



TEO Signal Committee Meeting Minutes
Meeting Date: 3/22/2019
Water's Edge Conference Rm 176
Meeting Time: 9:00am – 12:00am

Meeting Attendees:

Jerry Kotzenmacher	Sue Zarling	Kile Holm	Kevin Chan
Linda Heath	Mike Posch	Robin Delage	Mike Schroeder
Mike Fairbanks	Derek Lehrke	Tod Becker	Paul Reichstadt
Clint McCullough	Brian Vitek	Cindy Dittberner	Mike Gerbensky
Alex Govrik	Curt Krohn	Chris Bosak	Gennadiy Begelman
Jeff Knofczynski	Nick Ollrich	Mike Schweyen	
By phone: Kuczynski	Les Bjerketvedt	Paul Ackerley	Mark Korwin-
Guests:	Christina Prentice	John Hackett	Ben Timerson

Old Business-

ATC cabinet – Initial ATC cabinet reviews are complete and it will be placed on contract. Prototypes are still needed for review prior to being able to purchase the cabinets. It may take a couple months to get the prototype cabinets for review. Discussions are taking place on whether the current contract should be put out for bid again.

Background shield reflector project – The project from last (2018) year was pushed back to 2019. Each district will have some signals on this project. The project will place a yellow reflector on the outer edge of the background shield. This will be done by cleaning the shield and placing the reflector tape around the outer edge of the shield. This tape can only be put on when temperatures are within specs.

Ped Station replacement – When a ped station continually gets hit, the district and ESS must work together on the replacement and location of the new ped station. The district must change the layout showing the new location of the station. Tod Grugel (staff) should also be called on location of the new ped station.

New Business-

Counts off detection – Other MnDOT groups such as Road Research have asked if it is possible to get traffic counts off of traffic signal detection and RICWS detection. New cameras can be

used for counting purposes. Both Maxview and newer controllers such as the ASC/3 and Cobalt can be set up for counting. Increment bins can be set up for any time wanted but 15 minute bins are typical. RICWS can likely be set up for counting. Paul had TH 53 at Landfill road counting but wants the detection counts confirmed by road tubes before suggesting that all RICWS detection works as planned. Loops could also be used for the traffic counts.

Action item – Jerry, Jeff Knofczynski, and Ben Timerson will work together on a RICWS at TH 7 at County 33 to see if the RICWS counts are accurate. They will set up a tube counter at this location and get counts off the RICWS. Derek will work with Ben to also test a signal in the same manner.

TSMO (Transportation System Management Operations) – Mike Schweyen is heading TSMO and gave an update on the signals aspect of the project. Signal timing and coordination and pedestrian and bicycles safety were strategies that ranked highly. The TSMO plan is still under development, so work is still in progress. MnDOT management will finalize the TSMO plan.

Pole delay solutions – C.O. Signals met with C.O. Construction on how to deal with steel delays when ordering poles and mast arms. Construction suggested that they could look at penalties for delays if appropriate and the contractor did not look at options in getting the poles sooner. They also suggested that we might want to try pre-ordering poles and mast arms for a project, but they did indicate that there are risks that we are taking on by doing this. If a district has a project coming up that we want to work on language for preordering contact Sue. The special provision language does include proof of having placed the order within 15 calendar days following the contract approval.

Ball Locators – Ball locators should be going in all hand holes. Mount the ball to a stick of PVC pipe. Currently State provided but it was suggested that they be placed in the contract. C.O. will look into getting ball locators in the contract. These ball locators can be used by the districts for locating, but they are also used by ESS for maintenance.

ADA Button signs replacement – The signs for ADA buttons are fading and beyond the warranty date. ESS (Mike Schroder) has stickers for all button and sign styles that can be placed on the existing signs and that will leave the brail in place and not cover. These stickers can be ordered through ESS.

Working with ESS – Any changes to existing products should be communicated to ESS. Vendor made changes to the wiring of the APS push button and ESS didn't know until they went out to work on a button.

