



Public Works Department Lighting District

Supplemental Specifications for Traffic Signal and Street Lighting Installations

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7000 Florida Street

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General Notes

Traffic Signals & Street Lighting Work within Charlotte County

The following pertains to all traffic signals/street lighting work, either in conjunction with a road project or a “free standing” electrical project. These notes apply to all traffic signal projects where existing equipment is maintained and/or any new equipment will be maintained by Charlotte County or unless otherwise noted on project plan sheets and indicated as approved by Charlotte County.

Before any project work begins there shall be a maintenance transfer (forms follow general notes). The maintenance will transfer from the Charlotte County Lighting District to an FDOT qualified electrical contractor no later than the day before the project begins. The contractor is required to have an authorized representative on-site to accept the maintenance transfer and to witness to existing condition of the traffic signal or street lighting system.

Any deficiencies that may be found on the day of the maintenance transfer shall be repaired by the Charlotte County Lighting District at that time. After any deficiencies have been corrected on the day of the transfer, any and all deficiencies found from that day and time shall be the responsibility of the contractor.

- 1. Notifications:** Before the start of any construction of Traffic Signals, Street Lighting, RRFBs, Flashers, School Flashers, or ITS Devices, the Charlotte County Lighting District shall be notified via email LightingInspector@CharlotteCountyFL.gov at least ten (10) business days prior.
- 2. Preliminary Product and Equipment Data Submittals:** Prior to installation or within thirty (30) days after the preconstruction meeting, whichever comes first, submit to the Charlotte County Lighting District for approval, a completed submittal package that includes the following: All traffic control signals, devices, and hardware that will be used on the project. Shop drawings for structural support material and other special designs, such as non-electrical, non-mechanical, or other fabricated items which may not be specifically detailed in the plans via email (LightingInspector@CharlotteCountyFL.gov).

3. Qualifications: Minimum qualifications for personnel supervising or performing work involving electrical or solar power traffic control devices and related components.

1. **Traffic Signal Cabinet Wiring:** Work must be performed by an employee of the Contractor that holds a current IMSA Traffic Signal Field Technician Level II certification or higher; and must be present at the final inspection of the project.
2. **Traffic Signal Electrical Service:** Work must be performed by or in the presence of and under the responsible charge of an employee of the licensed electrical Contractor and that holds a current IMSA Traffic Signal Field Technician Level II certification or higher.
3. **RRFB, Flashers, and School Flashers:** Work must be performed by an employee of the Contractor that holds a current IMSA Traffic Signal Field Technician Level II certification or higher; and must be present at the final inspection of the project.
4. **ITS Devices:** Work must be performed by an employee of the Contractor that holds a current IMSA Traffic Signal Field Technician Level II certification or higher; and must be present at the final inspection of the project.
5. **Street Lighting:** Work must be performed by or in the presence of and under the responsible charge of an employee of the licensed electrical Contractor and that holds a current IMSA Roadway Lighting Technician Level I certification or higher.

4. Contractor Transfer of Maintenance Responsibilities:

1. Fully maintain all traffic control devices located within the Project limits, including any interconnect, preemption, system/advanced loops, and ITS Devices, beginning on the date of the Notice to Proceed or the date Contractor has begun any work on any portion of the Project, whichever is sooner, through and including the date of Final Acceptance by the County subject to any additional Contractor Warranty and Burn-in Period requirements. Investigate all inquiries, complaints or requests made by the County or the Public and immediately initiate all required repairs.
2. Notify the Charlotte County Lighting District of intent to begin any physical construction work on the Project or any portion thereof. This notification must be a minimum of seven (7) working days prior to the start of construction to allow sufficient time for Contractor to conduct an inspection of the existing traffic control device installation(s). In the event any deficiencies are noted by Contractor, at the County's option, they are to be repaired by the Charlotte County Lighting District or documented on the "Transfer of Maintenance" form. If work is started prior to the inspection, maintenance of the traffic control device(s) will immediately be transferred to Contractor without an inspection. Contractor is then responsible for repairing or replacing all equipment that is not operating properly or is damaged at no cost to the owner of the traffic control device.

5. Emergency and Non-Emergency Repairs:

1. Provide the Charlotte County Lighting District a minimum two (2) contact names and (24-hour) telephone numbers. Contractor must provide sufficient qualified personnel to respond to all notifications of malfunctions on a round-the-clock basis (24 hours a day, 7 days a week).
2. Maintain and make available to the Charlotte County Lighting District a time and date log of each response from the time of the initial report to the time of final permanent repair.
3. When a signal malfunction occurs, Contractor must respond within two (2) hours of notification and repair the traffic signal so that it is operating in a safe manner within four (4) hours of initial notification. Contractor is responsible for the permanent repair within 24 hours and must notify the County immediately upon completion of the repairs. If Contractor fails to respond within two (2) hours, the County reserves the right to either repair the malfunction or employ alternate personnel and charge all costs incurred by the County to the Contractor.
4. Authorized County personnel may, at any time, enter the controller cabinet in order to modify timing or restore any and all signal equipment to proper operation if the malfunction or non-function of such equipment poses a hazard or inconvenience to motorists or pedestrians. Such authorized entry may occur at any time within the period of the contract, and such authorized entry will in no way relieve the Contractor or manufacturer of their respective warranties.

6. Emergency Repairs:

1. During the Transfer of Maintenance period, the following will be considered an Emergency unless otherwise identified by the Charlotte County Lighting District:
 - i. Any hazardous condition.
 - ii. Any malfunction of a controller and its accessory equipment; or
 - iii. Any site condition, equipment malfunctions or damage, which in the opinion of the Charlotte County Lighting District constitutes a serious hazard or inconvenience to the public.
2. Contractor must dispatch personnel to undertake each such repair no later than thirty (30) minutes after the County notifies Contractor of the Emergency. Personnel responding must arrive within one (1) hour after notification and immediately proceed to make the site safe.

- 7. Locates:** One (1) courtesy locate shall be performed by the Charlotte County Lighting District at the start of the project at the contractor's request. The contractor shall document the location of the existing underground and above ground facilities. After the courtesy locate, all locates within the project limits are the responsibility of the contractor and shall be performed in a timely manner. Timely manner in response to locates is defined as, locate shall be performed no later than twenty-four (24) hours after notification or as required by Florida Statute. The Charlotte County Lighting District will advise the contractor via e-mail or fax of Sunshine Locate requests within the work zone. Any damage incurred due to contractor failure to locate shall be repaired by the contractor. Should Charlotte County forces be called out to make repairs due to contractor refusal or inability to make repairs, the contractor will be billed the entire cost as a "deduct" on the next payment request and will trigger a "vendor/contractor complaint" notice to be filed with Charlotte County Contracts as well as FDOT. Being an "out of town" contractor does not relieve this responsibility.
- 8. Damage to existing facilities:** Any damage to Charlotte County facilities shall be repaired by the contractor. Repairs shall be made to ensure facilities are like or better. Any damage to existing communication lines shall necessitate the removal of all damaged lines and the re-pulling of new cable. Splicing of communication lines will not be allowed. Caution shall be exercised during excavation near existing Charlotte County fiber optic lines, since many entities use these facilities. Should damage occur to fiber optic lines, Charlotte County will decide which qualified fiber optic splicing company will be used to make repairs. The contractor will be responsible for all repair costs incurred, whether repairs are made by Charlotte County or a third party.
- 9. Existing Equipment:** Equipment shall be returned to the Charlotte County Lighting District in good operating condition and in the same condition as on the day of the maintenance transfer at 7000 Florida Street, Punta Gorda, FL 33950 and within a timely manner. Timely manner for existing equipment is defined as: no later than 72 hours after disconnection. The contractor shall notify Charlotte County of the disconnection 24 hours in advance to schedule the delivery of the equipment, so the delivery takes place during a regular business day and hours. Failure to perform as outlined in this paragraph will result in no inspection at completion until contractor is in compliance with this requirement. The Charlotte County Lighting District will withhold payment requests until Charlotte County property is delivered to 7000 Florida Street, Punta Gorda, FL 33950.
- 10. Cabinet/Controller/Video Detection Prep:** The Charlotte County Lighting District will assist the contractor in the setup of new signal cabinet/controllers/cameras when the following conditions are met: delivery of equipment to 7000 Florida Street, Punta Gorda, FL 33950 by contractor or shipper. The contractor shall send a qualified technician to the signal shop to setup the equipment with the aid of a senior signal technician, giving a minimum of 48 hours' notice. After setup, the contractor shall arrange to pick up the equipment within one week. At time of removal from the Charlotte County shop, the equipment shall be signed out by the contractor representative as complete. Charlotte County will not store contractor equipment. Under these conditions, the Charlotte County Lighting District will assist the contractor with "turn on" day in the field. Should the contractor elect to setup, burn in, and test the equipment without Charlotte County assistance, a manufacturer's representative shall be onsite at the contractor's expense, on the day of turn on to assist the contractor and to verify proper operation.

11. SPECIAL NOTE REGARDING NEW CONTROLLERS: Charlotte County reserves the right to substitute different control equipment in the event that delivered equipment is not compatible with the existing system. Since system upgrades may be behind controller technology, as the maintaining agency, the Charlotte County Lighting District will decide equipment placement, timing and may provide an alternate controller temporarily until future upgrades are made. If there is a cost differential, payment will be made to the contractor per plan quantity and specification.

12. Temporary Detection and Maintenance:

Contractor shall provide and maintain fully actuated vehicle detection at existing, temporary, and new signalized intersection for the duration of the entire project.

Several options are available to the contractor for temporary vehicle detection:

1. Maintain and/or recut loops as necessary.
2. Install contractor-owned temporary video detection.
3. Install the permanent cameras that may be called out on the plans for temporary use during construction. The contractor can relocate these cameras to their permanent location at the appropriate time. Should the contractor choose option 3, Charlotte County will not be responsible for any damage to the video cameras during the project. The cameras shall be subject to final inspection and shall be in good working order.

Additionally, all existing signal phases, any phases active during construction, and all-new or modified phases resulting from new construction shall have detection fully maintained and operational during the duration of the project. Only detection approved by the Charlotte County Lighting District and operated properly in the “presence” mode may be used. **Motion detection such as microwave pulse detection is prohibited.**

No additional compensation will be allowed, unless specifically called out in the plans for any of the above options. **Microwave detection or pulse detection shall not be used in Charlotte County for presence detection due to operational problems and failure to detect stopped vehicles.**

13. New Signals or SOP: All new signals or existing signals with a new SOP shall have DMS boards on all approaches 48 hours prior to Pre-Flash, Full-Operation, or New SOP. The Charlotte County Lighting District representative shall be present for: Flash Mode activation, Full operation, or New SOP.

14. Pre-Flash: Prior to activating flash mode at new signals, inspection will be required to ensure the intersection is ready to be energized. Activation of Flash mode shall be done on Monday, Tuesday, Wednesday, or Thursday between the hours of 9:00 AM – 11:00 AM. Place all new signal installations (no existing signals) in flash for a minimum of 72 hours not to exceed 168 hours unless EOR or The Charlotte County Lighting District approves in writing. If signal cannot go into full operation after 168 hours the signal must be turned back off and signal indications covered.

15. Full Operation: Once the pre-flash requirement has been satisfied, the intersection can be placed into full operation unless Prime Contractor or the Charlotte County Lighting District states otherwise in writing. Full operation shall be done on Tuesday, Wednesday, or Thursday between the hours of 9:00 AM – 11:00 AM unless falls on a Holiday or special events.

16. Traffic Signal & Street Lighting Inspections:

1. All traffic signal & street lighting inspections must be scheduled via email at LightingInspector@CharlotteCountyFL.gov two weeks in advance of pre-flash activation, Full-operation, SOP change, final inspection, or punch list inspections.
2. The vendor shall configure all video/radar detection before the final inspection takes place. Failure to do so will result in rescheduling of the inspection.
3. Intersection shall be programmed to final configuration prior to scheduling final inspection.
4. Contractor is required to be present and/or have an authorized representative on all formal inspections. Contractor shall have all necessary equipment to complete the inspections onsite at all signal and lighting inspections. Failure to have a representative onsite will result in the cancellation of the inspection and the withholding of final payment. Authorized representative is a person with knowledge and ability to make corrections as needed. This is a requirement and is necessary to eliminate costly re-inspections and to speed up the close-out of the project.

17. As-Built Drawings: When construction is complete, as a condition precedent to final acceptance, provide signed and sealed As-Built Drawings, either by a State of Florida licensed Professional Engineer or a professional surveyor and mapper contractor in electronic form (.pdf) to: LightingInspector@CharlotteCountyFL.gov

18. Warranty: Contractor's responsibility for warranty repairs, warranty replacement, troubleshooting, or other costs associated with repair or replacement of traffic control signals and devices within the Contract's project limits will terminate 90 days after Final Acceptance.

19. Drilled Shaft: Mast arm drilled shaft inspections are required before concrete placement. Please refer to the most current FDOT standard specifications for drilled shaft installation, which require an FDOT certified drilled shaft inspector to be onsite during the entire process. Use casing when necessary to ensure shaft integrity. Concrete strain pole excavations will also require inspection. When using the "wet hole" method, the concrete shall be placed from the bottom up, using either a concrete pump or tremie tube, or as specified in the plans by the EOR. No free-falling concrete shall be allowed. All FDOT guidelines for concrete QA/QL shall be adhered to. Twenty-four (24) hours' notice is required for the inspector as shown in the plan set general notes. Should the information be missing, the contractor is hereby directed to call the Charlotte County Lighting District at 941-575-3600 and ask for the Signal Inspector.

End of General Notes

Section 1 - Directional Bore

1.1 General

- 1.1.1 Directional bore conduit for general signalization and street lighting shall be two (2) inch continuous HDPE, SDR 13.5, and shall be gray in color. No other conduit color can be used unless approved by The Charlotte County Lighting District in writing.
- 1.1.2 Directional bore conduit for FOC Interconnects shall be two (2) inch continuous HDPE, SDR 13.5, and shall be orange in color. No other conduit color can be used unless approved by the Charlotte County Lighting District in writing. A minimum of #10 Orange CU THHN Stranded Copper wire shall be installed for locating purposes in the orange conduit. The Locate Wire shall not be spliced in the conduit. Splices of the locate wire shall be in pull boxes and spliced with a split bolt and insulated per NEC. Contractor must perform continuity tests and insulation resistance tests on all locate wires and provide the Charlotte County Lighting District with all test results. Replace, or repair defective locate wire at no additional cost to the County.
- 1.1.3 All road crossings for signalization shall have a minimum of six (6) each two (2) inch conduits. (2- Signal High Voltage, 1 - PED High Voltage, 1 - Signal/PED Low Voltage, 1 - Detection, 1 - Power intersection lighting)
- 1.1.4 Potholes cut in pavement are prohibited to locate existing utilities unless approval is obtained from the Engineering Division.
- 1.1.5 Any bores that fail, are to be removed. If removal is not possible, ends shall be cut off at a minimum depth of 36" below ground and the pipes shall be grouted.
- 1.1.6 All conduits on Directional Bore Crossings shall be installed in one packet.

1.2 Installation

- 1.2.1 All road and driveway crossings shall be a minimum of 36" deep.
- 1.2.2 All holes caused by equipment shall be backfilled and match existing elevation (installing sod if needed).
- 1.2.3 If the distance is too far to complete the bore in one attempt, then the contractor shall use reverse thread couplings to connect the HDPE conduit together.
- 1.2.4 When connecting HDPE conduit to standard PVC conduit a E-LOC coupling shall be used. Use of a standard PVC coupling is prohibited.

