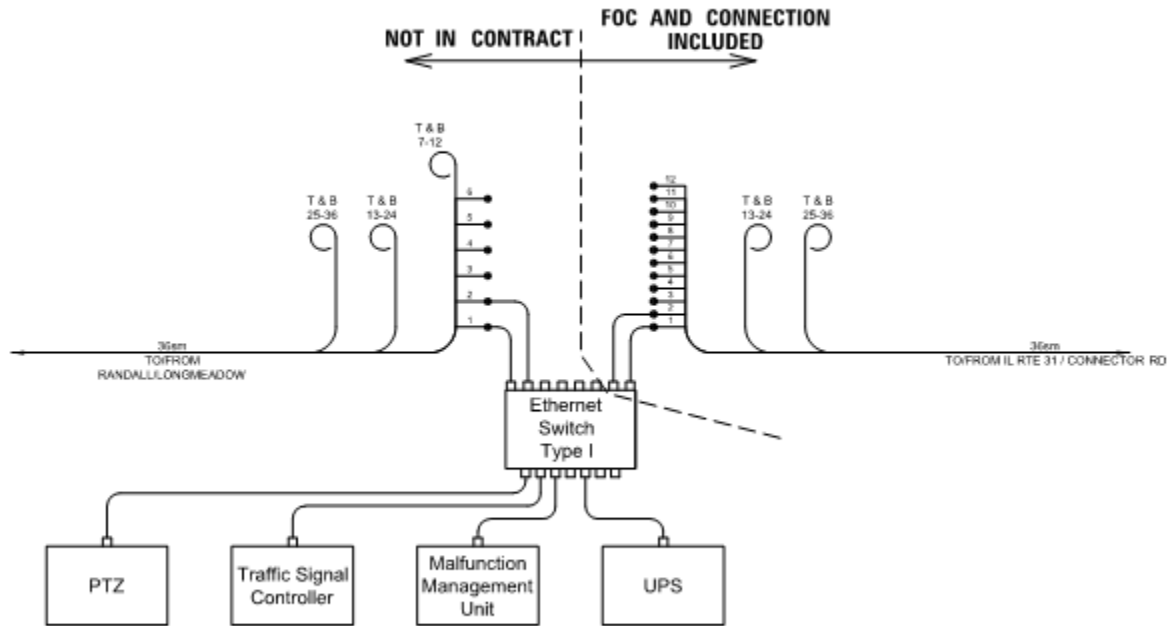
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REVIEWED	AMB	10/25/17

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RANDALL ROAD / COUNTY LINE ROAD			TO 57A										
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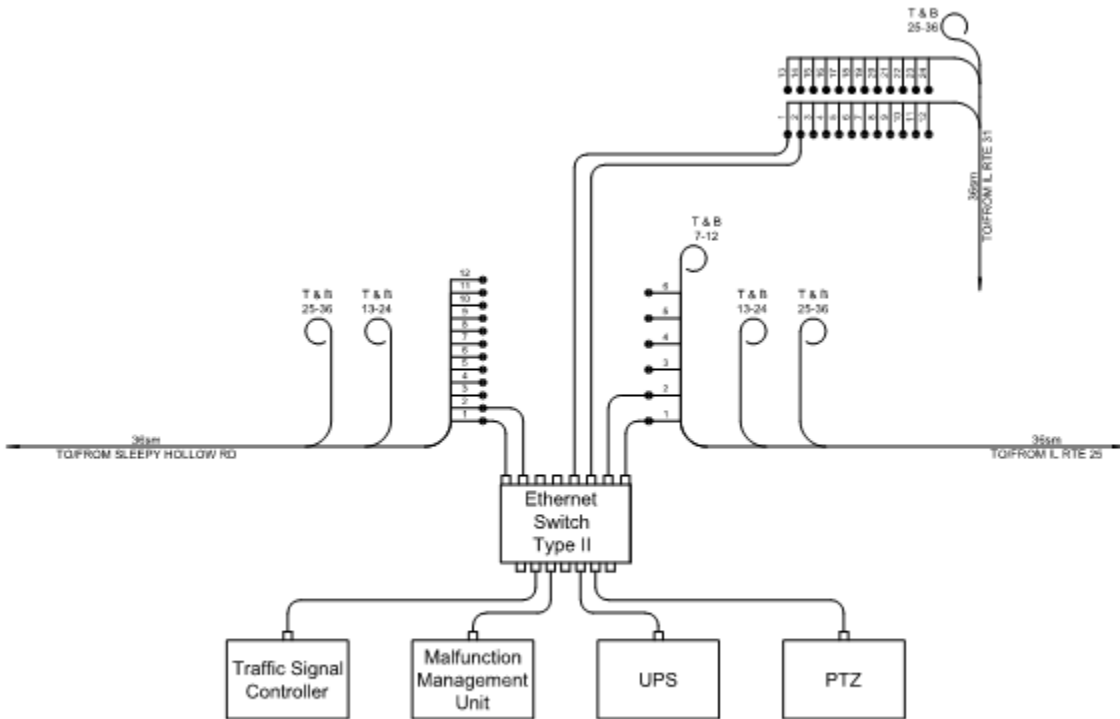