APS wiring – For APS work being done on a re-work project such as a mill and overlay, do not use existing wires for the APS buttons. Dedicated home runs using 2/c #14 shielded wires (loop) must be pulled for the APS buttons.

Electrical Work Eligibility – Clint handed out a list of what license is needed to do different types of work on signals and components of signals. (See attached). APS buttons can be replaced by trained in district operators.

Operations check – All districts should be doing an annual ops check. Ops checks should then be recorded on TAMS. A separate meeting will be held to discuss this, update a form to be filled out listing the items to be checked and review where this requirement is stated in our documents.

Left turn loops – Mike F. has proposed to reduce the number of left turn loops to 3 from 4. They should be wired so at least one loop is by itself for counting purposes. The design manual committee will review the request in the next manual review to be set prior to when the class is offered. The group agreed that 3 loops would work for PVC loops, but that 4 loops should still be used if the loops are saw cut.

Minimum Phase Times – At the meeting reviewing the signal timing manual Metro brought up that they are using a shorter minimum green time and they proposed using 5 secs up to 20 sec minimum. Current minimum is 10 sec for cross street and 15-20 sec for mainline. Other districts were using higher numbers. If the manual is changed it does not mean that higher numbers can't be used any longer. These would just be the minimums. Proposed changes to the timing manual such as this will be sent out to the districts. Density operation becomes more critical when using shorter minimum times on free operating signals.

Rail road preemption – The CTC preemption card was approved for use. This will replace the home made board built by ESS. Ron C. had the card out on TH 149 for the past several years without incident. The new card will cover all 7 circuits that MnDOT now uses. The ped preemption circuit and timing will always be wired but only used when the ped times are long enough. There was a specific concern about some Brainerd signals. ESS has figured out this issue and will resolve. The seven circuits are; Energy, Advanced Preemption, Supervisor, Simultaneous Preemption, Gate Down, Traffic Health, and Advanced Pedestrian Preemption.

Round Robin –

Gennadiy – Should have a video example plan. OTE will make a video example plan.

Mike P. – Requesting again that the Fortran plumbizer be put on the APL? Fortran will be coming in to town in April to discuss their product and new products they are working on. OTE will work on this. NOTE: the Fortran Plumbizer does not currently have options for all of our mounting scenarios so it will be limited in when contractors can use it.

Kyle – They are getting a lot of signals going in to flash this time of year. It was mentioned that we want to try to pull the wires all of the way to the head, eliminating the Deutsch connector. D1 is interested in trying this.

Mark K. – Commented that there is a manufacturer that has 15 year warranty for LED indications and he wants to know if we should change to this warranty in provisions. – Ideally this would be very nice, but we also don't want to have just one vendor on the APL for this item. This has been an issue in the past. We will watch to see if the other vendor does follow suit.

Next meeting: Friday, August 9th, 2019
 Waters Edge **Conference Room 176**
 9:00am – 12:00 noon
 Phone call available
 Send agenda items to Jerry K

Attachments:

Electrical Work License Requirements and Roles	License Required	Metro Traffic Engineering				Outstate Traffic Engineering				NFFA TOE Hazard/Risk Category		
		ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	123/249	249/490
Source of Power												
Plans and specifications for SOP	PE signoff required									N/A	N/A	N/A
Operate user controls	Not electrical work	A	A	A	A	A	A	A	A	N/A	0	0 Dead Front 1, RIG, IHT Exposed
Power system controller programming	Not electrical work	A	A	A	A	A	A	A	A	N/A	N/A	N/A Dead Front 1, RIG, IHT Exposed
Repair SOP (by repairing or replacing-in-kind electrical components)	Maint elect exemption	A	P	A	A	A	P	A	A	N/A	1, RIG, IHT	2, RIG, IHT
Connect new or replacement SOP cabinet or enclosure	Elect lic required		P				P			N/A	Only De Energized	Only De Energized
Add or modify SOP wiring and components in field	Elect lic required		P				P			N/A	1, RIG, IHT	2, RIG, IHT
Replace-in-kind SOP pluggable items	Not electrical work	A	A	A	A	A	A	A	A	N/A	1, RIG, IHT	2, RIG, IHT
Temporarily disconnect, reconnect and/or test wiring and/or equipment	Maint elect exemption	A	A	A	A	A	A	A	A	N/A	1, RIG, IHT	2, RIG, IHT
SOP Physical Maintenance	Not electrical work	A	A	A	A	A	A	A	A	N/A	N/A	N/A Dead Front 1, RIG, IHT Exposed