End of Section 1

Section 2 - Conduit

2.1 General

- 2.1.1 Any changes to specifications must be approved by the Charlotte County Transportation Engineer in writing.
- 2.1.2 All road crossings for signalization shall have a minimum of seven (7) each two (2) inch conduits. (3- Signal High Voltage, 1 - PED High Voltage, 1 - Signal/PED Low Voltage, 1 - Detection, 1 - Power intersection lighting)
- a. All Mast Arm Foundations shall have minimum – five (5) each two (2) inch conduit and one (1) each ($\frac{3}{4}$) inch conduit. Conduit stub out location to be determined by The Charlotte County Lighting District in field. Stub outs shall be a minimum of thirty (30) inches deep. **(Intersection lighting shall be separate from standard street lighting circuit. Having 480 VAC power in a signal pole is strictly prohibited.)**
- Two - 2" conduit for Signal high voltage
 - One - 2" conduit for PED high voltage
 - One - 2" conduit for power **(240 VAC maximum)** – intersection lighting
 - One - 2" conduit for detection
 - One - $\frac{3}{4}$ " conduit for #6 AWG green ground wire
- b. All Steel Strain Pole Foundations shall have minimum – five (5) each two (2) inch conduit and one (1) each ($\frac{3}{4}$) inch conduit. Conduit stub out location to be determined by The Charlotte County Lighting District in field. Stub outs shall be a minimum of thirty (30) inches deep. **(Intersection lighting shall be separate from standard street lighting circuit. Having 480 VAC power in a signal pole is strictly prohibited.)**
- Two - 2" conduit for signal high voltage
 - One - 2" conduit for PED high voltage
 - One - 2" conduit for power **(240 VAC maximum)**– intersection lighting
 - One - 2" conduit for detection
 - One - $\frac{3}{4}$ " conduit for #6 AWG green ground wire
- c. All Concrete strain poles shall have a minimum of four (4) each two (2) inch flexible conduit. **(Intersection lighting shall be separate from standard street lighting circuit. Having 480 VAC power in a signal pole is strictly prohibited.)**
- One - 2" conduit for signal high voltage
 - One - 2" conduit for ped high voltage
 - One - 2" conduit for power **(240 VAC maximum)** – intersection lighting
 - One - 2" conduit for detection
- d. All Controller Cabinet Base assembly shall have minimum the following Conduits:
- One - 3" Conduit for Signal High Voltage
 - One - 3" Conduit for Ped High Voltage
 - One - 3" Ped Low Voltage Detection
 - One - 3" Detection
 - One - 2" HDPE Continuous Conduit (Orange) For FOC
 - One - 2" Conduit for Power Service
 - One – $\frac{3}{4}$ " Conduit For #6 AWG Green Ground Wire

- e. Intersection lighting and illuminated sign power wires are prohibited from being in the cabinet.
- f. All pedestal bases for Vehicle signal indications shall have minimum the following conduits:
 - One - 2" conduit for Signal high voltage
 - One - 2" conduit for Spare/Detection if Video detection is installed
 - One - 3/4" conduit for #6 AWG green ground wire
- g. All Pedestal bases for Pedestrian signal indications shall have minimum the following conduits:
 - One - 2" conduit for Ped High Voltage
 - One - 2" conduit PED Detection (PED Low voltage)
 - One - 3/4" conduit for #6 AWG green ground wire
- h. All Pedestal bases for flashers, school flashers, and RRFBs shall have minimum the following conduits:
 - One - 2" conduit for AC power/Spare
 - One - 2" conduit Spare
 - One - 3/4" conduit for #6 AWG green ground wire

2.1.3 Where FOC interconnect conduit is called for, 2-2"-inch continuous HDPE SDR 11 "Orange". No other conduit colors can be used unless approved by The Charlotte County Lighting District in writing. A minimum of #10 Orange CU THHN Stranded Copper wire shall be installed for locating purposes in the orange conduit. The locate wire shall not be spliced in the conduit. Splices of the locate wire shall be in pull boxes and spliced with a split bolt and insulated per NEC.

Perform continuity tests and insulation resistance tests on all locate wires and provide The Charlotte County Lighting District with all test results. Replace, or repair defective locate wire at no additional cost.

2.1.4 All street lighting conduit shall be two (2) inch minimum.

2.1.5 Trenched in conduit shall be PVC conduit only. HDPE conduit is strictly prohibited for trenched in conduit except for FOC interconnect.

2.1.6 PVC conduit shall be schedule 40 or schedule 80 approved for electrical use (gray). No thin wall conduit is allowed. Twenty (20) foot lengths on runs over twenty (20) foot shall be used.

2.1.7 Existing two (2) inch conduit shall not have innerduct.

2.1.8 Any conduit above ground shall be rigid galvanized steel conduit or Schedule 80 PVC.

2.1.9 High and low voltage shall be in separate conduits.

2.1.10 All spare conduits shall have mule tape installed.

2.2 Installation

- 2.2.1 Conduit shall be installed at a minimum depth of thirty-six (36) inches.
- 2.2.2 When connecting HDPE conduit to standard PVC conduit a Reverse thread coupling, or E-LOC coupling shall be used. Use of a standard PVC coupling is prohibited.
- 2.2.3 All PVC conduits shall be joined together with long line couplings.
- 2.2.4 All rocks and debris shall be removed from the trench.
- 2.2.5 Backfill shall be clean and contain no rocks.
- 2.2.6 Observe maximum number of conduits allowed in a pull box per NEC. Install per FDOT standard index.

2.3 Termination

- 2.3.1 All conduits shall be notched, and white caps installed at each end to protect the cable and pipe.
- 2.3.2 **All cables must be labeled with Nylon Cable Ties with a minimum of 1 inch of writing space.**

End of Section 2

Section 3 - Pull Box

3.1 General

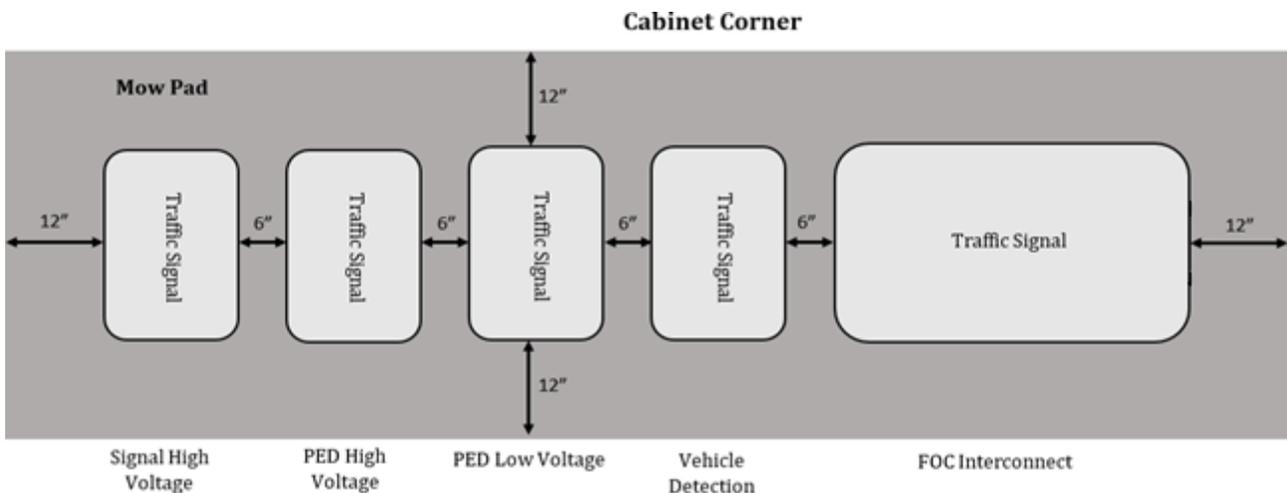
- 3.1.1 Pull boxes shall be Polymer concrete construction (Quazite), have ANSI Tier rating of T22 and design load rating of 22,500 lbs., no exceptions will be permitted. Minimum pull box size shall be as follows:
- i. Traffic Signal and Street Lighting 17" x 30" x 12" - (PG1730BA12)
 - ii. Fiber Optic Cable mid runs 24" x 36" x 24" - (PG2436BA24)
 - iii. Fiber Optic Cable Splice Vault - 30" x 60" x 36" - (PG3060BA36)
- 3.1.2 Pull box covers shall be Polymer concrete construction (Quazite), have ANSI Tier rating of T22 and design load rating of 22,500 lbs., and marked appropriately, "Traffic Signal" or "Street Lighting", no exceptions will be permitted.
- i. 17" x 30" cover - "Traffic Signal" - (PG1730HH0046), "Street Lighting" - (PG1730HH0041)
 - ii. 24" x 36" cover - "Traffic Signal" - (PG2436HH0046)
 - iii. 30" x 60" cover 2 piece - "Traffic Signal" - (PG3060HH0046)
- 3.1.3 Pull boxes shall be sized to accommodate maximum number of pipes allowed per NEC and to comply with cable manufacturer's bend radius.
- 3.1.4 Distance between pull boxes on long runs shall be minimum of five hundred (500) feet and maximum of One thousand (1000) feet as determined by EOR.
- 3.1.5 For signalization, shall have a minimum of five (5) pull boxes. (1 – Signal High voltage, 1 – PED High Voltage, 1 – Signal/PED Low Voltage, 1 – Detection, 1 – Power – Intersection lighting)
- 3.1.6 Pull boxes shall not be installed in roadways or Pedestrian ramps, no exceptions will be permitted.
- 3.1.7 Pull boxes shall not be installed in sidewalk without prior approval from The Charlotte County Lighting District in writing.

3.2 Installation

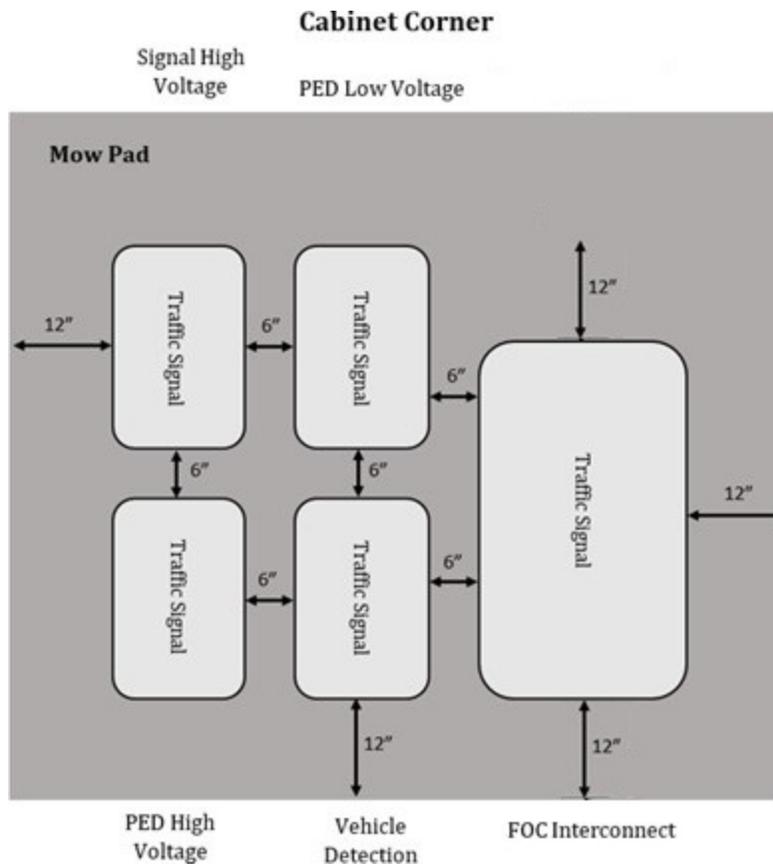
- 3.2.1 As per current FDOT specifications Section 635.
- 3.2.2 All pull boxes shall have a minimum of six (6) inches between other pull boxes.
- 3.2.3 All pull boxes shall have a concrete apron; the apron shall be minimum 1-foot-wide x 6 inches deep. Apron shall be level to existing grade and have a finished edge and surface.
- 3.2.4 Pull boxes shall not be incorporated into the cabinet work pad.
- 3.2.5 Refer to acceptable Pull box layouts below Section 3.3. If layouts below do not work field adjustment is acceptable if approved by The Charlotte County Lighting District in writing.
- 3.2.6 All conduits except FOC conduit shall be plumbed, centered and no lower/higher than midpoint in the pull box.
- 3.2.7 All FOC conduit shall be at forty-five (45) degree angle, facing towards opposite end of pull box. Conduit shall be just past the center point of pull box and shall be no lower/higher than midpoint in the pull box. Opposing conduit runs shall be intertwined.
- 3.2.8 All pull boxes shall have a minimum of twelve (12) inch bed of rock under pull box and fill inside of pull box with (4) inches of rock. Rock shall be 57 stone (3/4" clear) or equivalent.

3.3 Illustration

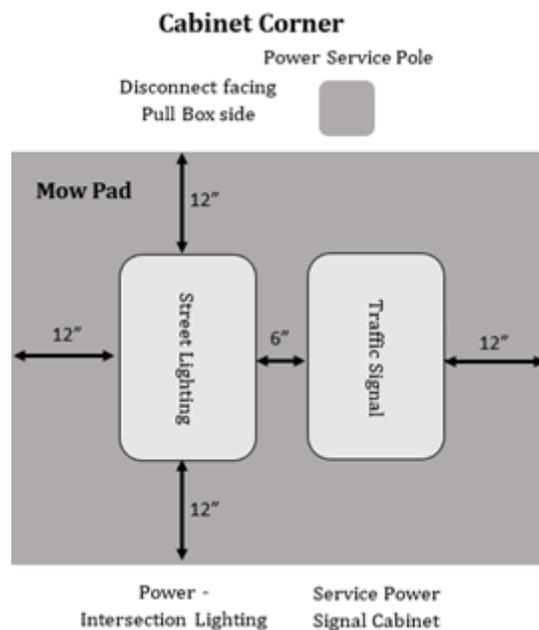
3.3.1 Linear pull box (Cabinet Corner) illustration



3.3.2 Quad pull box (Cabinet Corner) illustration



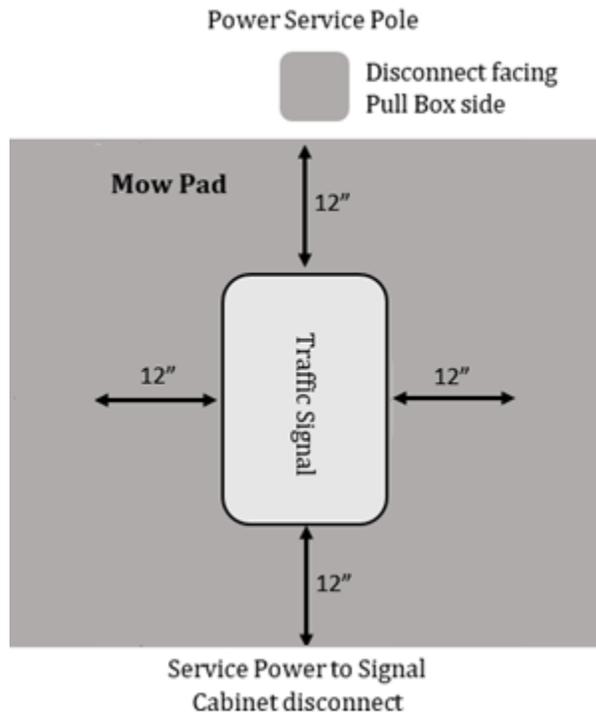
3.3.3 Electrical Service and intersection lighting power pull box illustration (Cabinet Corner)



3.3.4 Main Electrical Service

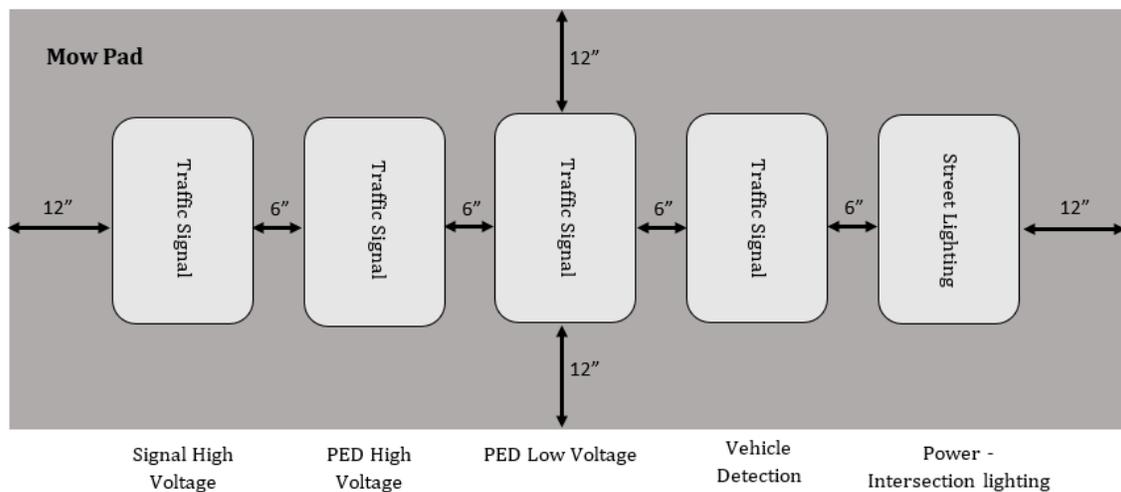
(Used when power feed is not on cabinet corner or when power feed run is 150 feet or greater)

Electrical Meter Main Disconnect

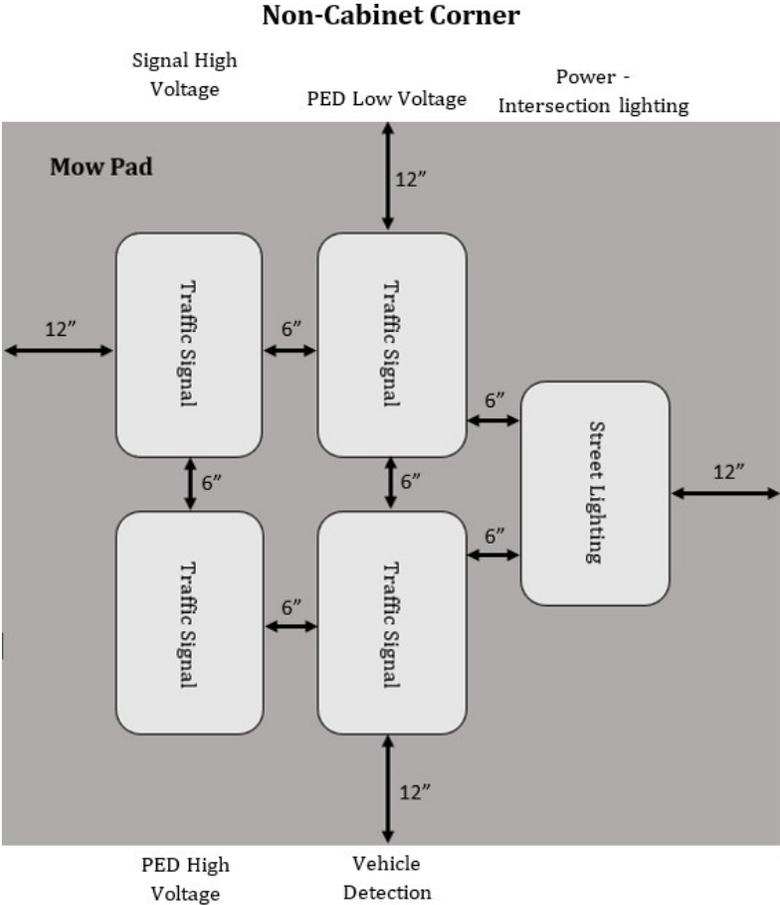


3.3.5 Linear pull box (Non-Cabinet Corner) illustration

Non-Cabinet Corner



3.3.6 Quad pull box (Non-Cabinet Corner) illustration



End of Section 3

Section 4 - Cabinet Base

4.1 General

- 4.1.1 Cabinet base shall be Polymer Concrete construction (Quazite) and shall be 40" X 58" X 24" with a 12" x 24" Throat Opening. Quazite P/N: PB40581224B24, approved for Charlotte County.
- 4.1.2 Cabinet base shall be buried to manufacturer's recommended depth.
- 4.1.3 Signal cabinet shall not be placed in drainage slopes, swales, or where sheet water can intrude.
- 4.1.4 There shall be a six (6) foot level clear zone surrounding the cabinet base.
- 4.1.5 Cabinet work pad shall be poured in place on signal cabinet access side of base. It shall be the length of the base and a minimum thirty-six (36) inches wide and 6" thick with a finished edge and surface. A composite or precast pad is not acceptable.