Appendix B

Cabinet and Fiber Termination Details

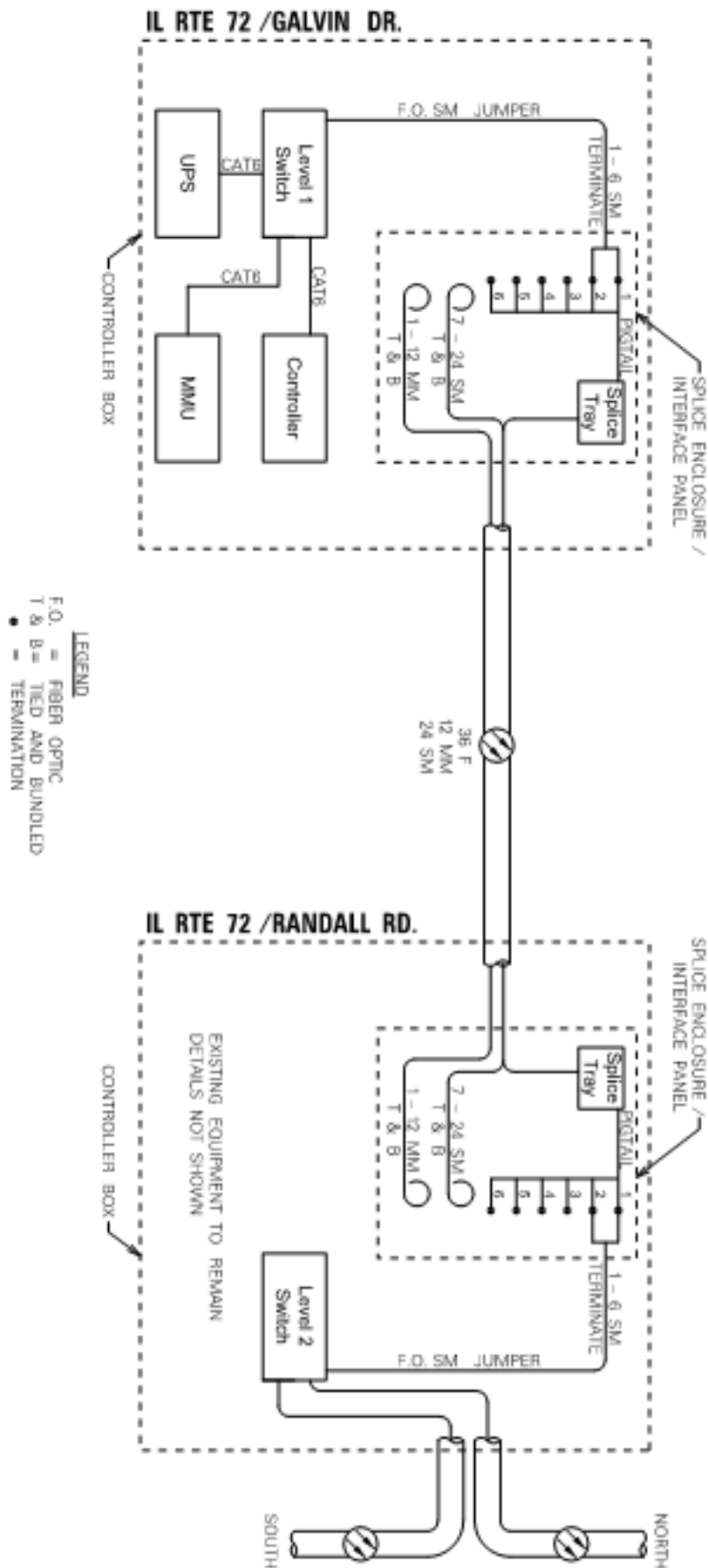


LONGMEADOW PARKWAY AT SLEEPY HOLLOW ROAD



LONGMEADOW PARKWAY AT CONNECTOR ROAD

FIBER OPTIC SPLICING DIAGRAMS



Appendix C

Flashing Yellow Arrow Sign Detail



NOTES:

1. COLOR:
BACKGROUND: WHITE
MESSAGE: BLACK
2. LINE 1 IS SERIES C
LINE 2, 4 AND 5 ARE SERIES D
LINE 3 IS SERIES B
3. ALL DIMENSIONS SHOWN ARE IN INCHES

Appendix D

Standard Wattage Table

I.D.O.T / KANE COUNTY TRAFFIC SIGNAL INSTALLATION ELECTRICAL SERVICE REQUIREMENTS					
TYPE	NO. LAMPS	WATTAGE		PERCENT (%) OPERATION	TOTAL WATTAGE
		INCAND.	LED		
SIGNAL (RED)			10	50	
(YELLOW)			13	5	
(GREEN)			10	45	
ARROW (EXCEPT FOR FYA)			10	10	
FLASHING YELLOW ARROW (FYA)			12	30	
PEDESTRIAN SIGNAL			20	100	
CONTROLLER			100	100	
UPS			25	100	
ILLUM. SIGN (BLANK OUT)			25	5	
