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Communication Infrastructure

Policies & Procedures

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Revision History

Revision Date	Revision Number	Revision Description
8/14/06	0001	-Added additional verbiage to section 3.3 to include the CEI -Updated section 3.4 -Added section 3.5 -Added section 3.6 -Added section 3.7
1/13/12	0002	-Added section 3.8
8/21/14	0003	-Changed FDOT provided Actelis Copper Ethernet Switch to Cradlepoint IRB650LE2-SP

1.0 Introduction

The Broward County Traffic Engineering Division is responsible for assisting the motoring public in arriving at their destination safely and with minimal delay. This requires the Division to maintain and expand the communications infrastructure to enable communications between a central signal computer and each signalized intersection to provide signal coordination. At present, communications is accomplished using a copper cable plant, fiber cable plant, point-to-point radio, DSL and cellular.

The County roads are in a constant state of change due to construction. Projects initiated by the State (FDOT), County, Cities and private companies affect the condition of the signal infrastructure and in particular, the communications infrastructure. Within the Division, the Communication's group is responsible for maintaining and expanding the communication's infrastructure. Through the use of the County's Communications Standards and Specifications and the governing Communications Policies and Procedures as outlined in this document, we are ensured that the communication's infrastructure is reliable and capable of supporting the Traffic Engineering Division's objectives. Any comments to this document shall be addressed to the Communications Manager by email at tecommunications@broward.org.

2.0 Objectives

The objectives of this document are to convey Broward County Traffic Engineering's Communications Policy and Procedures for maintaining and expanding the communication's infrastructure, establish guidelines for all Engineering, Consulting and Contracting companies doing business in Broward County and to make it known that standards and specifications exist for the communications infrastructure.

3.0 Communications Infrastructure Policies and Procedures

The following policies and procedures shall be used to guide all Engineering, Consulting and Contracting companies conducting business in Broward County.

3.1 Violation Discovery at Communications Re-inspection Policy

When a signalization project is completed, the Contractor will send in a request to the Broward County Traffic Engineering Division to perform an initial inspection. This inspection ensures that the completed project has conformed to the Broward County Traffic Engineering Division's standards and specifications. The inspection includes the communications infrastructure, i.e., copper or fiber optic interconnect cable, conduit, junction boxes, pull boxes, etc. On occasions, the inspection will fail and a punch list will be generated which lists each item that has failed.

When the Contractor has rectified the items on the punch list, the Contractor will request a re-inspection. The re-inspection will be conducted to verify that the items on the punch list have been rectified and now meet Broward County standards.

While performing the re-inspection, another significant violation of Broward County standards may be discovered. The discovered significant violation will be added to the punch list. Any additional significant violations found may result in the failure of the re-inspection. It is not the intent of the re-inspection to perform another entire inspection.

The overall intent of this policy is not to unnecessarily delay acceptance of the project but to guarantee the operational integrity of the communications infrastructure, thus helping to protect the motoring public of Broward County.

Note: A full inspection will be conducted if 90 or more days pass since the first inspection.

3.2 Replacement Interconnect Cable Policy – Fiber or Copper

Interconnect cable may need to be replaced when the cable is cut or when the construction project specifications require replacement. In either case, the cable shall be replaced in its entirety between existing termination points. Termination points for copper cable are junction boxes and controller cabinets and splice closures for fiber cable. If the replacement interconnect cable extends beyond the immediate project or damage area, the areas which are affected by the replacement cable will now be considered to be part of the project or damage area. It is the responsibility of the Contractor to take whatever steps are necessary to perform the installation of the replacement interconnect cable.

Two specific issues are addressed below that may affect the installation of the interconnect cable.

1. In the process of removing the interconnect cable for the installation of new cable, the cable cannot be pulled out of the conduit:

The problem may be located outside the project area or area of damage (cable cut). In this case, the Contractor must take the necessary steps to isolate the problem area (i.e. blowing out the conduit, going from pull box to pull box and pulling the cable, etc.) and take the necessary corrective actions so that the cable can be removed and the new cable installed.

2. In the process of reinstalling new interconnect cable, other communications infrastructure is damaged:

While in the process of removing or installing the interconnect cable, any damage to junction boxes, pull boxes or any other signal communications system equipment are the responsibility of the Contractor. The Contractor shall replace the damaged equipment with approved equipment as specified in our current Broward County Traffic Engineering “Standards and Specifications for Communications Infrastructure” document. For a copy of these standards, refer

to the Broward County web site at www.broward.org/traffic. To eliminate any questions concerning damages, it is required that the Contractor take pictures of the equipment in the area which may be affected by the installation of the replacement cable (i.e. pictures of a damaged pull box) prior to the cable installation. Prior to commencement of the cable replacement, these pictures are to be submitted to Broward County Traffic Engineering if they are to be used for arbitration purposes.