4.2 Installation

- 4.2.1 Elevation of cabinet base shall be at the same elevation as the center of roadway, but no higher than twelve (12) inches above the center of roadway.
- 4.2.2 For conduit specifications, [see section 2](#).
- 4.2.3 Spare conduits from cabinet base shall terminate at closest designated pull box and shall be sealed with duct seal or capped.
- 4.2.4 All fill dirt must be compacted around the cabinet base.
- 4.2.5 Stub up conduits shall be no lower than twelve (12) inches and no higher than six (6) inches below the access opening in cabinet pad and shall be centered within the throat opening.
- 4.2.6 Install twelve (12) inch minimum bed of rock under cabinet base and fill inside of cabinet base with six (6) inches of rock. Rock shall be 57 stone (3/4" clear) or equivalent.

End of Section 4

Section 5 – Mast Arm/Upright Poles

All new signalization projects shall utilize mast arm structures. The Engineer of Record shall represent seven directionally drilled conduits under three of the four legs of any intersection. A typical conduit and pull box layout are included within this document, and designers should follow this typical as close as possible. All mast arm and monotype structures shall be manufactured to comply with FDOT Standard Drawings, Indexes 17743 through 17745. The mast arm poles shall include the “optional terminal compartment.” The Standard Drawing Indexes shall be included within all signalization plans. The Engineer of Record shall calculate and sign/seal all dimensions which deviate from standard mast arm structure sizes. Mast arm assembly shop drawings must be submitted prior to any new mast arm pole installation.

5.1 General

- 5.1.1 Drilled Shaft foundations for mast arms shall be installed as per proposed plan elevation and shall not be installed in drainage slopes, swales, or where sheet water can intrude the anchor bolts.
- 5.1.2 When mast arm poles are installed, the pole height shall include additional height to include street light luminaires.
- 5.1.3 No electrical services are to be attached to mast arm poles.
- 5.1.4 No controller cabinets are to be attached to mast arm poles unless approved by the Charlotte County Lighting District in writing.
- 5.1.5 Terminal blocks are to be used in mast arm poles.
- 5.1.6 Astro Brackets shall not have terminal compartments.
- 5.1.7 Astro bracket hardware shall be tightened to manufacturer specifications with a torque wrench. No impact wrenches allowed.
- 5.1.8 All mast arm hardware shall be stainless steel 304 or 316.
- 5.1.9 All gusset tubes shall have the manufacturer gusset tube cap installed; shipping caps are prohibited.
- 5.1.10 Horizontally mounted 5 - section heads shall be mounted with two (2) Astro Brackets.
- 5.1.11 Single eye mesh grip strain relieves shall be used and appropriately sized to support signal cable in a mast arm upright.
- 5.1.12 Astro brackets shall be capable of being rotated 90 degrees without disassembly. When deemed necessary some installations will require articulating Astro brackets due to angle of arms.
- 5.1.13 Base of mast arm pole shall be screened.
- 5.1.14 Structural grout pad installation shall be performed by procedure below.

- 5.1.15 Wire mesh shall be installed at the mast arm connection point of the upright that will prevent vermin and debris from entering the potential access points by overlapping the wire mesh and using bolts and washers to secure in place. **Screwing or drilling into the connection plate is strictly prohibited.**
- 5.1.16 Mast arms shall be galvanized steel only. **If painted, a maintenance agreement is required to be in place.**

5.2 Installation

- 5.2.1 For conduit specifications, **see section 2.**
- 5.2.2 Conduits shall be plumbed and centered in foundation and shall be six (6) inches – ten (10) inches above the foundation. Top of the conduits shall be cut flat, not angled.
- 5.2.3 Each signal head shall have a separate cable from signal head to bottom of mast arm hand hole compartment.
- 5.2.4 A minimum of four (4) spare conductors at base of mast arm pole is required per trunk cable from cabinet.
- 5.2.5 Nut covers shall be installed on all mast arm anchor bolts.
- 5.2.6 All wiring including spares from trunk line shall be terminated on terminal block at base of upright handhole.

End of Section 5

Section 6 – Steel Strain Poles

6.1 General

- 6.1.1 Drilled Shaft foundations for steel strain poles shall be installed as per proposed plan elevation and shall not be installed in drainage slopes, swales, or where sheet water can intrude the anchor bolts.
- 6.1.2 The design and use of two (2) piece steel signal poles is not permitted for use in Charlotte County.
- 6.1.3 Charlotte County would like a copy of all steel pole submittals and calculations sheets prior to installation.
- 6.1.4 Steel Strain Poles shall be galvanized steel only. **If painted, a maintenance agreement is required to be in place.**
- 6.1.5 The base of steel pole shall be screened.
- 6.1.6 Structural grout pads shall be performed using using the procedure on page 71.
- 6.1.7 No electrical services are to be attached to steel strain poles.
- 6.1.8 No controller cabinets are to be attached to steel strain poles unless approved by the Charlotte County Lighting District in writing.

6.2 Installation

- 6.2.1 For conduit specifications, **see section 2.**
- 6.2.2 Conduits shall be plumbed and centered in foundation and shall be six (6) inches – ten (10) inches above the foundation. Top of the conduits shall be cut flat, not angled.
- 6.2.3 Nut covers shall be installed on all steel pole anchor bolts.
- 6.2.4 A minimum of four (4) spare conductors at base of steel strain pole is required per trunk cable from cabinet.
- 6.2.5 Appropriately sized wire nuts shall be used to splice signal cable in the base of pole shall have a minimum rating of 600V, silicone filled wire nuts are not permitted.
- 6.2.6 Spare conductors from signal heads shall be under its own appropriately sized split bolt and have its own #6 AWG green ground wire connected to the ground lug terminal.
- 6.2.7 Spare conductors from the trunk cable from the traffic signal cabinet shall have closed end crimp connectors installed on each individual conductor. Neatly formed and tie wrap all cable terminations. Trunk cable spare conductors shall be grounded at the traffic signal cabinet.

End of Section 6

Section 7 – Concrete Poles

7.1 General

- 7.1.1 Concrete poles shall be installed as per proposed plan elevation and shall not be installed in drainage slopes or swales.
- 7.1.2 Concrete/flowable fill around concrete strain pole shall be kept one (1) inch below conduit entry hole.
- 7.1.3 Calculations for design shall be submitted to the Traffic Engineer for approval prior to ordering poles.

7.2 Concrete Strain Pole Signal Supports

- 7.2.1 Signal poles shall comply with typical drawings, as to placement of attachment points, nipple placement, hand hole and conduit entry hole shall be cut at 45° to facilitate installation of conduits. Conduit entry hole shall be properly sized to accommodate two (2) each two (2) inch conduits per each conduit entry hole for a total of four (4) two (2) inch conduits per a concrete strain pole.
- 7.2.2 It is the contractor's responsibility to ensure all concrete signal poles comply with standard design and Charlotte County specifications prior to installing.
- 7.2.3 Concrete poles are to be designed by the pole manufacturer to meet FDOT standards and Charlotte County's specifications and details. The preferred standard configuration is a "box span", however, the size of the intersection, overhead power lines, underground utilities, right-of-way limitations or other factors may impact pole placement and necessitate a "diagonal" or other configuration.
- 7.2.4 Upon installation of signal poles, if the surrounding soil has potential for cave in around the pole, the contractor shall use corrugated pipe sleeved the length of the drilled hole.
- 7.2.5 No electrical services are to be attached to concrete strain poles.
- 7.2.6 No controller cabinets are to be attached to concrete strain poles.

7.3 Installation

- 7.3.1 For conduit specifications, **see section 2.**

End of Section 7

Section 8 – Span Wire

8.1 Span Wire

- 8.1.1 The catenary wire shall be a minimum of 3/8" high strength grade span wire rated at a minimum of 10,000 pounds. The catenary shall be installed at the specified design sag with a minimum of 12" and a maximum of 24" separation from the bottom messenger wire.
- 8.1.2 The bottom messenger wire shall be a minimum of 1/4" extra high strength grade span wire rated at a minimum of 6,500 pounds. The bottom messenger shall be installed without SAG at the specified location on the concrete/steel pole.
- 8.1.3 2-point attachment spans shall be installed per FDOT Standards using Span wire adjustable hanger assembly with messenger clamp.

8.2 Span Wire Hanger Assembly

- 8.2.1 Proper size hanger clamps shall be used on catenary and messenger cable.
- 8.2.2 Sign hangers shall have proper size clamp for catenary and messenger cable.
- 8.2.3 Messenger clamps shall be correct size for cable used. Messenger clamps shall be 2 inches by 6 inches with two (2) each, 3/8-inch holes.
- 8.2.4 All attaching hardware for messenger wire shall be stainless steel 304 or 316.
- 8.2.5 Flat extension bar shall be used when top/bottom of hanger assembly has less than a five (5) hole overlap.
- 8.2.6 When using flat extension bar, the bar shall be staggered.
- 8.2.7 When using flat extension bar, the bar shall fully overlap top/bottom of hanger assembly.
- 8.2.8 Hanger assembly and flat extension bar shall be attached with minimum of four (4) bolt overlap using 3/8" bolts with minimum of two (2) hole spacing between the bolts.

8.3 Disconnect Hanger Assembly

- 8.3.1 Terminal blocks and Jones plugs shall be removed from each disconnect prior to installation.
- 8.3.2 Splices in disconnect shall be done by using Appropriately sized wire nuts shall be used to splice signal cable in the base of pole shall have a minimum rating of 600V, silicone filled wire nuts are not permitted.
- 8.3.3 All IMSA 19-1 signal cable outer black jacket shall extend a minimum of three (3) inches into disconnect.
- 8.3.4 Neoprene grommets shall be installed in both side of disconnects.
- 8.3.5 Cable entrances in disconnects, when not used, shall be sealed.
- 8.3.6 Tri-stud hanger shall be silicone sealed where it attaches to disconnect.
- 8.3.7 Signal cable shall be attached to the messenger by means of tie wraps and lashing rod. Lashing rod shall be proper size for signal cable and thread through the drip loop.
- 8.3.8 **For box span intersections** - All disconnect doors shall face on the back side of each signal head.

For diagonal span intersections - Contact the Charlotte County Lighting District at LightingInspector@CharlotteCountyFL.gov prior to installation for disconnect door facing.

End of Section 8

Section 9 - Signal Cable

9.1 General

- 9.1.1 Each signal cable shall have a minimum of four (4) spare wires over the entire length on span wire installation.
- 9.1.2 Each signal cable from the controller cabinet to the mast arm hand hole compartment shall have a minimum of four (4) spare wires and be a continuous run.
- 9.1.3 Each signal phase shall have its own neutral. Sharing of a neutral is not allowed.
- 9.1.4 Each pedestrian phase shall have its own neutral. Sharing of a neutral is not allowed.
- 9.1.5 Signal head termination block is in the yellow of the three (3) section or top yellow of a four (4) section signal head.
- 9.1.6 On mast arm installation, all signal heads shall be wired with outer jacket of the cable extending into the termination block of the signal head.
- 9.1.7 At mast arm hand hole compartment, signal cable shall have a minimum of three (3) foot of slack.
- 9.1.8 The terminal compartment of each mast arm pole shall be fed with one (1) 19-conductor cable. Mast arm poles with twin arms shall be fed with two (2) 19-conductor cable. All the signal conductors shall be terminated onto terminal blocks.
- 9.1.9 All pedestrian push buttons shall be wired with # 12 AWG two (2) conductor, stranded copper wire with shield and polyethylene insulation, meeting the requirements for IMSA 50-2. Each button shall have its own cable and conduit run from the signal cabinet. No splicing allowed.

9.2 Mast Arm - Vehicular Signal Indications

- 9.2.1 Each signal cable from the controller cabinet to the mast arm hand hole compartment shall have a minimum of four (4) spare wires and be a continuous run.
- 9.2.2 All three (3) and/or four (4) section heads shall have a minimum seven (7) conductor jacketed signal cable installed continuous from the mast arm hand hole compartment to signal head termination block.
- 9.2.3 All five (5) section heads shall have a minimum five (5) conductor jacketed signal cable installed as a jumper in addition to a nine (9) conductor jacketed signal cable installed continuous from the mast arm hand hole compartment to signal head termination block
- 9.2.4 Each one-way mast arm (near side or far side) shall have a minimum nineteen (19) conductor signal cable installed continuous from controller cabinet to mast arm hand hole compartment for vehicular signal indications.
- 9.2.5 Each two-way mast arm (near side or far side) shall have a minimum of two (2) - nineteen (19) conductor signal cable installed continuous from controller cabinet to mast arm hand hole compartment for vehicular signal indications.
- 9.2.6 Each one-way mast arm that includes multiple approaches (near and far side combined) shall have a minimum of nineteen (19) conductor signal cable installed continuous from controller cabinet to mast arm hand hole compartment for vehicular signal indications main approach and a minimum of a nine (9) conductor for vehicular signal indications serving different approach other than main approach.

9.3 Span Wire - Vehicular Signal Indications

- 9.3.1 Each signal cable shall have a minimum of four (4) spare wires over the entire length on span wire installation.
- 9.3.2 All three (3) and/or four (4) section heads shall have a minimum seven (7) conductor signal cable installed from the signal head termination block to the disconnect.
- 9.3.3 All five (5) section heads shall have a minimum nine (9) conductor signal cable installed from the signal head termination block to the disconnect.
- 9.3.4 Each approach (near side or far side) shall have a minimum nineteen (19) conductor signal cable installed continuous from controller cabinet to the first disconnect for that approach and the nineteen (19) conductor cable shall continue through all disconnects for that approach.
- 9.3.5 All single conductors in the last disconnect shall have closed end crimp connector installed on each individual conductor. Neatly formed and tie wrap all cable terminations.

9.4 Mast Arm/Strain Pole - Pedestrian Signal Indications

- 9.4.1 Each signal cable from the controller cabinet to the mast arm/strain pole hand hole compartment shall have a minimum of four (4) spare wires.
- 9.4.2 Pedestrian signal heads mounted on mast arm upright or strain pole shall have a minimum five (5) conductor signal cable installed continuous from mast arm/strain pole hand hole compartment to pedestrian signal head termination block.
- 9.4.3 Each mast arm or strain pole for pedestrian signal heads shall have a minimum seven (7) conductor signal cable installed continuous from controller cabinet to mast arm/strain pole hand hole compartment for a one (1) way pedestrian signal head. Or shall have a minimum twelve (12) conductor signal cable installed continuous from controller cabinet to mast arm/strain pole hand hole compartment for two (2) way pedestrian signal head.

9.5 Mast Arm - Blank-Out Signs

- 9.5.1 Each single or dual message Blank out sign shall have a minimum seven (7) conductor signal cable installed from mast arm hand hole compartment to blank-out sign termination block and shall have its own minimum seven (7) conductor signal cable installed continuous from controller cabinet to mast arm hand hole compartment.
- 9.5.2 Cabinet termination of blank-out signs shall be verified with the Charlotte County Lighting District prior to wiring intersection.
- 9.5.3 Blank-out signs shall not be wired with vehicular or pedestrian signal indications.

9.6 Span Wire - Blank-Out Signs

- 9.6.1 Each single message or dual message Blank out sign shall have a minimum seven (7) conductor signal cable installed continuous from controller cabinet to blank-out sign termination block, no splicing allowed.
- 9.6.2 Cabinet termination of Blank-out signs shall be verified with the Charlotte County Lighting District prior to wiring intersection.
- 9.6.3 Blank-out signs shall not be wired with vehicular or pedestrian signal indications.