VIDEO DETECTION SYSTEM			150	100	
ILLUM. STREET NAME SIGN			120	50	
LUMINAIRE (COMBO POLE)				50	
PTZ / SURVEILLANCE CAMERA			60	100	
FLASHING BEACON (SIGNAL)				50	
ENERGY COSTS TO:					TOTAL =
ENERGY SUPPLY CONTACT: <u>CONTACT PERSON</u>					
PHONE: <u>(###) ###-####</u>					
COMPANY: <u>COMPANY NAME</u>					

ENGINEER NOTES REGARDING ABOVE REQUIREMENTS:

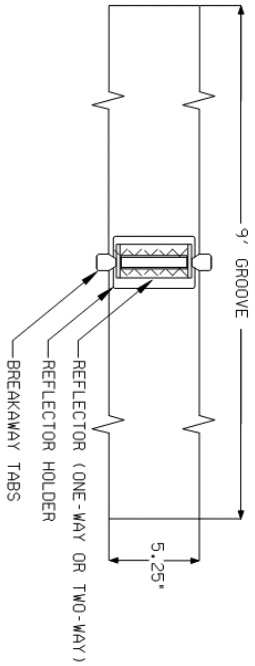
1. LUMINAIRE WATTAGE DETERMINED BY ROADWAY LIGHTING DESIGN, ONLY INCLUDE IF LIGHTING IS POWERED BY SIGNAL.
2. FLASHING BEACON WATTAGE DETERMINED BY BEACON COLOR, USE WATTAGE SHOWN IN "SIGNAL" TYPE ENTRIES.
3. IF SIGNAL DESIGN CONTAINS RED COLORED "ARROWS", DISCUSS WITH TRAFFIC ENGINEER IF SEPARATE PERCENT OPERATION IS NEEDED FOR THESE ARROWS.
4. TOTAL WATTAGE AND TOTAL WATTAGE SUMMATION SHOULD ALWAYS DISPLAY CALCULATION TO FIRST DECIMAL (TENTHS) PLACE.