Electrical Work License Requirements and Roles		License Required	Metro Traffic Engineering				Outstate Traffic Engineering				NFPA 70E Hazard/Risk Category		
			ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480
e.g. Signals - replace broken door stops, shelves, doors, covers, locks, vacuum out dirt and debris, replace air filter, remove rodent nests, open doors and hinged panels, perform visual inspection Lighting - replace broken door stops, shelves, doors, covers, locks, vacuum out dirt and debris, replace air filter, remove rodent nests, open doors and hinged panels, perform visual inspection RTMC - replace broken door stops, shelves, doors, covers, locks, vacuum out dirt and debris, replace air filter, remove rodent nests, open doors and hinged panels, perform visual inspection													
* Although not electrical work, Mn/DOT requires an electrician license if replacing fuses in SOP			P				P						

Electrical Work License Requirements and Roles		License Required	Metro Traffic Engineering				Outstate Traffic Engineering				NFPA 70E Hazard/Risk Category		
			ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480
Control Cabinet/Shelter/Enclosure													
Plans and specifications for cabinet/shelter/enclosure		PE signoff required											
Operate user controls		Not electrical work	A	A	A	A	A	A	A	A	N/A	N/A Other	Not Used
e.g. Signals - Operate police panel switch, turn circuit breaker off/on, press detector call buttons, turn control power switch off/on, adjust thermostat, set test display message on dynamic message sign, operate camera pan/tilt/zoom Lighting - See Under Source of Power above RTMC - Operate police panel switch, turn circuit breaker off/on, turn equipment power switch off/on, adjust thermostat, set test display message on dynamic message sign, operate camera pan/tilt/zoom, operate gate up/down													
Controller operational programming		Not electrical work	A	A	A	P	A	A	A	P	N/A	N/A	Not Used
e.g. Signals - Program phase timing, coordination timing, detector operation, dynamic message sign messages, set up video or radar/microwave detector Lighting - See Under Source of Power above RTMC - Program metering timing plans, dynamic message sign messages, set up video or radar/microwave detector													
Controller configuration programming		Not electrical work	P	A	A	A	P	A	A	A	N/A	N/A	Not Used
e.g. Signals - change comm parameters, replace EPROMS, flash EPROM, configure MMU Lighting - See Under Source of Power above RTMC - change comm parameters, replace EPROMS, flash EPROM													
Repair cabinet/shelter/enclosure (by repairing or replacing in-kind electrical components)		Main elect exemption	A	A	A	A	A	A	A	A	N/A	0, RG, IHT	Not Used
e.g. Signals - replace cabinet fan, repair cabinet light, replace hardwired surge suppressor, DC power supply, hardwired communication equipment, hardwired control equipment, switches, receptacles, re-terminate bus connections Lighting - See Under Source of Power above RTMC - replace cabinet fan, heater, repair cabinet light, replace hardwired surge suppressor, DC power supply, hardwired communication equipment such as modems, hardwired control equipment, switches, receptacles, re-terminate bus connections													
Connect new or replacement cabinet/shelter/enclosure in field		Elect lic required		P				P			N/A	Only Do De-energized	Not Used
e.g. Signals - Set new or replacement traffic signal cabinet, sign control cabinet Lighting - See Under Source of Power above RTMC - Set new or replacement ramp control cabinet, sign control cabinet, ATR cabinet													
Add or modify cabinet/shelter/enclosure wiring and hardwired components in field, not-power-limited		Elect lic required		P				P			N/A	0, RG, IHT	Not Used
e.g. Signals - move wires on terminal blocks, add hardwired components, add wires, modify load switch bay wiring, add new panels and wiring, add receptacle, add circuit breaker Lighting - See Under Source of Power above RTMC - move wires on terminal blocks, add hardwired components, add wires, modify load switch bay wiring, add new panels and wiring, add receptacle, add circuit breaker													
Add or modify cabinet/shelter/enclosure wiring and hardwired components in field, power-limited		Elect or power limited lic required	PLT	P			PLT	P			Gloves - Shock only	Not Used	Not Used
e.g. Signals - move class 2 or class 3 wires on terminal blocks, add hardwired class 2 or class 3 components such as communication interface boards, add class 2 or class 3 wires, wires for detectors, wires for comm, wires for ped pushbuttons, separate logic circuits Lighting - Not applicable RTMC - add or move class 2 or class 3 wires on terminal blocks, add hardwired class 2 or class 3 components such as communication interface boards, add class 2 or class 3 wires, wires for detectors, wires for comm, wires for ped pushbuttons, wires for temperature probes, separate logic circuits													
Build up cabinet/shelter/enclosure in shop		Misc parts exemption	P	A	A	A	P	A	A	A	N/A	0, RG, IHT	Not Used
e.g. Signals - move wires on terminal blocks, add hardwired components, add wires, configure load switch bay wiring, add new panels and wiring Lighting - Not applicable RTMC - move wires on terminal blocks, add hardwired components, add wires, configure load switch bay wiring, add new panels and wiring													
Replace cabinet/shelter/enclosure pluggable items		Not electrical work	A	A	A	A	A	A	A	A	N/A	N/A	Not Used