9.7 Pedestal Mounted Vehicular Signal Indications

- 9.7.1 All three (3) and/or four (4) section heads shall be installed to the aluminum pole by using an astro bracket, no slip fitters will not be permitted. Wiring shall have a minimum seven (7) conductor signal cable installed from signal head termination block to pedestal base hand hole and shall have a minimum nine (9) conductor signal cable installed continuous from controller cabinet to pedestal base hand hole.
- 9.7.2 All five (5) section heads shall be installed to the aluminum pole by using an astro bracket, no slip fitters will not be permitted. Wiring shall have a minimum nine (9) conductor signal cable installed from signal head termination block to pedestal base hand hole and shall have a minimum twelve (12) conductor signal cable installed continuous from controller cabinet to pedestal base hand hole.

9.8 Pedestal Mounted Pedestrian Signal Indications

- 9.8.1 All Pedestrian signal heads shall have a minimum five (5) conductor signal cable installed continuous from pedestrian signal head termination block to pedestal base hand hole.
- 9.8.2 Each one (1) way pedestrian signal head pedestal shall have a minimum seven (7) conductor signal cable installed continuous from controller cabinet to pedestal base hand hole.

Each two (2) way pedestrian signal head pedestal shall have a minimum twelve (12) conductor signal cable installed continuous from controller cabinet to pedestal base hand hole.

Each three (3) way pedestrian signal head pedestal shall have a minimum sixteen (16) conductor signal cable installed continuous from controller cabinet to pedestal base hand hole.

9.9 Cable Color Code

9.9.1 The following wiring color code tables below shall be used in accordance with Charlotte County intersection phasing standard, any variants need approval from the Charlotte County Lighting District prior to wiring.

Intersection Phasing

1. When Major Road is North/South Direction, Minor Road is East/West Direction:

NBLT	PHASE 1	NBT	PHASE 6	NBRT
SBLT	PHASE 5	SBT	PHASE 2	SBRT
EBLT	PHASE 3	EBT	PHASE 8	EBRT
WBLT	PHASE 7	WBT	PHASE 4	WBRT

2. When Major Road is East/West Direction, Minor Road is North/South Direction:

NBLT	PHASE 7	NBT	PHASE 4	NBRT
SBLT	PHASE 3	SBT	PHASE 8	SBRT
EBLT	PHASE 1	EBT	PHASE 6	EBRT
WBLT	PHASE 5	WBT	PHASE 2	WBRT

Mast/Arm Span Wire Vehicle Signal Color Code						
3 and 4 Section Signal Heads						
19 Cond. Cable				7 Cond.	7 Cond.	
	Phase	Color/Movement	Color	3 Section LT	4 Section PPLT	
	Ø1, Ø3, Ø5, Ø7	Red - LT Arrow	Red/Black	Solid Red	Solid Red	
	Ø1, Ø3, Ø5, Ø7	Yellow - LT Arrow	Orange/Black	Solid Orange	Solid Orange	
	Ø1, Ø3, Ø5, Ø7	Yellow - LT FY Arrow	Blue/Black	N/A	Solid Blue	
	Ø1, Ø3, Ø5, Ø7	Green - LT Arrow	Green/Black	Solid Green	Solid Green	
	Ø1, Ø3, Ø5, Ø7	Neutral - LT Arrow	White/Black	Solid White	Solid White	
Spares						
				Solid Black	Solid Black	
				White/Black	White/Black	
				Solid Blue		
19 Cond. Cable				7 Cond.		
	Phase	Color/Movement	Color	3 Section Thru		
	Ø2, Ø4, Ø6, Ø8	Red - Thru	Solid Red	Solid Red		
	Ø2, Ø4, Ø6, Ø8	Yellow - Thru	Solid Orange	Solid Orange		
	Ø2, Ø4, Ø6, Ø8	Green - Thru	Solid Green	Solid Green		
	Ø2, Ø4, Ø6, Ø8	Neutral - Thru	Solid White	Solid White		
Spares						
				Solid Black		
				White/Black		
				Solid Blue		
19 Cond. Cable				7 Cond.	7 Cond.	
	Overlaps	Color/Movement	Color	3 Section RT	4 Section PPRT	
	OL A, OL B, OL C, OL D	Red - RT Arrow	Red/White	Solid Red	Solid Red	
	OL A, OL B, OL C, OL D	Yellow - RT Arrow	Blue/White	Solid Orange	Solid Orange	
	OL A, OL B, OL C, OL D	Yellow - RT FY Arrow	Solid Blue	N/A	Solid Blue	
	OL A, OL B, OL C, OL D	Green - RT Arrow	Green/White	Solid Green	Solid Green	
	OL A, OL B, OL C, OL D	Neutral - RT Arrow	Black/White	Solid White	Solid White	
Spares						
			Solid Black	Solid Black	Solid Black	
			Black/Red	White/Black	White/Black	
			White/Red	Solid Blue		
			Orange/Red			
			Blue/Red			

Mast/Arm Span Wire Vehicle Signal Color Code					
5 Section Signal Heads					
19 Cond. Cable				9 Cond.	9 Cond.
Phase	Color/Movement	Color	5 Section LT	5 Section RT	
Ø1, Ø3, Ø5, Ø7	Yellow - LT Arrow	Orange/Black	Solid Blue		
Ø1, Ø3, Ø5, Ø7	Green - LT Arrow	Green/Black	Solid Black		
Ø1, Ø3, Ø5, Ø7	Neutral - LT Arrow	White/Black	White/Black		
Ø2, Ø4, Ø6, Ø8	Red - Thru	Solid Red	Solid Red	Solid Red	Solid Red
Ø2, Ø4, Ø6, Ø8	Yellow - Thru	Solid Orange	Solid Orange	Solid Orange	Solid Orange
Ø2, Ø4, Ø6, Ø8	Green - Thru	Solid Green	Solid Green	Solid Green	Solid Green
Ø2, Ø4, Ø6, Ø8	Neutral - Thru	Solid White	Solid White	Solid White	Solid White
OL A, OL B, OL C, OL D	Yellow - RT Arrow	Blue/White		Solid Blue	
OL A, OL B, OL C, OL D	Green - RT Arrow	Green/White		Solid Black	
OL A, OL B, OL C, OL D	Neutral - RT Arrow	Black/White		White/Black	
Spares					
		Red/Black	Red/Black	Red/Black	
		Blue/Black	Green/Black	Green/Black	
		Red/White			
		Solid Blue			
		Solid Black			
		Black/Red			
		White/Red			
		Orange/Red			
		Blue/Red			

Pedestal Mounted Vehicle Signal Color Code					
3 and 4 Section LT Signal Heads					
9 Cond. Cable Cabinet to Pedestal				7 Cond.	7 Cond.
Phase	Color/Movement	Color	3 Section LT	4 Section PPLT	
Ø1, Ø3, Ø5, Ø7	Red - LT Arrow	Solid Red	Solid Red	Solid Red	Solid Red
Ø1, Ø3, Ø5, Ø7	Yellow - LT Arrow	Solid Orange	Solid Orange	Solid Orange	Solid Orange
Ø1, Ø3, Ø5, Ø7	Yellow - LT FY Arrow	Solid Blue	N/A	Solid Blue	
Ø1, Ø3, Ø5, Ø7	Green - LT Arrow	Solid Green	Solid Green	Solid Green	Solid Green
Ø1, Ø3, Ø5, Ø7	Neutral - LT Arrow	Solid White	Solid White	Solid White	Solid White
Spares					
		Solid Black	Solid Black	Solid Black	
		White/Black	White/Black	White/Black	
		Red/Black	Solid Blue		
		Green/Black			

Pedestal Mounted Vehicle Signal Color Code				
3 Section Thru Signal Heads				
9 Cond. Cable Cabinet to Pedestal				7 Cond.
	Phase	Color/Movement	Color	3 Section Thru
	Ø2, Ø4, Ø6, Ø8	Red - Thru	Solid Red	Solid Red
	Ø2, Ø4, Ø6, Ø8	Yellow - Thru	Solid Orange	Solid Orange
	Ø2, Ø4, Ø6, Ø8	Green - LT Arrow	Solid Green	Solid Green
	Ø2, Ø4, Ø6, Ø8	Neutral - LT Arrow	Solid White	Solid White
Spares				
			Solid Green	Solid Black
			Solid Black	White/Black
			White/Black	Solid Blue
			Red/Black	
			Green/Black	

Pedestal Mounted Vehicle Signal Color Code					
3 and 4 Section RT Signal Heads					
9 Cond. Cable Cabinet to Pedestal				7 Cond.	7 Cond.
	Overlaps	Color/Movement	Color	3 Section RT	4 Section PPRT
	OL A, OL B, OL C, OL D	Red - RT Arrow	Solid Red	Solid Red	Solid Red
	OL A, OL B, OL C, OL D	Yellow - RT Arrow	Solid Orange	Solid Orange	Solid Orange
	OL A, OL B, OL C, OL D	Yellow - RT FY Arrow	Solid Blue	N/A	Solid Blue
	OL A, OL B, OL C, OL D	Green - RT Arrow	Solid Green	Solid Green	Solid Green
	OL A, OL B, OL C, OL D	Neutral - RT Arrow	Solid White	Solid White	Solid White
Spares					
			Solid Black	Solid Black	Solid Black
			White/Black	White/Black	White/Black
			Red/Black	Solid Blue	
			Green/Black		

Pedestal Mounted Vehicle Signal Color Code				
5 Section LT Signal Heads				
12 Cond. Cable Cabinet to Pedestal				9 Cond.
	Phases	Color/Movement	Color	5 Section LT
	Ø2, Ø4, Ø6, Ø8	Red - Thru	Solid Red	Solid Red
	Ø2, Ø4, Ø6, Ø8	Yellow - Thru	Solid Orange	Solid Orange
	Ø2, Ø4, Ø6, Ø8	Green - Thru	Solid Green	Solid Green
	Ø2, Ø4, Ø6, Ø8	Neutral - Thru	Solid White	Solid White
	Ø1, Ø3, Ø5, Ø7	Yellow - LT Arrow	Orange/Black	Solid Blue
	Ø1, Ø3, Ø5, Ø7	Green - LT Arrow	Green/Black	Solid Black
	Ø1, Ø3, Ø5, Ø7	Neutral - LT Arrow	White/Black	White/Black
Spares				
			Solid Black	Red/Black
			Solid Blue	Green/Black
			Red/Black	
			Blue/Black	
			Black/White	

Pedestal Mounted Vehicle Signal Color Code				
5 Section RT Signal Heads				
12 Cond. Cable Cabinet to Pedestal				9 Cond.
	Phases/Overlaps	Color/Movement	Color	5 Section RT
	Ø2, Ø4, Ø6, Ø8	Red - Thru	Solid Red	Solid Red
	Ø2, Ø4, Ø6, Ø8	Yellow - Thru	Solid Orange	Solid Orange
	Ø2, Ø4, Ø6, Ø8	Green - Thru	Solid Green	Solid Green
	Ø2, Ø4, Ø6, Ø8	Neutral - Thru	Solid White	Solid White
	OL A, OL B, OL C, OL D	Yellow - RT Arrow	Orange/Black	Solid Blue
	OL A, OL B, OL C, OL D	Green - RT Arrow	Green/Black	Solid Black
	OL A, OL B, OL C, OL D	Neutral - RT Arrow	White/Black	White/Black
Spares				
			Black	Red/Black
			Blue	Green/Black
			Red/Black	
			Blue/Black	
			Black/White	

Mast/Arm Span Wire Vehicle Signal Color Code				
High-Intensity Activated CrossWalk Signals (HAWKS)				
19 Cond. Cable				7 Cond.
Phase	Color/Movement	Color	HAWK	
Ø2, Ø6	Red - Left Red	Solid Red	Solid Red	
Ø2, Ø6	Red - Right Red	Solid Black	Solid Black	
Ø2, Ø6	Yellow	Solid Orange	Solid Orange	
Ø2, Ø6	Neutral	Solid White	Solid White	
Spares				
		Solid Green	Solid Green	
		Solid Blue	White/Black	
		White/Black	Solid Blue	
		Red/Black		
		Green/Black		
		Orange/Black		
		Blue/Black		
		Black/White		
		Red/White		
		Green/White		
		Blue/White		
		Black/Red		
		White/Red		
		Orange/Red		
		Blue/Red		

1-way Pedestrian Signal Color Code				
7 Cond. Cable				5 Cond.
	Phases	Color/Movement	Color	Pedestrian
	P2, P4, P6, P8	Don't Walk	Solid Red	Solid Red
	P2, P4, P6, P8	Walk	Solid Green	Solid Green
	P2, P4, P6, P8	Neutral	White	White
Spares				
			Solid Orange	Solid Orange
			Solid Black	Solid Black
			Solid Blue	
			White/Black	

2 Way Pedestrian Signal Color Code				
12 Cond. Cable				5 Cond.
	Phases	Color/Movement	Color	Pedestrian
	P2, P6	Don't Walk	Solid Red	Solid Red
	P2, P6	Walk	Solid Green	Solid Green
	P2, P6	Neutral	Solid White	Solid White
	P4, P8	Don't Walk	Red/Black	Solid Red
	P4, P8	Walk	Green/Black	Solid Green
	P4, P8	Neutral	White/Black	Solid White
Spares				
			Solid Orange	Solid Orange x2
			Solid Black	Solid Black x2
			Solid Blue	
			Orange/Black	
			Blue/Black	
			Black/White	

3-Way Pedestrian Signal Color Code				
16 Cond. Cable				5 Cond.
	Phases	Color/Movement	Color	Pedestrian
	P2, P6	Don't Walk	Solid Red	Solid Red
	P2, P6	Walk	Solid Green	Solid Green
	P2, P6	Neutral	Solid White	Solid White
	P4, P8	Don't Walk	Red/Black	Solid Red
	P4, P8	Walk	Green/Black	Solid Green
	P4, P8	Neutral	White/Black	Solid White
	*	Don't Walk	Red/White	Solid Red
	*	Walk	Green/White	Solid Green
	*	Neutral	Black/White	Solid White
Spares				
			Solid Orange	Solid Orange x3
			Solid Black	Solid Black x3
			Solid Blue	
			Orange/Black	
			Blue/Black	
			Blue/White	
			Black/Red	

Blank-Out Sign Color Code			
Single Message "No Turn"/"Yield"			
7 Cond.		7 Cond.	
Message	Color	Sign	
"No Turn" Message	Solid Red	Solid Red	
Neutral	Solid White	Solid White	
Ground	Solid Green	Solid Green	
Spares			
	Solid Orange	Solid Orange	
	Solid Black	Solid Black	
	Solid Blue	Solid Blue	
	White/Black	White/Black	
Single Message "Yield"			
7 Cond.		7 Cond.	
Message	Color	Sign	
"Yield" Message	Solid Orange	Solid Orange	
Neutral	Solid White	Solid White	
Ground	Solid Green	Solid Green	
Spares			
	Solid Red	Solid Red	
	Solid Black	Solid Black	
	Solid Blue	Solid Blue	
	White/Black	White/Black	
Dual Message "No Turn"/"Yield"			
7 Cond.		7 Cond.	
Message	Color	Sign	
"No Turn" Message	Solid Red	Solid Red	
"Yield" Message	Solid Orange	Solid Orange	
Neutral	Solid White	Solid White	
Ground	Solid Green	Solid Green	
Spares			
	Solid Black	Solid Black	
	Solid Blue	Solid Blue	
	White/Black	White/Black	

End of Section 9

Section 10 – Signal Heads

10.1 General

- 10.1.1 All traffic signal heads shall be black twelve (12) inch diameter polycarbonate housing. McCain traffic signal heads is the Charlotte County Lighting District preference.
- 10.1.2 All traffic signal heads shall have one-piece black aero flex retroreflective bordered backplates installed.
- 10.1.3 All traffic signal LED modules shall be twelve (12) inch Dialight Long Life 15-year full performance warranty or approved equivalent by the Charlotte County Lighting District writing.
- 10.1.4 No arrow or U-turn inserts allowed, if plans call for U-turn signals, U-turn LED modules shall be used.
- 10.1.5 Hubs shall be silicone sealed to signal heads.
- 10.1.6 All signal heads, backplates, and LEDs shall be new, uniform, and from the same manufacturer for each intersection.
- 10.1.7 All signal heads shall be mounted vertical unless noted on plans or approved by the Charlotte County Lighting District in writing.

10.2 Installation

- 10.2.1 Two (2) each ¼ inch drain hole shall be placed in bottom of each signal head.
- 10.2.2 The signal phase shall be marked in signal head.
- 10.2.3 For signal cable specifications please **see Section 9 - Signal cable.**
- 10.2.4 Signal head termination compartment is in the yellow of the three (3) section or top yellow of a four (4) section signal head. The IMSA 19-1 signal cable outer jacket shall extend into the termination compartment of the signal head.
- 10.2.5 Spare conductors in traffic signal heads shall have closed end crimp connectors installed on each individual conductor. Neatly formed and tie wrap all cable terminations.
- 10.2.6 Mast arm and Span wire traffic signal head clearances: Unless directed otherwise by the Engineer for unusual circumstances at the site, provide a vertical clearance of not less than 17 feet-6 inches and not more than 19 feet for traffic signals placed over the roadway. Measure such clearance for each Mast-arm/span directly under the most critical signal head including installed backplate (in regards to clearance) for that Mast- arm/span. Place signal head on each Mast-arm/span as near as practical to the same elevation as the critical signal assembly.
- 10.2.7 Pedestal/side-mounted mounted Traffic Signal Head clearances: Ensure that the lowest point on pedestal- mounted and side-mounted signal heads including installed backplate is 12 feet above finished grade at the point of their installation.