3.3 Communications Disruption Policy and Procedures

3.3.1 Communication Disruption Responsibility Policy

The County's communications policy requires all Contractors to maintain online communications during the construction period within their project corridor. This is required for two reasons; to ensure continued signal coordination through the project corridor and other affected corridors in the County and second to provide the County with visibility to down stream communications in other areas outside the project corridor. If communications is not restored after being down for 3 consecutive days and we have a cable cut down stream outside the project limits, it shall be the Contractors responsibility to also repair the downstream cable cut. This is due to the fact that we will not be aware of the cable cut until communications is re-established and by that time it may be too late to find the responsible party. Due to this risk to the infrastructure, *Time is of the Essence* for replacing the communications cable to re-establish communications. A cable cut outside the project corridor shall be treated as a normal cable cut.

3.3.2 Notification of Communications Disruption Procedure

When communications to one or more intersections must be disrupted by a Contractor to perform work other than an Emergency Disconnect, the Contractor shall provide an advance two (2) day notice in writing through their CEI or Project Manager (FDOT/Agency), to the Broward County Traffic Engineering Division.

This notification shall be conveyed via electronic mail (email) to the Communications Manager at tecommunications@broward.org. Notification shall include contact person, telephone number, purpose, location and duration. The disruption shall be scheduled during the weekend or during off peak hours beginning at 9:00 am and ending at 3:00 pm, however, the disruption shall last for no more than 3 consecutive days.

3.4 BCTED Signalization Inspection Procedure

- 1) Written requests for Signalization inspections must be made by the CEI or the Signalization Contractor, hereafter referred to as the Requestor. This request shall be provided to the Systems Engineer or Designee (SED) 30 calendar days in advance of the anticipated completion date. Inspection groups may include Signal Maintenance, Signal Timing, Planning, Design or Communications as required.
- 2) The SED will schedule inspections on a first come, first serve basis. The inspection will be scheduled no later than 30 days from the request, except when a later date is requested. The SED will notify the appropriate groups of the inspection to be conducted and provide plans as available. The groups notified of the inspection are committed to that inspection for the days required. The Planning group may inspect the markings as their schedule permits, but will perform their inspection prior to the scheduled inspection date.
- 3) An Information Package, to include five sets of As-built drawings and Submittal Data shall be provided to the SED seven (7) calendar days prior to the inspection date.
- 4) The group performing the inspection allocates and schedules the necessary staff to complete the inspection. Note: the scheduling of the inspection will typically be based on no more than one or two intersections per day. Additional intersections will be inspected if time and resources permit that day and will continue the next business day.
- 5) The Requestor will confirm the inspection date and location with the SED seven (7) calendar days prior to the scheduled inspection date. The location of the inspection may be changed two (2) days prior to the scheduled inspection date assuming there are no changes to the plans.
- 6) The Supervisors of the inspection groups will notify the SED the afternoon before the scheduled inspection date if the inspection should be cancelled. The inspection cancellation will be made by any Section Head after consultation with the Director or his designee. Notification of the cancellation will be provided by the SED to all of the parties.
- 7) The Communications Section and the Maintenance Section will each provide the SED and the requestor with a punch list within two (2) business days of the close of inspection. The punch list will state whether the intersection(s) passed or failed, and a list of the failed items. Pavement Marking and Signing items that present an operational hazard will be placed on the Maintenance punch list. Other Pavement Marking and Signing comments will be passed along to the appropriate party, as determined by roadway jurisdiction and the contract administration of the pavement markings. If an Early Termination occurs as a result of a Major Failure, a punch list is not required (See Section 9). If both punch lists have passed, the SED shall provide a Letter of Acceptance, if required, to the requestor within two (2) business days.
- 8) If an inspection fails, a re-inspection request must be submitted in writing to the inspection group(s) which failed the inspection confirming, item-by-item, that each item on the punch list has been corrected. A copy of this request will be sent to the SED. Once this

request is submitted, the re-inspection will be performed within 14 calendar days unless circumstances do not permit this. A revised punch list will be provided as in Section 7. This cycle will continue as needed until both punch lists are cleared.