(Note: do not include ENGINEER NOTES in plans)

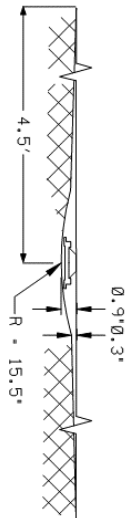
Appendix E

Recessed Pavement Marker (notes to be modified for Federally funded projects)

**TYPICAL RECESSED REFLECTIVE
PAVEMENT MARKERS**



PLAN

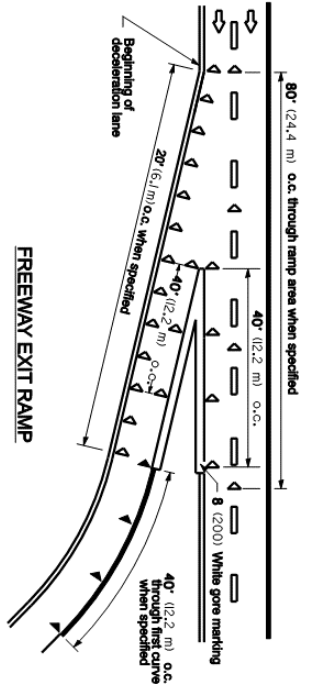
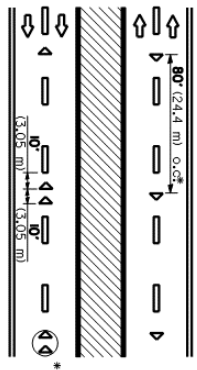
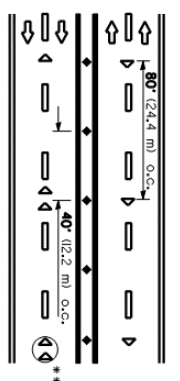
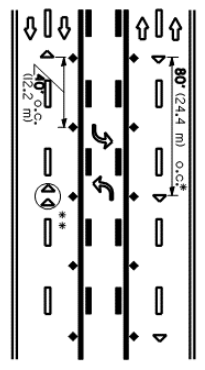
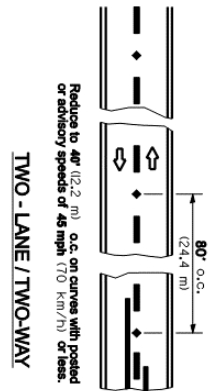


ELEVATION

NOTES

1. SAW CUT TO DIMENSIONS SHOWN
2. SAW CUT AREAS ARE TO BE DRY AND FREE OF MATERIAL THAT ADVERSELY AFFECTS THE ADHESIVE BOND.
3. INSTALL THE REFLECTOR WITH AN APPROVED TWO-COMPONENT EPOXY ADHESIVE. EPOXY SHOULD NOT OBSCURE OR BLOCK THE LENS.
4. REFLECTOR SHALL BE 3M SERIES 190 OR ENGINEERING APPROVED EQUIVALENT.
5. THE REFLECTOR HOLDER SHALL BE MARKERONE SERIES R100 REFLECTOR HOLDER OR ENGINEER APPROVED EQUIVALENT.
6. FOR 1-WAY MARKERS HEADING UPHILL, UPHILL GRIND TAPER MAY BE OMITTED.

PAGE 1	Typical Recessed Reflective Pavement Markers
OF 2	
Standard KC781001-04 Rev. 11/15/2008	



*** see MULTILANE DIVIDED detail for lane marker notes.

*** see MULTILANE DIVIDED detail for lane marker notes.

80' (24.4 m) O.C. through ramp area when specified

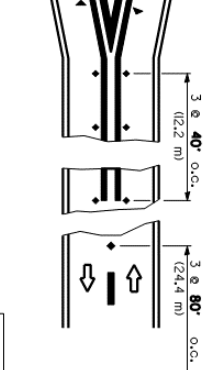
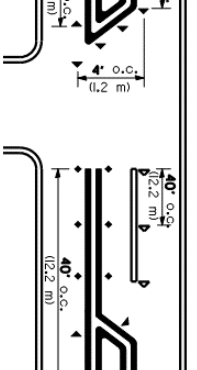
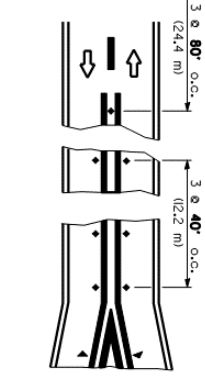
40' (12.2 m) O.C. when specified

20' (6.1 m) O.C. when specified

40' (12.2 m) O.C. when specified

8 (200) White gore markings

MULTI-LANE DIVIDED



SYMBOLS

- Yellow stripe
- White stripe
- One-way amber marker
- One-way crystal marker
- Two-way amber marker

All dimensions are in inches (millimeters) unless otherwise shown.

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Appendix F

Light Pole Decal