End of Section 10

Section 11 – Pedestrian

11.1 General

- 11.1.1 All pedestrian signal heads shall be black sixteen (16) inch aluminum housing with egg crate visor; polycarbonate housing heads are prohibited. Mobotrex pedestrian signal heads are the Charlotte County Lighting District preference.
- 11.1.2 All pedestrian LED signal modules shall be international symbol and countdown; use of words in place of symbols are prohibited. Dialight LED Modules are the Charlotte County Lighting District preference.
- 11.1.3 All Pedestrian heads and LED Modules shall be new, uniform, and from the same manufacturer for each intersection.
- 11.1.4 All Pedestrian Signal assemblies shall be pedestal mounted, and preference is one-way.
- 11.1.5 If remote pedestrian detection station is required, they shall be pedestal mounted with breakaway base, direct buried is prohibited.
- 11.1.6 Use Pelco square breakaway base for pedestrian poles with aluminum door and ground lug (SP-1116-FL- AD-GL-PNC) or approved equivalent by the Charlotte County Lighting District in writing.
- 11.1.7 All pedestal mounted pedestrian signal assemblies shall have a pole & base collar assembly (PB-5325-PNC) installed.
- 11.1.8 All attaching hardware shall be stainless steel 304 or 316.
- 11.1.9 Use Pelco pedestal spun aluminum four (4) inch Schedule 80 pole (PB-5102-X-PNC) X=Length or approved equivalent by the Charlotte County Lighting District in writing.
- 11.1.10 The control face and vibrotactile arrow of APS and tactile arrow of standard pedestrian push button shall be carefully aligned with the direction of travel to the designated pedestrian ramp and crosswalk while ensuring a reach distance not to exceed 10” for wheelchair users. Incorporating the base into the curb or sidewalk is an option but would require a non-chauffeured edge base to be used.
- 11.1.11 For standard pedestrian detection, Pedestrian push button shall be a Polara momentary LED Bull Dog BDL3 with tactile arrow. (All new intersections shall be Accessible Pedestrian System (APS))
- 11.1.12 For Accessible Pedestrian Detection System, PedSafety Auditable tactile pedestrian detector shall be used:
- APL Certification number 665-004-010
 - The Ped Safety Pedestrian station shall have the complete street names (to include Street, Road, Drive, etc.) programmed by PED SAFETY.
 - The Charlotte County Lighting District shall receive the voice files digitally. Send to the following email: LightingInspector@CharlotteCountyFL.gov
 - For any further questions please call Jody Mansell at the Charlotte County Lighting District at (941)575-3648.
- 11.1.13 All signal-controlled crosswalks shall be FDOT Special Emphasis (Hi-Emphasis).
- 11.1.14 All crosswalk ramps ADA Detectable Warning Tiles (Truncated pads) shall be wet set.

11.2 Installation

- 11.2.1 Mounting height of pedestrian signal head shall be nine (9) feet +/- 3" above grade to bottom of head.
- 11.2.2 Mounting height of pedestrian button shall be forty-two (42) inches to center of button above grade, measured from "pedestrian landing POV". Button shall be under the head it calls.
- 11.2.3 APS control face shall be mounted to the inside of the intersection.
- 11.2.4 The control face and vibrotactile arrow of APS and tactile arrow of standard pedestrian push button shall be carefully aligned with the direction of travel to the designated pedestrian ramp and crosswalk while ensuring a reach distance not to exceed 10" for wheelchair users. Incorporating the base into the curb or sidewalk is an option but would require a non-chamfered edge base to be used.
- 11.2.5 Closure caps and non-audible pedestrian buttons shall be sealed with silicone.
- 11.2.6 Two (2) each ¼ inch drain hole shall be placed in bottom of each pedestrian signal head.
- 11.2.7 Pedestrian crossing information sign shall be standard nine (9) inch x eighteen (18) inch and installed above the button. Each sign shall identify the crosswalk to which each button applies. The complete street names (to include St., Rd., Dr., etc.) shall be permanently printed onto the sign face.
- 11.2.8 For pedestrian signal pre-cast or Cast-In-Place base, refer to FDOT Index 653-001, the base shall be minimum 2 feet diameter x 3 feet length, and include anchor bolt cage (Pelco - AP-1095-GLV).
- 11.2.9 For Pedestrian Pedestal base conduit specifications [see Section 2](#).
- 11.2.10 For Pedestrian Signal cable specifications [see Section 9](#).
- 11.2.11 For Pedestrian detection cable specifications [see Section 9](#).
- 11.2.12 Signal cable shall be spliced in the base of pedestrian pole and not in pedestrian signal head,
- 11.2.13 Appropriately sized wire nuts shall be used to splice signal cable in the base of pole, shall have a minimum rating of 600V, silicone filled wire nuts are not permitted.
- 11.2.14 Spare conductors in the base from the pedestrian signal head shall be under its own appropriately sized split bolt and have its own #6 AWG green ground wire connected to the ground lug terminal.
- 11.2.15 Spare conductors from the trunk cable from the cabinet shall have closed end crimp connectors installed on each individual conductor. Neatly formed and tie wrap all cable terminations. Trunk cable spare conductors shall be grounded at the traffic signal cabinet.
- 11.2.16 Spare conductors in Pedestrian Signal Heads shall have closed end crimp connectors installed on each individual conductor. Neatly formed and tie wrap all cable terminations.

End of Section 11

Section 12 – Cabinet Assembly

12.1 General

- 12.1.1 All Traffic Controller Cabinets shall be an FDOT APL 676-023-004 TRAFFICWARE / NEMA TS-2 Type 1 WIRED CABINET ASSY TS2 SIZE 6.
- 12.1.2 Traffic Signal Controller shall Commander Controllers TS-2 Configuration
- 12.1.3 Malfunction Monitor Unit (MMU) shall be an Eberle Design Inc. (EDI): Malfunction Management Unit Type 16 APL Certification Number: 678-016-008
- 12.1.4 The contractor shall bring the Traffic Signal Cabinet, Traffic Signal Controller, MMU, and UPS (if equipped) and any other additional equipment to Charlotte County Lighting District Signal Shop for programming and to allow the signal staff to assist with the start-up operation. Contractor shall schedule appointment minimum 1 week in advance via email with the Charlotte County Lighting District at LightingInspector@CharlotteCountyFL.gov. Contractor shall have a technician on-site to set-up cabinet and equipment.

12.2 Installation

- 12.2.1 Traffic Signal Cabinet shall be mounted to Quazite cabinet base with four (4) non-shouldered Stainless-Steel bolts and four (4) Stainless steel flat washers. For cabinet base specification see Section 4
- 12.2.2 Traffic Signal Cabinet shall have at minimum a silicone bead where the traffic signal cabinet meets the Quazite cabinet base. Silicone bead shall be sufficient to prevent water intrusion and shall have neat appearance.
- 12.2.3 All trunk cable spare conductors shall be under its own appropriately sized split bolt and have its own #6 AWG green ground wire connected to the ground bar or ground lug terminal.

12.3 Standard MMU Settings

MMU settings shall be programmed as follows:

(The Charlotte County Lighting District will assist in programming these settings per 12.1.4, failure to bring equipment to the Charlotte County Lighting District Signal shop will require the contractor to program these settings)

Main Menu Status:

At the top level, the NEXT button selects whether Current Status or the Main Menu is displayed. The NEXT button is used to scroll through the different selections that each menu level is provide. The SELECT button will invoke the function that the cursor points at.

At any time, the EXIT button may be pressed to back out of menu selection.

Status:

Pressing the SELECT button from the top level provides further details, such as the current state including Field Check, BND, Field and Cabinet Voltages.

Set Up Menu:

Pressing the NEXT button followed by the SELECT button from the top level provides the Menu structure.

Set/View Configuration:

Press NEXT button this will move cursor to MENU, then Press SELECT button.

Press NEXT one (1) time; this will move cursor to SET/VIEW CONFIG, then Press SELECT.
Press NEXT three (3) times; this will move cursor to UNIT OPTIONS, then Press SELECT. The following settings should be programmed:

(Press SELECT to toggle between ON, OFF; Press NEXT to move cursor to next item)

- Recurrent Pulse - ON
- Walk Disable - OFF Log CVM Faults - OFF
- Extern Watchdog - OFF
- +24V-2 = 12 VDC - OFF
- PGM Card Memory - ON LED Guard - ON
- Force Type 16 - OFF Type 12 SDLC - OFF
- VM 3x/Day Latch - OFF Press Reset.

Flashing Yellow Arrow Setup:

Press NEXT button this will move cursor to MENU, then Press SELECT button.

Press NEXT one (1) time; this will move cursor to SET/VIEW CONFIG, then Press SELECT.

Press NEXT twelve (12) times; this will move cursor to FLASHING YELL ARROW; then press SELECT. FYA Mode - Press NEXT to change to MODE H, then press SELECT

Enable CH Pair - (Press NEXT to move to cursor to next pair, Press SELECT to turn pair ON)
Example below is showing FYA for Phase 1, Phase 3, Phase 5, and Phase 7

- CH 1-13 ON
- CH 3-14 ON
- CH 5-15 ON
- CH 7-16 ON

Press EXIT, then Press SELECT to SET

Setup Wizard:

Press the NEXT button followed by the SELECT button.

Press NEXT two (2) times, this will take you to SET UP WIZARD.

Press SELECT button, it will show a brief explanation of the button use for the cursor. Answer all the screen question by pressing NEXT to move to the next phase.

Press SELECT to Enable or Disable the channels. Press EXIT to move to the next screen.

Choose NEXT, CANCEL or EDIT by pressing SELECT.

Repeat steps 4 through 7 until all programming is complete.

- Unused channels
- Pedestrian channels
- Protected-Permissive Turn channels
- Review Channel Assignments

12.4 UPS and Transfer Switches for Traffic Signals

- 12.4.1 All new or remodeled signalized intersections shall have a UPS installed on the left-hand side of the traffic signal cabinet as you face the door.
- 12.4.2 UPS cabinet shall be supported on the bottom by the Quazite base or an approved independent means.
- 12.4.3 UPS shall be a Myers and shall include a 5-year warranty on all components. (Myers MP2000E, with TCSUPSPTS)

End of Section 12

Section 13 – Traffic Signal Electric Service

13.1 General

- 13.1.1 The Charlotte County Lighting District prefers to have underground fed electrical services.
- 13.1.2 When electric service feed is on cabinet corner and within one hundred fifty (150) feet of the traffic signal cabinet. The electrical service assembly shall include the following:
- a. Traffic signal electric service shall be mounted on eight (8) inch x eight (8) inch x twelve (12) foot concrete service pole within thirty (30) feet of traffic signal cabinet.
 - b. Traffic signal electrical service shall be metered. Meter socket shall be 200 Amp lever bypass NEMA 3R aluminum enclosure rated for outdoor use (Milbank UAP9551-X-QG-HSP).
 - c. Main lug load center shall be Square D QO 100 Amp 6 space/12 circuit rated for outdoor use. (Square D QO612L100RB).
 - d. Surge Protection Device (SPD) shall be a double pole 120/240 VAC or an approved equivalent that is on the FDOT APL (ASCO 400 series 420120SP05NWSJ10) or (HESCORLS PRO120-2S-A).
 - e. When signalization plans call for intersection lighting the following shall be included: (These items are incidental to the electrical service assembly)
 1. NEMA 4X Single door wall mount clamp 24" x 20" x 08" 304 Stainless Steel enclosure (WIEGMANN SSN4242008) OR (HOFFMAN A24H2008SSLP) shall be mounted on the traffic signal electric service pole.
 2. Lighting contactor shall be a 30 Amp 2 pole 120 VAC coil (Square D 8903SMO1V02) and mounted inside the above referenced enclosure.
 3. Photo control shall be a ½" stem Diecast zinc, 120 – 277 VAC, 2000W Tungsten, 1800VA Ballast (TORK 2129A) and mounted on the main lug load center.
 4. Isolated Neutral Bar
 5. Ground Bar
 6. 30A Fuse Block
 - f. All circuit breakers shall be Square D QO, and spaces shall be assigned as follows:
 1. Space 1 shall be a single pole 30 Amp for Traffic Signal Cabinet
 2. Space 2-4 shall be a double pole 30 Amp for intersection lighting
 3. Space 3-5 shall be a double pole 30 Amp for SPD
 - g. #6 AWG (THHN/THWN-2) wire shall be used from the meter socket to the point of service.
 - h. #10 AWG (THHN/THWN-2) wire shall be used from Main disconnect to traffic signal cabinet.

13.1.3 When electric service feed is **NOT** on cabinet corner or greater than one hundred fifty (150) feet from the traffic signal cabinet. The electrical service assembly shall include the following:

Main Traffic Signal Electric Service Meter and Disconnect

- a. Main traffic signal electric service meter and disconnect shall be mounted on eight (8) inch x eight (8) inch x twelve (12) foot concrete service pole near point of service.
- b. Traffic signal electrical service shall be metered. Meter socket shall be 200 Amp lever bypass NEMA 3R aluminum enclosure rated for outdoor use (Milbank UAP9551-X-QG-HSP).
- c. Main lug load center shall be Square D QO 125 Amp 4 space/8 circuit rated for outdoor use (Square D QO148L125GRB)
- d. Surge Protection Device (SPD) shall be a double pole 120/240 VAC or an approved equivalent that is on the FDOT APL (ASCO 400 series 420120SP05NWSJ10) or (HESCORLS PRO120-2S-A).
- e. All circuit breakers shall be Square D QO, and spaces shall be assigned as follows:
 1. Space 1-2 shall be a single pole 100 Amp for Traffic Signal Cabinet
 2. Space 3-4 shall be a double pole 30 Amp for SPD

Secondary Disconnect for Traffic Signal Electric Service

- a. Secondary disconnect for traffic signal electric service shall be mounted on eight (8) inch x eight (8) inch x twelve (12) foot concrete service pole near traffic signal cabinet.
- b. Main lug load center shall be Square D QO 125 Amp 6 space/12 rated for outdoor use. (Square D QO612L100RB).
- c. Surge Protection Device (SPD) shall be a double pole 120/240 VAC or an approved equivalent that is on the FDOT APL (ASCO 400 series 420120SP05NWSJ10) or (HESCORLS PRO120-2S-A).
- d. When signalization plans call for intersection lighting the following shall be included: (These items are incidental to the electrical service assembly)
 7. NEMA 4X Single door wall mount clamp 24" x 20" x 08" 304 Stainless Steel enclosure (WIEGMANN SSN4242008) OR (HOFFMAN A24H2008SSLP) shall be mounted on the traffic signal electric service pole.
 8. Lighting contactor shall be a 30 Amp 2 pole 120 VAC coil (Square D 8903SMO1V02) and mounted inside the above referenced enclosure.
 9. Photo control shall be a ½" stem Diecast zinc, 120 – 277 VAC, 2000W Tungsten, 1800VA Ballast (TORK 2129A) and mounted on the main lug load center.
 10. Isolated Neutral Bar
 11. Ground Bar
 12. 30A Fuse Block
- e. #2 AWG (THHN/THWN-2) wire shall be used from the meter socket to the point of service.
- f. #2 AWG (THHN/THWN-2) wire shall be used from the main disconnect to the secondary disconnect.
- g. #10 AWG (THHN/THWN-2) wire shall be used from secondary disconnect to traffic signal cabinet.

13.1.4 For grounding specifications **See Section 14.**

13.1.5 Above ground electrical service conduit shall be rigid galvanized or schedule 80 PVC (Preference is Schedule 80 PVC).

13.1.6 Rigid galvanized conduit shall be connected together by use of galvanized threaded couplings or compression no-thread couplings.

13.1.7 If using schedule 80 PVC the pipe shall have larger diameter PVC around it at ground level extending 12" above and 6" below finish grade.

13.1.8 #6 AWG (THHN/THWN-2) green ground wire shall be in ¾ inch schedule 80 PVC or ¾ inch rigid galvanized conduit. Conduit shall extend a minimum of six (6) inches below finish grade.

13.1.9 Intersection lighting wiring: (240 VAC Preferred)

1. **120 VAC intersection Lighting:**

- a. Each mast arm upright, steel strain pole, concrete strain pole, and aluminum street light poles with intersection lighting luminaire(s) shall have #10 AWG (THHN/THWN-2) Black, White, and green wire installed from the traffic signal electric service contactor enclosure box.

2. **240 VAC intersection lighting:**

- a. Each mast arm upright, steel strain pole, concrete strain pole, and aluminum street light poles with intersection lighting luminaire(s) shall have #10 AWG (THHN/THWN-2) Black, Red, and green wire installed from the traffic signal electric service contactor enclosure box.

13.1.10 When intersection lighting modifications are made to existing intersections, the traffic signal electric service must meet current Charlotte County Lighting District – Traffic Signal Electric Service specifications [Section 13](#).