Work Eligibility List DUL Approved With Classifications and 70E Category..._xlsx

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Electrical Work License Requirements and Roles		License Required	Metro Traffic Engineering				Outstate Traffic Engineering				NFPA 70E Hazard/Risk Category		
			ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480
e.g. Signals - replace load switches, fuses, detector cards, plug-in relays, MMU, controller, plug-in surge suppressors, plug-in modems, ethernet switches Lighting - See Under Source of Power above RTMC - replace load switches, fuses, detector cards, plug-in relays, controller, plug-in surge suppressors, plug-in modems, ethernet switches													
Temporarily disconnect, reconnect and/or test wiring and/or equipment		Main elect exemption	A	A	A	A	A	A	A	A	N/A	0, RG, IHT	Not Used
e.g. Signals - disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect Lighting - See Under Source of Power above RTMC - disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect													
Cabinet/shelter/enclosure physical maintenance		Not electrical work	A	A	A	A	A	A	A	A	N/A	Gloves	Not Used
e.g. Signals - replace broken door stops, shelves, doors, covers, locks, vacuum, replace air filter, remove rodent nests, open doors and hinged panels, perform visual inspection Lighting - See Under Source of Power above RTMC - replace broken door stops, shelves, doors, covers, locks, vacuum, replace air filter, remove rodent nests, inspect hardware, winterize/summerize, open doors and hinged panels, perform visual inspection													
Electronic equipment repairs		Not electrical work	P	A	A	A	P	A	A	A	N/A	N/A	N/A
e.g. Signals - Shop repair of failed electronic components such as controllers, detectors, malfunction monitor units, bus interface units, radios, modems Lighting - Not applicable RTMC - shop repair of failed electronic components such as controllers, detectors, radios, modems													