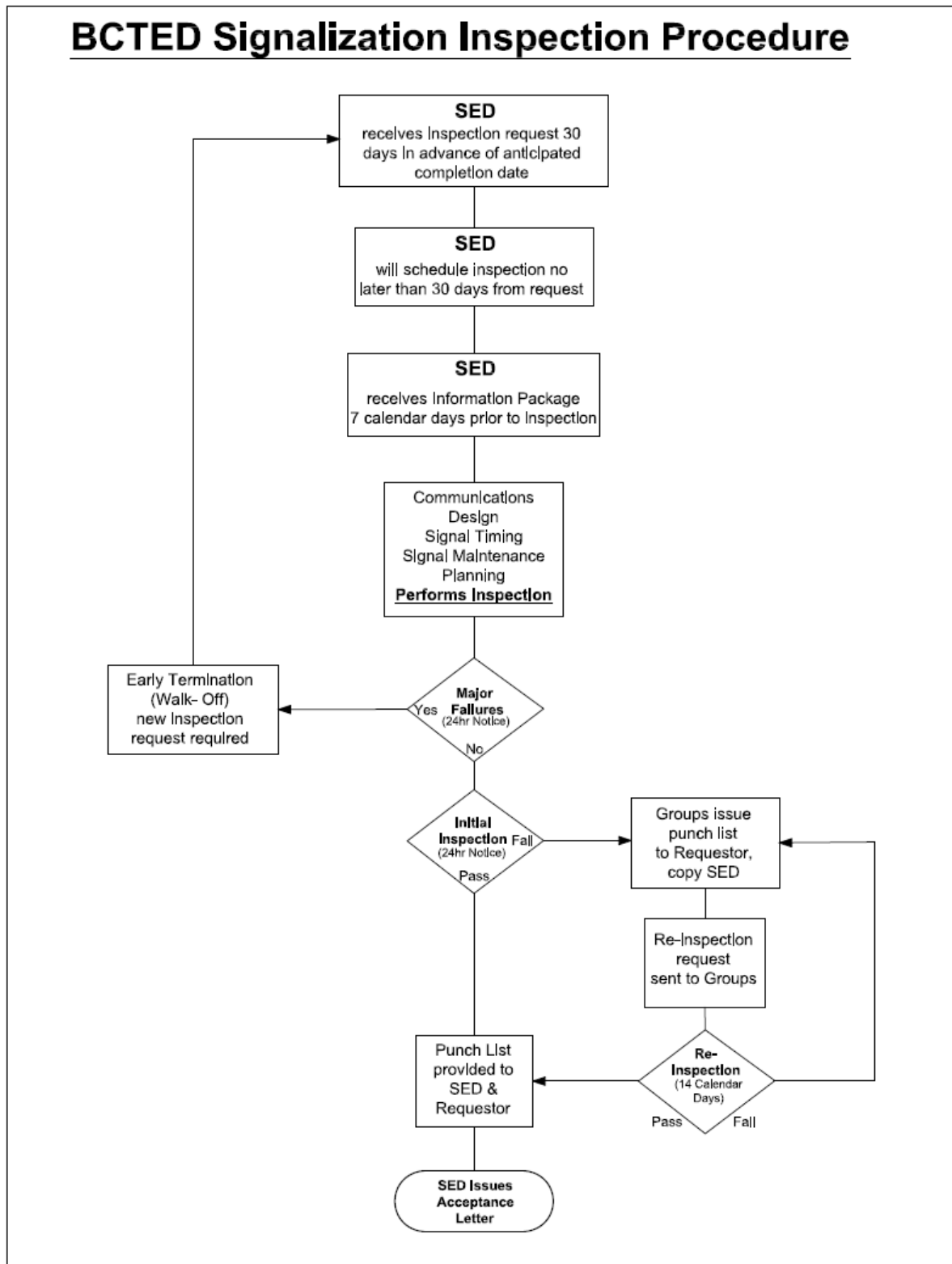
9) An inspection will terminate early if a single major problem is discovered by any of the FDOT or BCTED inspection groups as specified in Section 10, “Major Failure List” or if a pattern of incomplete work has been noticed as determined by the Supervisor and approved by the Director or his designee. If an Early Termination occurs, the group(s) terminating the inspection will notify the SED in writing stating the reason for the termination. The Requestor must provide a written request for inspection to the failing inspection group for a new inspection. Termination of an inspection by one group does not require termination by all other groups. Any punch list generated by the remaining group will be processed as specified in Section 7.