13.1.11 For intersection lighting specifications, see [Section 20](#).

End of Section 13

Section 14 – Grounding

14.1 General

- 14.1.1 Use current FDOT Specifications - Section 620
- 14.1.2 All Electrical Services shall have a ground resistance reading of 5 ohms or less.
- 14.1.3 All Traffic Signal or ITS cabinets shall have a ground resistance reading of 5 ohms or less.
- 14.1.4 All poles that contain ITS equipment (CCTV, BlueToad, DMS, LPR) shall have a ground resistance reading of 5 ohms or less.
- 14.1.5 All signal and pedestrian poles, street light poles, RRFB, and School flasher shall have a ground resistance reading of 15 ohms or less.
- 14.1.6 All Traffic Signal cabinets, ITS cabinets, and Load centers shall have a minimum five (5), ten (10) foot length 5/8” copper clad ground rod installed.
- 14.1.7 All signal and pedestrian poles, street light poles, electrical services, RRFBs, Warning Flashers, and School Flashers shall have a minimum of two (2), ten (10) foot length 5/8” copper clad ground rod shall be installed.
- 14.1.8 All ground rods outside of pull boxes shall be marked with a temporary marker for easy location/identification for inspection purposes. The temporary markers shall be removed after completed inspection and ground readings.

14.2 Installation

- 14.2.1 All signal poles, pedestrian poles shall be tied into a network ground system and brought back to the cabinet.
- 14.2.2 The top of ground rod shall be two (4) inches above rock when placed inside pull box.
- 14.2.3 Traffic controller cabinet shall be 40 feet of ground rods.
- 14.2.4 Electric service ground rods shall be 20 feet of ground rods.
- 14.2.5 For mast arm foundations, steel strain pole foundations, concrete strain poles, pedestrian poles, RRFB, and School flasher install 20 feet of ground rods.
- 14.2.6 Ground spare conductors inside traffic signal cabinet on ground buss bar.

14.3 Testing

- 14.3.1 All ground rod readings shall be verified by the Charlotte County Lighting District Signal Inspector during inspection.
- 14.3.2 All ground rod readings shall be noted on a ground rod sheet.
- 14.3.3 The Charlotte County Lighting District requires that all ground rod readings recorded by the project CEI shall be submitted by email when final inspection is scheduled.

End of Section 14

Section 15 – Detection

15.1 General

- 15.1.1 Detection requirements during a project – see General Notes – Temporary Detection and maintenance.
- 15.1.2 Inductive Loop detection shall be the detection platform for signalized intersections unless otherwise approved in writing from the Charlotte County Lighting District.
- 15.1.3 When using Video detection/Radar detection system the intersection geometry shall meet the manufactures specifications. When the intersection exceeds manufacturer specifications then an Inductive Loop system shall be installed for that intersection.
- 15.1.4 All detection systems shall be installed to manufacturer specifications.
- 15.1.5 Signalization plans proposed for Video detection/Radar detection system shall be submitted to manufacturer for equipment placement prior to installation.

15.2 Video Detection

- 15.2.1 The following video detection systems are approved for mast-arm installations in Charlotte County:

(The Charlotte County Lighting District will specify which system shall be used)

- Iteris Vantage Next

- 15.2.2 The above listed video detection cameras shall be installed on Pelco 36” gusset tube camera bracket assembly with Astro-Brac (SP-1106-FL-X-74-X-PNC) for “X” see manufacturer for option details, unless otherwise approved by the Charlotte County Lighting District in writing or manufacturer suggested deviation in writing and approved the Charlotte County Lighting District in writing.

- 15.2.3 The following video detection systems shall be used on span-wire installation **when requested by the Charlotte County Lighting District only**, otherwise inductive loop system shall be used for span wire intersections:

- Miovision TrafficLink Detection/SmartView 360

15.3 Radar Detection

- 15.3.1 The following radar detection system is approved for mast-arm installations in Charlotte County:

(The Charlotte County Lighting District will specify when this system shall be used)

- Iteris Vantage Next Vector

15.4 Inductive Loops

- 15.4.1 No preformed loops shall be permitted, except bicycle loops.
- 15.4.2 Inductive loop wire shall be # 12 or # 14 AWG stranded copper wire with type XHHW cross-linked polyethylene insulation and an additional outer sleeve composed of polyvinylchloride or polyethylene insulation that meets the requirements of IMSA 51-7.
- 15.4.3 Inductive loop shielded lead-in cable shall be #12 or # 14 AWG two conductor, stranded copper wire with shield and polyethylene insulation, meeting the requirements for IMSA 50-2 and shall be continuous from controller cabinet to nearest proposed loop pull box. (No splices shall be permitted)
- 15.4.4 All inductive loops shall be installed underneath finished surface of asphalt, unless approved by the Charlotte County Lighting District in writing; saw cutting into the finished asphalt surface is prohibited.
- 15.4.5 Depth of saw cut shall not be less than three (3) inches or greater than four (4) inches below roadway surface.
- 15.4.6 Backer rod shall be placed in all saw cuts every one (1) foot and at each turn in the saw cut. The backer rod pieces shall be a minimum of one (1) inch and maximum of two (2) inches in length.
- 15.4.7 No more than one (1) loop lead-in shall be permitted in a single saw cut.
- 15.4.8 Loop lead-in wires should be twisted a minimum of five (5) turns per foot up to a maximum of twelve (12) turns per foot.
- 15.4.9 All inductive loops shall be sealed with an FDOT approved epoxy type loop sealant.
- 15.4.10 The inductive loop window shall not be placed on a radius.
- 15.4.11 Curbs shall be drilled to accommodate one two (2) inch conduit to run loop lead-in wires to pull box. No holes in asphalt will be accepted.
- 15.4.12 Where no curb is existing, saw cut to the edge of pavement and place one, two (2) inch conduit three (3) to five (5) inches under the pavement surface.
- 15.4.13 There shall be a minimum of three (3) feet and a maximum of four (4) feet of slack of the twisted inductive loop wire and the loop lead-in cable for each loop assembly.
- 15.4.14 All inductive loops shall be placed into a county approved watertight enclosure. The end of the home run cable shall be sealed to prevent water infiltration.
- 15.4.15 Each inductive loop shall have its own loop lead-in cable and shall be installed on a separate loop detector channel.
- 15.4.16 All loop lead-in cable shall have ground wire connected to earth terminal on the detector loop interface panel.
- 15.4.17 All inductive loops shall be labeled with phase, direction, and lane designation. (Example: Phase 2 NBLT Outside)

15.4.18 Charlotte County standard loop sizes are as follows:

1. Stop bar – shall be Type F 6' x 40' and shall be placed two (2) feet in front of stop bar
2. Advanced and/or system – shall be Type B 6' x 6'

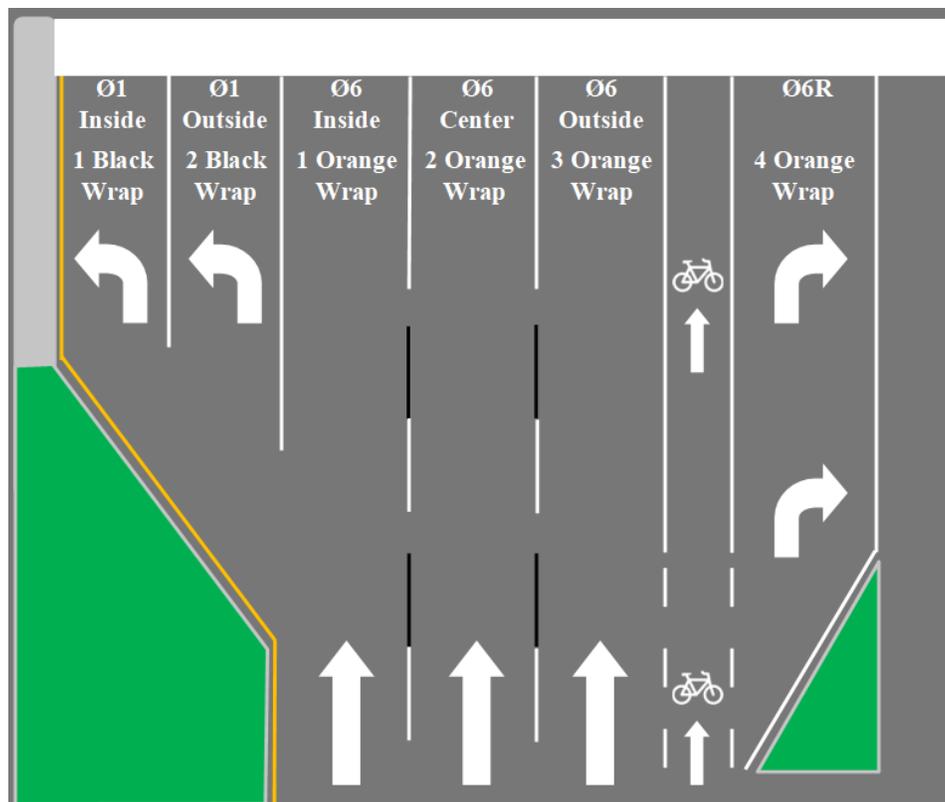
15.4.19 Minimum insulation megger reading shall be 250 Meg. Ohms for each loop.

15.4.20 Maximum resistance reading shall be less than 10 ohms for each loop.

15.4.21 All inductive loop detectors shall be Econolite LMD622 Two channel NEMA TS2 Type A Loop Monitor Deflectometer.

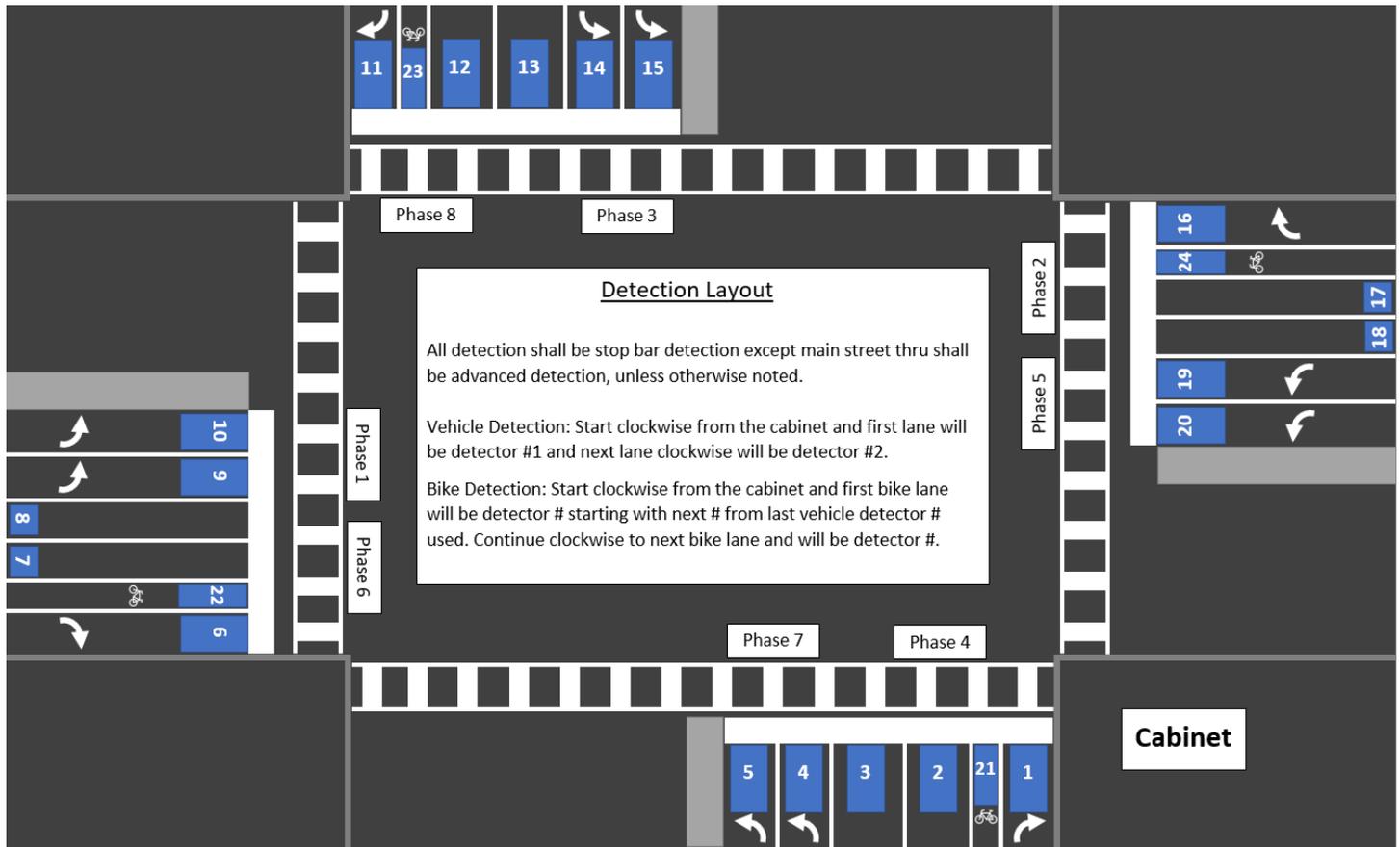
15.4.22 All twisted loop lead-in and loop lead-in cable shall be marked as per illustration below.

- Phase 1 – Black Wrap
- Phase 2 – Red Wrap
- Phase 3 – Green Wrap
- Phase 4 – Blue Wrap
- Phase 5 – Brown Wrap
- Phase 6 – Orange Wrap
- Phase 7 – White Wrap
- Phase 8 – Yellow Wrap



15.5 Intersection Detection Layout

15.5.1 All intersection detection shall be setup lane by lane.



End of Section 15

Section 16 – Fiber Optic Cable (FOC) - Interconnect

16.1 General

- 16.1.1 All installations shall be done in a workmanship like manner and performed by a qualified personnel, adhering to FDOT Standard Specifications for Road and Bridge Construction, Section 633 Communication Cable, unless noted.
- 16.1.2 For FOC conduit specifications see [Section 2.](#)
- 16.1.3 For FOC pull box specifications, see [Section 3.](#)
- 16.1.4 FOC splices are prohibited between Traffic Signal Cabinets.
- 16.1.5 FOC shall be 144 strand all-dielectric, dry filled loose tube single mode fiber with **Corning Brand glass**, shall be marked with the logo “Traffic Operations” and contain a continuous linear green stripe on the cable jacket.
- 16.1.6 The installer of the FOC shall be a Corning warranty partner and BICSI certified.
- 16.1.1 FOC shall be shipped on reels of marked continuous length.
- 16.1.2 The installer shall provide a copy of transmission test results of cable prior to installation and after installation is complete.
- 16.1.3 FOC shall not share a pull box with any other cables.
- 16.1.4 Whenever cable(s) are installed as new or re-installed, cables placed in any underground conduit shall have an AWG #10 continuous locate wire with a minimum of two feet (2’) of wire accessible at each conduit termination point.
- 16.1.5 The Contractor shall prepare a cable-pulling plan for approval by the County. No work shall begin until the cable pulling plan has been approved and a Notice to Proceed given.
- 16.1.6 FOC splice locations shall be determined by the Charlotte County Lighting District TMC and located where vehicles can park safely out of the travel way and where lane closures will not be required for service. Aerial splice enclosures shall not be located over driveways.
- 16.1.7 Should the FOC become damaged or broken, the FOC shall be replaced from the FOC splice vault to another FOC splice vault.

16.2 Installation

- 16.2.1 Ensure conduit is clean and free from damage prior to installing FOC.
- 16.2.2 FOC shall be tested at factory, before installation, and after installation.
- 16.2.3 Install equipment according to the latest version of the manufacturer's installation procedures and current industry accepted installation standards, codes and practices or as directed by the Charlotte County Lighting District TMC.
- 16.2.4 Provide and store fiber optic cable at each pull box and splice vault to allow for future splices, additions, or repairs to the fiber network. Store the fiber optic cable without twisting or bending the cable below the minimum bend radius.
- Store a minimum of two hundred (200) feet of fiber optic backbone cable in FOC splice vault. One hundred (100) feet of FOC on each side of the cable splice enclosure or as shown in the plans.
 - Store a minimum of one hundred (100) feet of fiber optic drop cable in FOC splice vault or as shown in the plans.
 - Store a minimum of one hundred (100) feet fiber optic backbone cable in each adjacent FOC pull box to the splice vault or as shown in the plans.
 - Store a minimum of fifty (50) feet of FOC in FOC mid run pull boxes or as shown in the plans.
- 16.2.5 Install cable tags within 1 foot of each splice and/or termination point indicating the cable type, fiber count, and each fiber optic cable origination and termination points. Ensure that the cable tags are **permanent labels** suitable for outside applications and are affixed to all fiber optic cables. Ensure that lettering is in **permanent ink** and displays the phrase "FIBER OPTIC CABLE".
- 16.2.6 FOC splice vaults shall have cable hanger racks designed to support cable and splice enclosure.
- 16.2.7 All FOC splices shall be fusion spliced according to latest version of the manufacture's installation procedures and current industry accepted installation standards, codes and practices, or as directed by the Charlotte County Lighting District TMC. **(Mechanical splicing is strictly prohibited)**
- 16.2.8 Where any FOC is to be accessed for lateral insertion, open only the buffer tube containing the fiber to be accessed and cut only the actual fiber to be accessed. (Ring cut splice)
- 16.2.9 FOC patch panel to patch panel, connectors shall be LC/LC.
- 16.2.10 FOC patch panels to FOC managed switch, connectors shall be LC/SC.