Electrical Work License Requirements and Roles	License Required	Metro Traffic Engineering				Custstate Traffic Engineering				NFPA 79E Hazard/Risk Category			
		ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480	
Field Equipment External to Control Cabinet/Shelter/Enclosure													
Plans and specifications for field equipment	PE signoff required										N/A	N/A	N/A
Operate user controls	Not electrical work	A	A	A	A	A	A	A	A		N/A	N/A	N/A
e.g. Signals - Operate pedestrian pushbutton, activate detector by presence or passage of vehicle, activate EVP using test emitter Lighting - Not applicable RTMC - Activate detectors by presence or passage of vehicle, operate gate arm up/down													
Repair equipment (by repairing or replacing-in-kind electrical components)	Main elect exemption	A	A	A	A	A	A	A	A		N/A	0, RIG, IHT	0, RIG, IHT
e.g. Signals - Repair luminare, repair or replace pedestrian pushbutton, repair or replace EVP detector, repair EVP indicator light, repair enforcement light, repair faulty signal, flasher or pedestrian indication, repair or replace video/radar/microwave detector, repair or replace camera, repair or replace dynamic message sign, repair or replace radio antenna Lighting - Repair luminare RTMC - Repair faulty signal or flasher indication, repair or replace video/radar/microwave detector, repair or replace camera, repair or replace dynamic message sign, repair or replace lane control signal, repair or replace radio antenna, repair or replace gate arm electrical equipment													
Connect new or replacement equipment	Elect tie required		P					P			N/A	0, RIG, IHT	0, RIG, IHT
e.g. Signals - Connect wiring to new or replacement signal pole, signal pedestal, luminare extension, replace luminare, replace signal head, replace EVP indicator light fixture, connect new dynamic message sign, connect new non-power-limited camera Lighting - Connect new or replacement light pole, replace luminare RTMC - Connect wiring to new or replacement signal pedestal, replace signal head, connect new dynamic message sign, connect new lane control signal, connect new non-power-limited camera, connect new or replacement gate arm													
Add or modify equipment wiring and hardwired components in field, not-power-limited	Elect tie required		P					P			N/A	0, RIG, IHT	0, RIG, IHT
e.g. Signals - Move wires on terminal blocks in pole or pedestal base, add new signal head or signal section, add enforcement light, add EVP light, add pedestrian countdown display, replace luminare with a different type, replace incandescent indication with LED indication, replace dynamic message sign with different type Lighting - Replace luminare with a different type, add or remove photobeams from luminare, add receptacle to lighting pole RTMC - Move wires on terminal blocks in pedestal base, add new signal head or signal section, replace incandescent indication with LED indication, replace dynamic message sign with different type													
Add or modify equipment wiring and hardwired components in field, power-limited	Elect or power limited tie required		PLT	P				PLT	P		N/A, Gloves	Not Used -	Not used
e.g. Signals - Move class 2 or class 3 wires on terminal blocks, add pedestrian pushbutton, replace pedestrian pushbutton with different type, add EVP detector, add power-limited camera, replace power-limited camera with a different type, add power-limited video/radar/microwave detector, replace power-limited video/radar/microwave detector with different type Lighting - Not applicable RTMC - Move class 2 or class 3 wires on terminal blocks, add power-limited camera, replace power-limited camera with a different type, add power-limited video/radar/microwave detector, replace power-limited video/radar/microwave detector with different type													
Build up equipment in shop	Misc parts inspection	A	A	P	A	A	A	P	A		N/A	N/A	N/A
e.g. Signals - Assemble standard signal sections and mounting provisions to form a signal head specific for a location to be installed in the field Lighting - Not applicable RTMC - Assemble standard signal sections and mounting provisions to form a signal head specific for a location to be installed in the field													
Replace equipment pluggable items	Not electrical work	A	A	A	A	A	A	A	A		N/A	0, RIG, IHT Fuses	0, RIG, IHT Fuses
e.g. Signals - Replace plug-in camera, replace LED modules, replace incandescent, LED, induction or HID lamps, replace EVP indicator lamp, replace photobeams in luminare, replace plug-in dynamic message sign modules, replace plug-in network devices, replace fuses Lighting - Replace photobeams on luminare, replace fuses, replace lamps RTMC - Replace plug-in camera, replace LED modules, replace incandescent lamps, replace plug-in dynamic message sign modules, replace plug-in lane control signal modules, replace plug-in network devices, replace fuses													
Temporarily disconnect, reconnect and/or test wiring and/or equipment	Main elect exemption	A	A	A	A	A	A	A	A		N/A	0, RIG, IHT	0, RIG, IHT