10) The following is the Major Failure List which will be used to determine if an inspection will terminate early:

1. No communications established between any one intersection to be inspected and the BCTED communications room and any failed communications outside the project area due to work performed as part of the project.
2. Pavement Markings not completed (temporary markings are acceptable).
3. An Information Package containing As-built signalization plans (five sets) and Submittal Data have not been provided seven (7) calendar days prior to the inspection.

Or when a pattern of incomplete work has been noticed, for example;

- a. One or more movement is found to be on recall, unless called for on plan and no detection installed or working.
- b. Phasing and operations not as stipulated on the plans.
- c. Signal indications, including pedestrian, not functioning properly as per plans.
- d. Improper grounding found.
- e. Electrical service installation presents a hazard due to code violation or improper installation.



3.5 Pre-Construction Communication Infrastructure Verification Policy

It is the responsibility of the Contractor/Project Manager/CEI to perform an inspection of the communications infrastructure prior to the commencement of construction. This is to verify the integrity of the various elements associated with the infrastructure (i.e., conduit, interconnect cable, pull boxes, etc.) It is assumed by BCTED that the infrastructure is in perfect working condition and meets BCTED's Communications Standards and Specifications.

If a condition is discovered by the Contractor/Project Manager/CEI that may affect the acceptance of the communication's portion of the project at its conclusion, BCTED must be notified prior to commencement of the construction in the form of a written letter or email, preferably with pictures. If the condition is not brought to the attention of BCTED, it will be the responsibility of the Contractor/Project Manager/CEI to make the necessary repairs in order for the communication's portion of the project to pass inspection and be accepted.

3.6 Cable Cut Restoration Procedure

When a cable is cut by a Contractor performing work on a project and prior notification of the cut was not provided, a temporary repair of the damaged cable shall be provided within 48 hours. Permanent repairs, which include the duct work, shall be provided within two (2) weeks after all excavation within the designated cable area has been completed. Repairs are to be performed by a FDOT Prequalified Signal Contractor. Inspection of the permanent repairs shall be performed within 30 days.

3.7 Failed Communication Inspection Responsibility Policy

When a construction project is completed, the Contractor/CEI shall send in a request to the Broward County Traffic Engineering Division to perform a communications inspection (see 3.4 above). This inspection ensures that the completed project has conformed to the Broward County Traffic Engineering Division's Communications Standards and Specifications. On occasions, the inspection will fail and a punch list will be generated which lists each item that has failed. Until the punch list items have been resolved and the inspection passes, the communications portion of the project is not accepted and continues to be the responsibility of the Contractor.

Due to the failure of the communications inspection, the Broward County Traffic Engineering Division will not accept any responsibility for damage or equipment failures associated with the communications portion of the project. Upon damage or equipment failures to the communications portion of the project, the Contractor shall make repairs within 24 hours to ensure the continued safety of the public.

3.8 Establishing Communications at Signalized Intersections

Broward County is transitioning from the analog UTCS platform to the digital ATMS.now platform to provide enhanced monitoring and control capabilities for all signalized intersection. The new ATMS.now platform will communicate to the signalized intersections using difference technologies that are capable of providing the necessary bandwidth for these enhanced services.

The existing analog UTCS platform is slowly being migrated over to the ATMS.now platform through the use of special projects. While the migration is taking place through these special projects, other construction projects in the County are taking place that can affect the operation of the UTCS platform before it is migrated over or affect the ATMS.now platform after migration has taken place.

The County has made the decision not to purchase any more RCUs for the UTCS platform. The County has also decided that in place of a RCU that is normally provided in a construction project, the project will now provide a Cradlepoint IBR650LE2-SP cellular router switch instead. The only exception to this requirement is when the signalized intersection will be provided with fiber optic interconnect cable. In this case, an Ethernet switch will be provided by the construction project. Ordering information for the Cradlepoint IBR650LE2-SP is provided in this document.

This document will address the different scenarios affecting communications on both platforms when construction is taken place. The new technology installations, which place the signalized intersection on the ATMS.now platform, will be installed by the County.

3.8.1 Construction Impacts on UTCS and ATMS.now Platforms

A number of communication designs exist in the field for both platforms, see below. These existing designs will affect the way communications will be handled by construction projects.

- Communications via fiber optic interconnect cable (ATMS.now platform)
- Communications via copper interconnect cable (UTCS platform)
- Communications via cellular (ATMS.now platform)
- Communications via copper interconnect cable using Actelis (ATMS.now platform)

The type of communications technology to be used will depend on the type of construction being performed, see below. Some construction projects may not need to change what is already in place, i.e.; UTCS copper interconnect cable.