16.3 Testing

- 16.3.1 FOC shall be tested by the manufacturer.
- 16.3.2 FOC shall be tested prior to installation with readings no greater than 0.1 decibel per reel.
- 16.3.3 All fibers shall be tested from both FOC end points with an optical time domain reflectometer (OTDR) at wavelengths of 1310NM and 1550NM. Splice loss shall not exceed maximum bidirectional average of 0.1 decibel per splice. Connector attenuation at each termination panel and its associated splice shall not exceed 0.5 decibel. Splices and connectors exceeding allowable attenuation shall be replaced at no cost to the Charlotte County Lighting District.
- 16.3.4 All FOC tests and equipment calibration records shall be submitted to the Charlotte County Lighting District for review digitally at LightingInspector@CharlotteCountyFL.gov

16.4 FOC Node Cabinet

- 16.4.1 The Charlotte County Lighting District TMC will specify when a FOC Node Cabinet is necessary.
- 16.4.2 The following is The Charlotte County Lighting District approved FOC Node cabinet:
- **Transportation Control Systems Type 334 Base Mount ITS Enclosure w/ HVAC and generator hookup**
 - Part # F722430B2D2GRSD_S and shall include the following:
 - LED, Panel mount 1" Dome Red 125vac
 - UPS Power Transfer Switch For 19" Rack Mount
 - MP2000E-TB-3-R UPS, SNMP Card (G30222ca2) Rack Mount
 - Drawer, 16" Rack Mount For 19" EIA Rack Laptop & Document Drawer
 - PDA 30 Amp 19" Rack Power Dist with Air Cond Breaker
 - Busbar Panel ITS, 1 Ground, 1 Neutral, Mount to External Hinge
 - 2-4"Fan, 2-Thr, 2-Led, 4-Limit SW, Long Plate
 - (2) 19" EIA Rack Led Mount L Bracket
 - Strip Outlet, 12 Pos, 15A
 - AC Unit 3000 BTUH NEMA 04, 120v, 60 Hz Remote Controller
 - 19" Rack Shelf For 2 Batteries
 - Power Converter / Charger 70vf
- 16.4.3 For cabinet base specifications See [Section 4.](#)
- 16.4.4 The following is the Charlotte County Lighting District approved FOC Node cabinet UPS:
- Myers MP2000E-TB-3-R UPS

End of Section 16

Section 17 – Network and ITS Devices

17.1 General

- 17.1.1 All installations shall be done in a workmanlike manner and be performed by qualified personnel.
- 17.1.2 All network and ITS devices shall be compatible with the Charlotte County Lighting District's Advanced Traffic Management System (ATMS).

17.2 Managed Field Ethernet Switch

- 17.2.1 Managed Field Ethernet Switch shall be Charlotte County Lighting District TMC approved.
- 17.2.2 Managed Field Ethernet Switch shall include the power supply, SFP Optic Modules, and additional components.
- 17.2.3 The following is the Charlotte County Lighting District TMC approved managed field Ethernet switch:

Layer 3 switch with needed components (Rack Mounted)

- a. Switch – ITS EXPRESS/Hardened Networks (ITS-8042 V3) FL APL Approval # 684-002-028
- b. SFP Optic Modules – The Charlotte County Lighting District TMC will specify required SFP Optic Modules on plans
- c. Power Supply – ITS EXPRESS/Hardened Networks Dual DC inputs 12-48VDC on 6-pin terminal block

17.3 Cellular Modem

- 17.3.1 Any intersection that will not have FOC communications to the Charlotte County Lighting District ATMS shall include a cellular modem.
- 17.3.2 When a cellular modem is used a managed field switch shall also be included See **Section 17.2.**
- 17.3.3 Cellular modem shall include antenna, power supply, and management software.
- 17.3.4 The following is the Charlotte County Lighting District TMC approved cellular modem:

- **ThruGreen Modem 5-Port Cell Modem**

17.4 Pan/Tilt/Zoom Cameras (PTZ)

17.4.1 The following is the Charlotte County Lighting District TMC approved PTZ camera:

ITS EXPRESS/Hardened Networks Advanced Imagers Series

- a. HN-AIS-8300 FL APL Approval # 682-002-025
- b. Traffic Camera Candy Cane Kit

The Charlotte County Lighting District TMC will determine and provide location detail for PTZ camera.

17.4.2 Standard mounting pole for PTZ camera is a “Candy Cane” and shall be mounted using a Pelco Astro bracket.

17.4.3 PTZ wiring shall be Cat 5e shielded outdoor/underground rated for distance no longer than manufacture’s recommendation of 300 cable feet.

17.4.4 **Cable distances over 300 cable feet shall require a one-on-one meeting with the Charlotte County Lighting District TMC.**

End of Section 17

Section 18 – Flashers/Rectangular Rapid Flashing Beacon(RRFB)

18.1 General

- 18.1.1 All installations shall be done in a workmanship like manner and performed by a qualified personnel. See [General Notes](#).
- 18.1.2 The Charlotte County Lighting District prefers Solar powered flashers and RRFBs.
- 18.1.2 All Flashers and RRFBs shall be pedestal mounted with a breakaway base, direct buried is prohibited.
- 18.1.3 For Flashers/RRFB pre-cast or Cast-In-Place base, refer to FDOT Index 654-001 (RRFB) or FDOT Index 700- 120 (Flashers), the base shall be minimum 2 feet diameter x 4 feet length, and shall include anchor bolt cage (Pelco - AP-1095-GLV).
- 18.1.4 For Flasher/RRFB concrete base conduit specification See [Section 2](#).
- 18.1.5 Use Pelco square breakaway base for pedestal poles with aluminum door and ground lug (SP-1116-FL-AD- GL-PNC) or approved (in writing) equivalent by the Charlotte County Lighting District.
- 18.1.6 All flashers/RRFB assemblies shall have a pole & base collar assembly (PB-5325-PNC) installed.
- 18.1.7 All attaching hardware shall be stainless steel 304 or 316.
- 18.1.8 Use Pelco pedestal spun aluminum four (4) inch Schedule 80 pole (PB-5102-X-PNC) X=Length or approved (in writing) equivalent by the Charlotte County Lighting District.
- 18.1.9 For grounding specifications See [Section 14](#).

18.2 Traffic Controller Activated - Advanced Warning Flasher

- 18.2.1 Use current FDOT Specifications - section 700, Index 700-120
- 18.2.2 Each advanced warning flasher shall have seven (7) conductor signal cable from the traffic signal controller cabinet to each advanced warning flasher pedestal base hand hole.
- 18.2.3 Each signal head on advanced warning flasher shall have five (5) conductor signal cable from the signal head to pedestal base hand hole.
- 18.2.4 Coordinate with the Charlotte County Lighting District for traffic signal cabinet termination and for controller programming.

18.3 Warning Flasher

18.3.1 Use current FDOT Specifications - section 700, Index 700-120

18.3.2 Warning flashers shall be on the FDOT APL and Charlotte County Lighting District approved.

18.3.3 The following are the Charlotte County Lighting District approved Flashing Beacons:

1. **Carmanah Solar Powered Warning Beacon**

- a. Carmanah R247-G
- b. Solar powered (80W PV + 100 AHR Battery)
- c. Natural aluminum cabinet finish
- d. 1 or 2 beacon (**per plans**), 12" aluminum housing with visor, wide view LED
- e. Black signal head finish
- f. 24-7 + Manual override switch
- g. Temple/AI - LPM 500-030 with 10 Year Plan

2. **Carmanah AC Powered Warning Beacon**

- a. Carmanah R247-G
- b. AC powered
- c. Natural aluminum cabinet finish
- d. 1 or 2 beacon (**per plans**), 12" aluminum housing with visor, wide view LED
- e. Black signal head finish
- f. 24-7 + Manual override switch
- g. Temple/AI - LPM 500-030 with 10 Year Plan

18.4 School Flasher

- 18.4.1 Use current FDOT Specifications - section 700, Index 700-120.
- 18.4.2 The center of the controller/battery cabinet shall be 5 ft. from final elevation.
- 18.4.3 All school flashers shall be compatible with the Charlotte County Lighting District School flasher monitoring system (RTC Connect).
- 18.4.4 School flashers shall be on the FDOT APL and Charlotte County Lighting District approved.
- 18.4.5 The following is the Charlotte County Lighting District approved school flasher: **(No exceptions)**

1. **Standard RTC Solar powered assembly**

- a. Two Battery Cabinet Including Panel No. 2 lock, Regulator and 4.5" Ubolt Mount (PN: 503568K)
- b. 40-Watt Solar Panel (PN: SP40)
- c. Power Source 100 AHR Battery (PN: PG12V103FR)
- d. 15' Spun Aluminum Pole, Base and Collar and Anchor Bolts (PN: POLE15SPALASSY)
- e. 12" Signal Heads Aluminum Black (1 or 2 per flasher) (PN: SIGAB)
- f. 12" Amber DC 5 Watt LED IL (RTC Standard) (3 per flasher) (PN: 502463)
- g. DC Guardian Board with Complete 3-way Wiring Harness only (PN: Guard)
- h. Five Year Plan with Modem, RTC Connect Software, Premium "Always up" Cloud Based Data Storage, Cell Service, Cable, Mount and Antenna (M2M5YR-4K)
- i. 7-10 Db M2M Omni Puck Antenna with 3' Lead and Mounting Bracket (PN: M2MOMNI)
- j. Include an AP22 with ANY Modem and Plan (PN: 503644)

18.5 Rectangular Rapid Flashing Beacon (RRFB)

- 18.5.1 Use current FDOT Specifications - section 654, Index 654-001
- 18.5.2 The following is the Charlotte County Lighting District approved RRFB:

- **Carmanah R920-E Solar-Powered Rectangular Rapid Flashing Beacon**
 - a. 80W PV + 100 AHR Battery
 - b. Natural aluminum cabinet finish
 - c. Single or Dual Light bars and sign package (# per plans)

18.6 Electronic Speed Feedback Signs (ESFS)

- 18.6.1 Use current FDOT Specifications - section 700, Index 700-120 **(Note cabinet shall be mounted per the Charlotte County Lighting District specifications)**
- 18.6.2 Electronic Speed Feedback Signs shall be on the FDOT APL and Charlotte County Lighting District approved.
- 18.6.3 The following are Charlotte County Lighting District approved ESFS:
1. Electronic Speed Feedback Sign for Roadways Under 45 MPH:
 - a. Carmanah Speedcheck-15
 - b. Static Sign Size - 30" x 42"
 - c. Sign Sheeting Colored: Yellow unless installed in Schools Zones then Fluorescent Yellow/Green shall be used.
 - d. Sign Sheeting Grade: Diamond Grade
 - e. Solar Powered (170W)
 - f. Natural aluminum cabinet finish
 - g. Temple/AI - LPM 500-070 with 10 Year Plan
 2. Electronic Speed Feedback Sign for Roadways 45 MPH and over:
 - a. Carmanah Speedcheck-18
 - b. Static Sign Size - 36" x 48"
 - c. Sign Sheeting Colored: Yellow unless installed in Schools Zones then Fluorescent Yellow/Green shall be used.
 - d. Sign Sheeting Grade: Diamond Grade
 - e. Solar Powered (170W)
 - f. Natural aluminum cabinet finish
 - g. Temple/AI - LPM 500-070 with 10 Year Plan

End of Section 18

Section 19 – Overhead Signs

19.1 General

- 19.1.1 **Only Regulatory Signs can be span wire mounted.**
- 19.1.2 All overhead street name signs shall be uppercase followed by lowercase letters.
- 19.1.3 All overhead street name signs shall not have block numbering.
- 19.1.4 All overhead street name signs shall have the complete street names (to include St., Rd., Dr., etc.).
- 19.1.5 Overhead span wire mounted regulatory signs shall be mounted using adjustable sign hanger assembly, with sixteen (16) inch CTC, with 3/8-inch stainless steel hardware. (Pelco - Single - SP-1032-FL-PNC, Double - SP-1031-FL-PNC)
- 19.1.6 Overhead signs 48 inches and larger shall have two (2) adjustable sign hanger assemblies on each sign as a minimum when suspended from span wire.
- 19.1.7 Attach sign to hanger with 304 or 316 stainless steel bolts, washers and nuts.
- 19.1.8 Cantilever arms shall be used to mount overhead street name signs to concrete strain or steel strain pole on span wire installations. Rigidly mounted on arm, free swinging is prohibited.
- 19.1.9 Cantilever arms shall be used to mount overhead street name signs on mast arm installations, when due to space constraints or mast arm is not perpendicular to direction of travel. Signs must be rigidly mounted on arm; free swinging is prohibited.

19.2 Static Signs

- 19.2.1 All new overhead sign installations shall be static with Type XI sheeting (Diamond Grade).
- 19.2.2 When intersection is equipped with Left Turn Flashing Yellow Arrow, a “Left Turn Yield on Flashing Yellow Arrow” sign shall be installed for that approach. (R10-12A)
- 19.2.3 When intersection is equipped with U Turn Flashing Yellow Arrow, a “U Turn Yield on Flashing Yellow Arrow” sign shall be installed for that approach.
- 19.2.4 When intersection is equipped with 5-section Left Turn, a “Left Turn Yield on (Green Ball Symbol)” sign shall be installed for that approach. (R10-12)
- 19.2.5 All overhead street name signs shall have aluminum Z bar mounted horizontal to/from edge of sign on top and bottom utilizing 3/8” stainless steel hardware
- 19.2.6 All overhead street name signs shall be mounted utilizing one of the following brackets:

Pelco formed tube, Pelco Astro Sign-Brac, Stellar Cable Mount for Overhead Street Name Signs, or Pelco Astro Sign-Brac, Stellar Tenon Mount for Overhead Street Name Signs.

19.3 Illuminated Street Name Signs

All internally illuminated street name signs shall be single sided and rigid mounted on a galvanized, clamp-on, cantilevered arm “**No free swinging.**” If the mast arm assembly is painted, the cantilevered arm shall be colored to match the pole assembly. Transportation Control Systems of Tampa, Florida, shall manufacture all illuminated street name signs the sign shall be a **TCS BRIGHT LITE EDGE LIT STREET NAME SIGN**. Illuminated street name signs shall utilize LED tubes as the light source. All sign housings shall be 4’ feet, 6’ feet, or 8’ feet in length. All sign faces shall have a 1” inch white border around the entire sign.

- 19.3.1 Illuminated street names signs shall be connected to the traffic signal electrical service (**not inside traffic signal cabinet**).
- 19.3.2 All cable and conduit for illuminated signs shall be kept separate from the signal cabinet.
- 19.3.3 A separate 15-amp circuit breaker shall be installed in the traffic signal electric service disconnect for illuminated signs.
- 19.3.4 A (Tork 2129A) photo control shall be installed on the traffic signal electric service disconnect for illuminated signs.
- 19.3.5 #10 AWG (THHN/THWN-2) wire shall be used from traffic signal electric service disconnect to hand hole compartment.
- 19.3.6 Three (3) conductor #14 AWG SO cable shall be used from sign termination compartment to hand hole compartment. (Belden (IMSA 50-2) and traffic signal cable is prohibited)
- 19.3.7 Illuminated sign power wire shall be terminated in the mast arm upright using terminal strips.

19.4 Blank out signs

- 19.4.1 All Blank out signs shall be on the FDOT APL and Charlotte County Lighting District approved.
- 19.4.2 The following is the Charlotte County Lighting District approved Blank out sign:
 - **Transportation Control Systems – Blank Out Sign (TCSLEDBO Series)**
- 19.4.3 For Blank out sign wiring, **See Section 9.**

End of Section 19

Section 20 – Intersection Lighting

20.1 General

- 20.1.1 **Intersection lighting shall be separate from Standard Roadway Street lighting circuits; 480 VAC power is strictly prohibited for intersection lighting.**
- 20.1.2 All intersection lighting shall be 120 or 240 VAC, no exceptions. **(The Charlotte County Lighting District prefers 240 VAC)**
- 20.1.3 For electrical service/wiring specifications for intersection lighting, **See Section 13.**
- 20.1.4 For grounding specifications, **See Section 14.**
- 20.1.5 All intersections shall have intersection lighting if there are no aerial constraints/conflicts.
- 20.1.6 All mast arm uprights shall be extended and have integrated bolt on street light arm. **(Attaching luminaire arm or fixture to the mast arm is prohibited.)**
- 20.1.7 All steel strain poles shall have integrated bolt on luminaire arm or clamp on street light arm.
- 20.1.8 All concrete strain poles shall either have a Tenon L Bracket mount or have a twenty (20) foot aluminum street light arm.
- 20.1.9 An alternative to above if not feasible is the use of standard aluminum street light poles with either an eight
(8) foot or fifteen (15) foot aluminum street light arm and maximum luminaire height of forty-five (45) feet.
- 20.1.10 All standard intersection lighting fixtures shall be on the FDOT APL and be Charlotte County Lighting District approved.
- 20.1.11 All Sea Turtle/wildlife friendly lighting fixtures shall be on the Florida Fish and Wildlife - Certified Wildlife Lighting Certification program and be The Charlotte County Lighting District approved.
- 20.1.12 The following are Charlotte County Lighting District approved intersection lighting fixtures:
1. **Standard Intersection Lighting**
 - a. Holophane Mongoose LED Medium P7, 3000K CCT, Forward Throw, with Field adjustable output (MGLEDM-P7-30K-MVOLT-FT-VH-GRSD-AO)
 2. **Sea Turtle/wildlife friendly Intersection Lighting**
 - a. PEMCO-SF GRN PART#WIN-W5-100W TAMBER-240V-SO1871-RAL6027-TX
 3. **Decorative Lighting**
 - a. Nova Pole #NPP-N202-CHAR-PED-BK-TX lower luminaire arm
 - b. Nova Pole #NPT6050D24AB-BC-BAW- BK-TX lighting pole w/ vibration damper, receptacle and #10090 upper arm
 - c. PEMCO X-WIN-W5-NL-60W4K-U-5-SMS-XPEN-BK-TX upper luminaire
 - d. PEMCO X-WIN-W5-NL-20W4K-U-3-SMS-XPEN-BK-TX lower luminaire

20.2 Installation

20.2.1 120VAC Intersection Lighting

1. Each mast arm upright, steel strain pole, concrete strain pole, and aluminum light poles with intersection lighting luminaire(s) shall have the following located in the hand hole compartment or T-Base.
 - a. One (1) breakaway fuse holder with lineside terminal having a Cu setscrew and the load side terminal having Cu crimp connector. **(Bussmann - HEB-AW-RYC)** and have one (1) breakaway neutral fuse holder with permanently installed solid neutral, with lineside terminal having a Cu setscrew and the load side terminal having Cu crimp connector **(Bussmann - HET-AW-RYC)** for each luminaire and shall be located in the hand hole compartment or T-Base.
 - b. 120VAC Surge Arrestor **(Hesco/RLS HE120BW)** and shall be installed using butt crimp connectors.