Work Eligibility List DU Approved With Classifications and 706 Categories...etc

Electrical Work License Requirements and Roles	License Required	Metro Traffic Engineering				Outstate Traffic Engineering				NPPA 70E Hazard/Risk Category		
		ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480
Wiring and cables external to and/or entering field equipment/control cabinet/shelter/enclosure												
Plans and specifications for field wiring	PE signoff required									N/A	N/A	N/A
Add, replace, repair or modify field wiring, non-power-limited e.g. Signals - Pull new or replacement conductor/cable through conduit, replace wiring harness, replace conduit, install new conduit, move signal indicator to different conductor within cable, terminate conductor, terminate or modify cable sheath grounding, splice wires Lighting - Add new section of lighting cable, replace section of lighting cable, move luminaire to different cable conductor, terminate or modify cable sheath grounding, splice wires RTMC - Pull new or replacement conductor/cable through conduit, replace wiring harness, replace conduit, install new conduit, move signal indicator to different conductor within cable, terminate conductor, terminate or modify cable sheath grounding, splice wires	Elect lic required	P				P				N/A	0, RIG, IHT	0, RIG, IHT
Add, replace, repair or modify field wiring, Add or modify hardware, power-limited e.g. Signals - Pull new or replacement conductor/cable through conduit, replace wiring harness, terminate conductor, terminate or modify electrical or fiber optic cable sheath grounding, splice loop detector wires, splice power limited wires Lighting - Not applicable RTMC - Pull new or replacement conductor/cable through conduit, replace wiring harness, terminate conductor, terminate or modify electrical or fiber optic cable sheath grounding, splice loop detector wires, splice power limited wires	Elect or power limited lic required	PLT	P			PLT	P			N/A, Gloves	Not Used	Not used
Temporarily disconnect, reconnect and/or test wiring e.g. Signals - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect Lighting - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect RTMC - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect	Mini elect exemption	A	A	A	A	A	A	A	A	N/A	0, RIG, IHT	0, RIG, IHT
Wiring physical maintenance e.g. Signals - Open handholes, perform visual inspection, re-bury buried cable that becomes exposed, clean out handholes Lighting - Open handholes, perform visual inspection, re-bury buried cable that becomes exposed, clean out handholes RTMC - Open handholes/vents, perform visual inspection, re-bury buried cable that becomes exposed, clean out handholes	Not electrical work	A	A	A	A	A	A	A	A	N/A, Gloves	N/A, Gloves	N/A, Gloves
HST - Highway Signal Technician (Licensed Electrician) ET - Electronic Technician (Associate Of Electronic Technician Degree) TSS - Transportation Worker series, including laborer OPS - District Traffic Signal Operations RTMC - Regional Transportation Management Center (Freeway Management System) P - Primary responsibility for task A - Alternate eligible for task, shall coordinate with primary person Blank - Not eligible or not appropriate to do the work Unlicensed individuals may do electrical work requiring an electrical license under the "direct supervision" of a licensed person, must register RIG - Rubber insulated Glove IHT - Insulated Hand Tools												

Electrical Work License Requirements and Roles	License Required	Metro Traffic Engineering				Outstate Traffic Engineering				NPPA 70E Hazard/Risk Category		
		ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480
e.g. Signals - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect Lighting - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect RTMC - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect												
Equipment physical maintenance e.g. Signals - Replace broken access doors and covers, locks, vacuum, replace air filter, remove rodent nest, open access doors and hinged panels, perform visual inspection Lighting - Replace broken access doors and covers, locks, vacuum, replace air filter, remove rodent nest, open access doors and hinged panels, perform visual inspection RTMC - Replace broken access doors and covers, locks, vacuum, replace air filter, remove rodent nest, open access doors and hinged panels, perform visual inspection, replace broken physical pane arm	Not electrical work	A	A	P	A	A	A	P	A	N/A	N/A Dead Front 0, RIG, IHT Exposed	N/A Dead Front 0, RIG, IHT Exposed
Electronic equipment repairs e.g. Signals - Shop repair of failed electronic components such as cameras, dynamic message sign modules, radios, modems Lighting - Not applicable RTMC - Shop repair of failed electronic components such as cameras, dynamic message sign modules, radios, modems	Not electrical work	P	A	A	A	P	A	A	A	N/A	N/A	N/A