- Re-use of existing cabinet at an intersection on the same pedestal
- Relocate existing cabinet to a new location at the intersection
- Install new cabinet at an existing signalized intersection
- Install new cabinet at a new intersection

3.8.2 Communications Installation Scenarios – Construction Type Dependent

The following scenarios describe how communications will be handled for construction projects at signalized intersections.

3.8.2.1 Re-use existing cabinet at an intersection on the same pedestal with the following technologies:

- Fiber Optic Interconnect Cable (ATMS.now platform)
No effect on communications infrastructure.
County: Re-use existing Ethernet switch and establish communications.
- Copper Interconnect Cable (UTCS platform)
No effect on communications infrastructure.
Contractor: Re-use existing RCU and establish communications.
- Cellular (ATMS.now platform)
No communications infrastructure.
County: Re-use existing cellular router and establish communications.
- Copper Interconnect Cable using Actelis (ATMS.now platform)
No effect on communications infrastructure.
County: Re-use existing Actelis switch and establish communications.

3.8.2.2 Relocate existing cabinet to a new location at the intersection:

- Fiber Optic Interconnect Cable (ATMS.now platform)
Contractor: Installed fiber interconnect cable, pig-tails and fiber patch panel housing.
County: Perform Communication's Inspection prior to establishing communications. Once passed, re-use existing Ethernet switch and establish communications.
- Copper Interconnect Cable (UTCS platform)
Contractor: Install new copper interconnect cable. Re-use existing RCU and establish communications.
- Cellular (ATMS.now platform)
County: Re-use existing cellular router and establish communications.
- Copper Interconnect Cable using Actelis (ATMS.now platform)
Contractor: Install new copper interconnect cable.
County: Perform Communication's Inspection prior to establishing communications. Once passed re-use existing Actelis switch and establish communications.

3.8.2.3 Install new cabinet at an existing signalized intersection:

- Fiber Optic Interconnect Cable (ATMS.now platform)
No comm. panel or RCU required by Contractor.
Contractor: Installed fiber interconnect cable, pig-tails and fiber patch panel housing.
County: Perform Communication's Inspection prior to establishing communications. Once passed, re-use existing Ethernet switch and establish communications.
- Copper Interconnect Cable (UTCS platform)
No comm. panel or RCU required by Contractor.
Contractor: Re-use local copper interconnect cable if possible otherwise install new and establish communications.
County: Install comm. panel and provide the RCU.
- Cellular (ATMS.now platform)
No comm. panel or RCU required by Contractor.
County: Re-use existing cellular router and establish communications.
- Copper Interconnect Cable using Actelis (ATMS.now platform)
No comm. panel or RCU required by Contractor.
Contractor: Re-use local copper interconnect cable if possible otherwise install new, install a 66 block and terminate copper cable on a 66 block.
County: Perform Communication's Inspection prior to establishing communications. Once passed, re-use existing Actelis switch and establish communications.

3.8.2.4 Install new cabinet at a new intersection:

- Fiber Optic Interconnect Cable (ATMS.now platform)
No comm. panel or RCU required by Contractor.
Contractor: If fiber interconnect cable is being used for adjacent intersections thus corridor is on ATMS.now, installed fiber interconnect cable, splice closure, pig-tails and fiber patch panel housing. Provide an Ethernet switch. If fiber interconnect cable is not being used at adjacent intersections, cellular communications will be used.
County: Perform Communication's Inspection prior to establishing communications. Once passed install Ethernet switch and establish communications.
- Copper Interconnect Cable (UTCS platform)
No comm. panel or RCU required by Contractor.

Contractor: Install copper interconnect cable and establish communications.

County: Install comm. panel and provide the RCU.

- Cellular (ATMS.now platform)

No comm. panel or RCU required by Contractor.

County: Install new cellular router/service and establish communications.

Contractor: Contractor shall coordinate the order and delivery of the cellular communications equipment six (6) weeks prior to final inspection with the Communications Manager.

- Copper Interconnect Cable using Actelis (ATMS.now platform)

No comm. panel or RCU required by Contractor.

Contractor: Install new copper interconnect cable, install a 66 block and terminate copper interconnect cable on a 66 block.

County: Perform Communication's Inspection prior to establishing communications. Once passed, install Actelis switch and establish communications.

3.8.3 Cellular Router Ordering Information

- Manufacturer: Cradlepoint
- Model: IRB650LE2-SP
- FDOT Pay Item: 684-1-1