20.2.2 240VAC Intersection Lighting (Preferred)

1. Each mast arm upright, steel strain pole, concrete strain pole, and aluminum street light poles with intersection lighting luminaire(s) shall have the following located in the hand hole compartment or T- Base.
 - a. Two (2) breakaway fuse holders with lineside terminal having a Cu setscrew and the load side terminal having Cu crimp connector. **(Bussmann - HEB-AW-RYC)** for each luminaire and shall be located in the hand hole compartment or T-Base.
 - b. 240VAC Surge Arrestor **(Hesco/RLS HE240BB)** and shall be installed using butt crimp connectors.

20.2.3 All luminaires and all hardware shall be installed to manufacturer specifications.

20.2.4 The luminaire tilt angle shall be set per the EOR/plans.

End of Section 20

Section 21 - Roadway Street Lighting

21.1 General

- 21.1.1 For conduit specifications See [Section 2](#).
- 21.1.2 For grounding specifications see [Section 14](#).
- 21.1.3 Streetlights, Electric services, and Load centers shall **not** be placed in ditches, drainage slopes, swales, or where sheet or standing water can intrude.
- 21.1.4 All Roadway Street Lighting shall be single phase, 240/480 volt, three wire.
- 21.1.5 All foundations for street light poles shall be pre-formed concrete and shall conform to the latest FDOT index 715-002 for Standard Aluminum Lighting. **(Screw-in bases are strictly prohibited)**
- 21.1.6 If the EOR determines a spread footer shall be used in lieu of a pre-formed foundation, the spread footer shall conform to the latest FDOT index 715-002 for Standard Aluminum Lighting.
- 21.1.7 All Roadway Street Lighting designs shall meet FDM Section 231 and be approved by The Charlotte County Lighting District.
- 21.1.8 All Roadway Street Lighting poles shall be installed with a breakaway Transformer base.
- 21.1.9 All Roadway streetlight poles shall be aluminum.
- 21.1.10 All Roadway streetlight arms shall be aluminum and clamp-on.
- 21.1.11 All Roadway Street Lighting shall have a maximum luminaire height of forty-five (45) feet.
- 21.1.12 All standard Roadway lighting fixtures shall be on the FDOT APL and be The Charlotte County Lighting District approved.
- 21.1.13 All Sea Turtle/wildlife friendly lighting fixtures shall be on the Florida Fish and Wildlife - Certified Wildlife Lighting Certification program and be The Charlotte County Lighting District approved.
- 21.1.14 The following are The Charlotte County Lighting District approved Roadway lighting fixtures:
- **Standard Roadway Lighting**
 - a. Holophane Mongoose LED Medium P7, 3000K CCT, Wide Roadway, with Field adjustable output (MGLEDM-P7-30K-480-WR-VH-GRSD-AO)
 - b. Holophane Mongoose LED Medium P8, 3000K CCT, Wide Roadway, with Field adjustable output (MGLEDM-P8-30K-480-WR-VH-GRSD-AO)
 - c. Autobahn Series ATB2 – ***The Charlotte County Lighting District will specify when to use***
- 21.1.15 All Roadway Street Lighting wire shall be #6 AWG or greater joining pole to pole.

21.1.16 No splicing permitted in pull boxes unless approved by The Charlotte County Lighting District. *If The Charlotte County Lighting District **approves** a splice in a pull box, the Charlotte County Lighting District approved Submersible insulated connector shall be used (MORRIS 98043 2/0 Streetlight Conn 3 Port).*

21.1.17 Fuse holders in pull boxes are strictly prohibited.

21.1.18 Under **NO** circumstances shall phase tape be used to identify a conductor.

21.2 Installation

21.2.1 No splicing permitted in pull boxes unless approved by the Charlotte County Lighting District. *If The Charlotte County Lighting District **approves** a splice in a pull box, The Charlotte County Lighting District approved submersible insulated connector shall be used (MORRIS 98043 2/0 Streetlight Conn 3 Port).*

21.2.2 **Fuse holders in pull boxes are strictly prohibited.**

21.2.3 All Roadway Street Lighting shall be #6 AWG or greater.

21.2.4 All streetlight wiring shall be as follows:

- **240VAC – two (2) conductors 240VAC with ground wire**

- a. All luminaires shall have three (3) #10 AWG (THHN/THWN-2) black, red, and green wire.
- b. All wiring from the load center and from pole to pole shall have three (3) #6 AWG or greater (THHN/THWN-2) black, red, and green wire.

- **480VAC – two (2) conductors 480VAC with ground wire**

- a. All luminaires shall have three (3) #10 AWG (THHN/THWN-2) black, white, and green wire.
- b. All wiring from the load center and from pole to pole shall have three (3) #6 AWG or greater (THHN/THWN-2) black, white, and green wire.

21.2.5 Each Roadway streetlight pole shall have the following located in the T-Base (**not in pull box**):

- **240VAC – two (2) conductors 240VAC with ground wire**

- a. Two (2) breakaway fuse holders with lineside terminal having a Cu dual setscrew and the load side terminal having Cu crimp connector. (**Bussmann - HEB-AW-RYC**) for each luminaire and shall be in the hand hole compartment or T-Base.
- b. 240VAC Surge Arrestor (**Hesco/RLS HE240BB**) and shall be installed using butt crimp connectors.

- **480VAC – two (2) conductors 480VAC with ground wire**
 - a. Two (2) breakaway fuse holders with lineside terminal having a Cu dual setscrew and the load side terminal having Cu crimp connector. **(1 Bussmann - HEB-AW-RYC and 1 Bussmann-HET-AW-RYC)** for each luminaire and shall be in the hand hole compartment or T-Base.
 - b. 480VAC Surge Arrestor **(Hesco/RLS HE480BW)** and shall be installed using butt crimp connectors.

21.2.6 Street light pole assembly shall be grounded using a #6 Green AWG wire from ground to the T-Base ground terminal lug.

21.2.7 Conduit shall run from pull-to-pull box at each light pole.

21.2.8 Pull boxes shall be placed by each light pole with mow pad, Load centers, on each side of road crossings/driveways, multi directional conduit runs, and on continuous conduit runs exceeding five hundred (500) feet.

21.3 Load Center

21.3.1 Roadway Street Lighting electric service shall be mounted on two (2) - eight (8) inch x eight (8) inch x twelve (12) foot concrete service poles.

21.3.2 A 100-amp 600 VAC rated NEMA 3R non-fusible single-throw safety switch disconnect **(Square D - HU363RB)** shall be installed on the concrete service poles, on the lineside of the meter socket.

21.3.3 All Roadway Street Lighting electrical services shall be metered. Meter socket shall be 200 Amp lever bypass NEMA 3R aluminum enclosure rated for outdoor use (Milbank UAP9551-X-QG-HSP). Meter socket shall be installed on the load side of safety switch disconnect on the concrete service poles.

21.3.4 Roadway Street Lighting load center enclosure cabinet shall be installed on the concrete service poles.

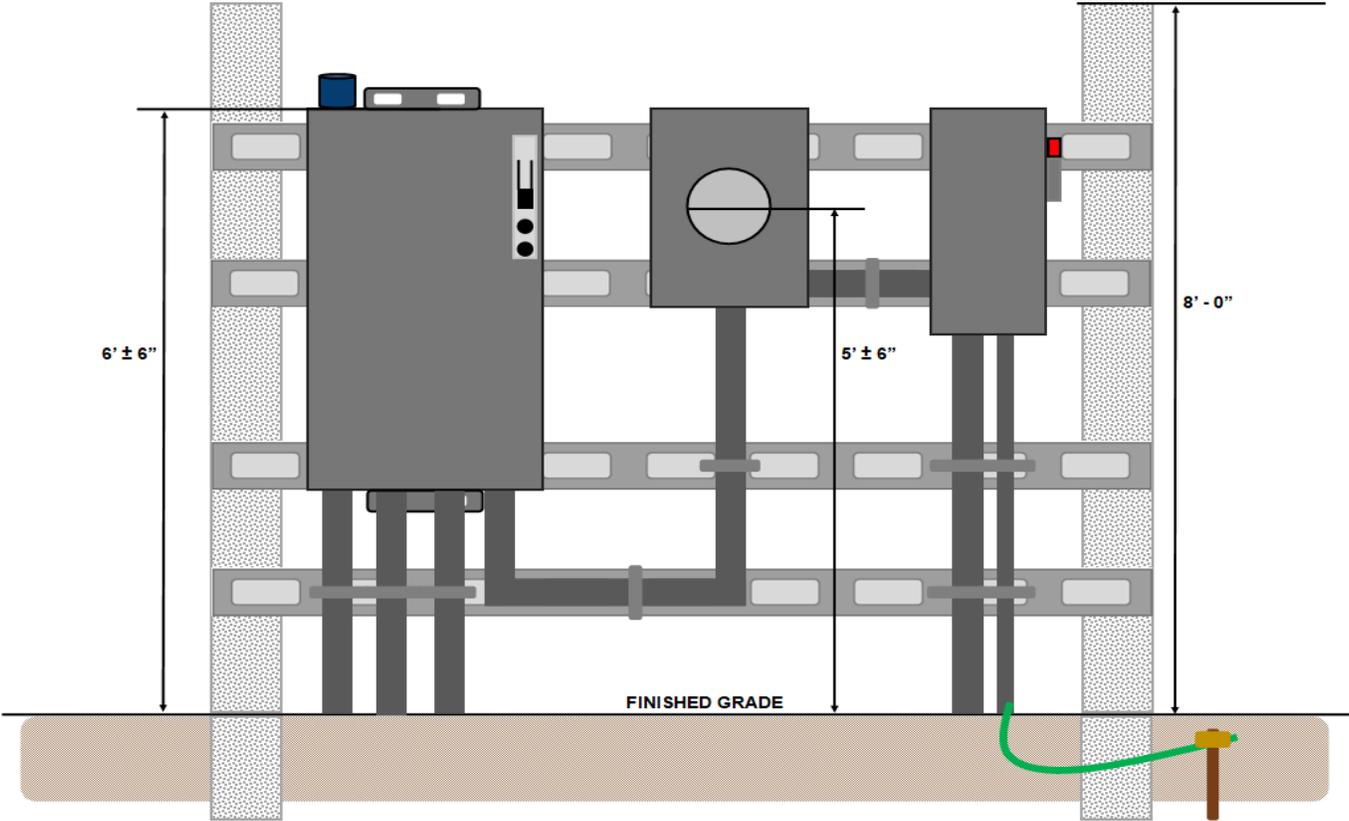
21.3.5 Roadway Street lighting Load center enclosure cabinet shall be stainless steel NEMA 3R Rainproof enclosure and approved by The Charlotte County Lighting District.

21.3.6 The following is The Charlotte County Lighting District approved Load center:

- a. Square D Night-Master Long Version (8903-SQH63-V06)
- b. Bussmann Fuse block 2 pole 30 amp (R60030-2CR) one (1) per each circuit
(four (4) circuits max per load center)
- c. One (1) Square D SPD 40kA 480V (SDSA3650) (mounted internally)
- d. One (1) Intermatic Lighting photoelectric 3-Pin Locking Receptacle mounting bracket (K122)
- e. One (1) Intermatic 480VAC twist lock photo control (LC4535LA)

(photo control receptacle and photo control shall be mounted externally on top left of Night-Master, when facing Night-Master access door)

21.4 Load Center Illustration



End of Section 21

Grout Pad with Drain Hole

A ½ inch tube with a maximum outside diameter of ¾ inch for a drain hole in the grout pad structure.

1. Ensure all of the leveling nuts are tightened against the structural base plate to proper spec using a wrench.
2. Cleaning the top of the foundation



If the foundation has mildew on top and under the structure, use a chlorine solution.





The chlorine solution is then washed off.



The water and any residue are then blown off with high pressure air.

3. Constructing the form:



Forms can be constructed from old aluminum signage or bender board.



Blocks are screwed to the form for mounting of the form to the top of the foundation.

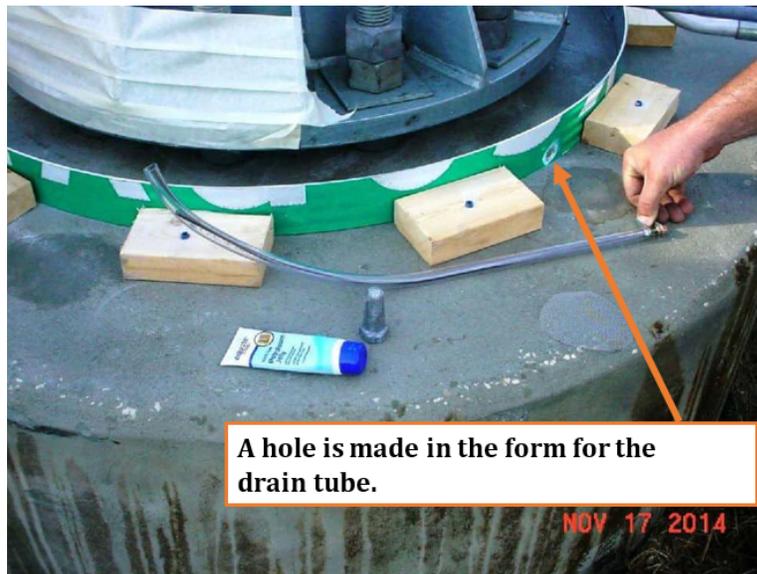
The form is then installed to the top of the foundation with tap-cons and spacer blocks.



The form is now installed where the top of the form is above the bottom of the structure base plate.



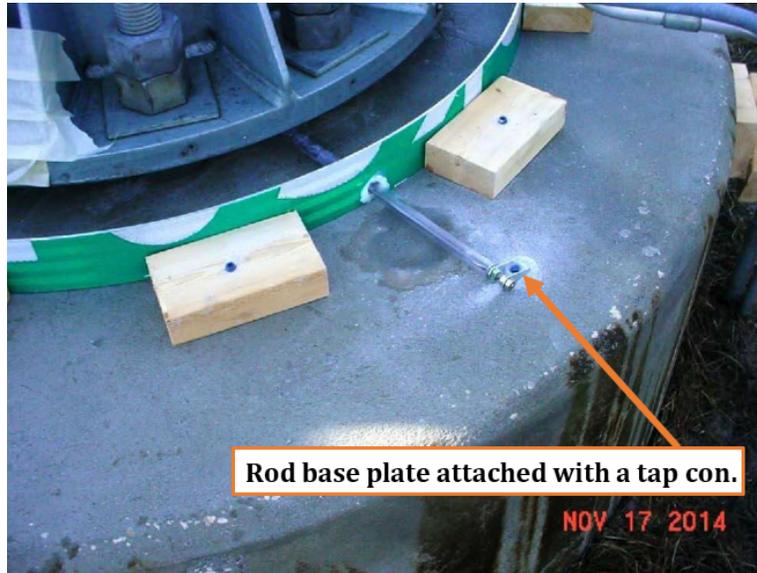
4. Installing the Drain Hole.



A ¼ inch rod is pre-formed with a base plate and inserted inside the tube to hold the tube in the proper position until the grout has set.



The tube is then covered with petroleum-based lubricant before it is reinstalled on the rod.



The lubricated tubing is then installed on the rod and inserted thru the form and the base of the rod is screwed to the top of the foundation to hold it in place.

5. Mixing the grout:



A suitable mixing container with a mixing paddle is used with this bag pour.

6. Pouring grout:



The grout is then poured on one side as much as possible.



Typical grout filled form.



With a trowel the outside top edge is rounded as the grout is setting.

7. Removing the drain hole tube:



When the grout is set enough remove rod base plate, rod, and tube from the foundation.

8. Removing the form:



After the grout has cured, remove the form.

9. Sealing the grout:



The grout is then sealed with a curing compound.

10. Plugging the drain hole:



A piece of aluminum screen is then preformed around a bolt.



The preformed screen is then inserted into the drain hole to keep out debris and vermin.

11. Completed structural grout pad with a drain:



The screen can be removed for cleaning.



Typical completed structural grout pad.