Electrical Work License Requirements and Roles	License Required	Metro Traffic Engineering			Outstate Traffic Engineering			NPPA 70E Hazard/Risk Category				
		ET	HST	TSS	OPS	ET	HST	TSS	OPS	Low Voltage	120/240	240/480
Wiring and cables external to and/or entering field equipment/control cabinet/shelter/enclosure												
Plans and specifications for field wiring	PE signoff required									N/A	N/A	N/A
Add, replace, repair or modify field wiring, non-power-limited <i>e.g.</i> Signals - Pull new or replacement conductor/cable through conduit, replace wiring harness, replace conduit, install new conduit, move signal indication to different conductor within cable, terminate conductor, terminate or modify cable sheath grounding, splice wires Lighting - Add new section of lighting cable, replace section of lighting cable, move luminaire to different cable conductor, terminate or modify cable sheath grounding, splice wires RTMC - Pull new or replacement conductor/cable through conduit, replace wiring harness, replace conduit, install new conduit, move signal indication to different conductor within cable, terminate conductor, terminate or modify cable sheath grounding, splice wires	Elect lic required	P				P				N/A	0, RIG, IHT	0, RIG, IHT
Add, replace, repair or modify field wiring, Add or modify hardware, power-limited <i>e.g.</i> Signals - Pull new or replacement conductor/cable through conduit, replace wiring harness, terminate conductor, terminate or modify electrical or fiber optic cable sheath grounding, splice loop detector wires, splice power limited wires Lighting - Not applicable RTMC - Pull new or replacement conductor/cable through conduit, replace wiring harness, terminate conductor, terminate or modify electrical or fiber optic cable sheath grounding, splice loop detector wires, splice power limited wires	Elect or power limited lic required	PLT	P			PLT	P			N/A, Gloves	Not Used	Not used
Temporarily disconnect, reconnect and/or test wiring <i>e.g.</i> Signals - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect Lighting - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect RTMC - Disconnect cables to attach locator equipment and reconnect, disconnect circuit conductors for insulation testing and reconnect, apply meter probes to measure voltage, current and/or waveforms, disconnect wires to measure current and reconnect	Mini elect exemption	A	A	A	A	A	A	A	A	N/A	0, RIG, IHT	0, RIG, IHT
Wiring physical maintenance <i>e.g.</i> Signals - Open handholes, perform visual inspection, re-bury buried cable that becomes exposed, clean out handholes Lighting - Open handholes, perform visual inspection, re-bury buried cable that becomes exposed, clean out handholes RTMC - Open handholes/vents, perform visual inspection, re-bury buried cable that becomes exposed, clean out handholes	Not electrical work	A	A	A	A	A	A	A	A	N/A, Gloves	N/A, Gloves	N/A, Gloves
HST Highway Signal Technician (Licensed Electrician)												
ET Electronic Technician (Associate Of Electronic Technician Degree)												
TSS Transportation Worker series, including laborer												
OPS District Traffic Signal Operations												
RTMC Regional Transportation Management Center (Freeway Management System)												
P Primary responsibility for task												
A Alternate eligible for task, shall coordinate with primary person												
Blank Not eligible or not appropriate to do the work												
Unlicensed individuals may do electrical work requiring an electrical license under the "direct supervision" of a licensed person, must register												
RIG Rubber insulated Gloves												
IHT Insulated Hand Tools												