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## **TAILORED INSPECTION FOR TRAFFIC SIGNALS**

Few would argue with the fact that full-time inspection of traffic signal construction is superior to post-construction signal inspection. Unfortunately, some agencies do not have the money or personnel to devote to full-time inspection. Is there some happy medium between full-time inspection and post-construction inspection that will provide most of the benefits of full time inspection, but do so at a lesser cost? I believe there is, and I describe such an approach (which I have termed "tailored inspection") in the following paragraphs.

Under a "tailored inspection" program the contractor is required to notify the inspector a certain time in advance (say, two days) so that the inspector can monitor critical construction activities. Critical construction activities are activities that are either difficult to inspect after-the-fact (because they are buried after installation) or activities that could cause safety problems at turn-on. The following is a list of typical critical activities that warrant real-time, on-site inspection:

1. **Inductance loop installation** - Many construction deficiencies associated with inductance loop installation can be spotted after construction is complete. This can be done either by visual inspection (as in the case of insufficient loop sealant) or via testing (as in the case of a severed loop wire). However, other construction deficiencies must be detected during installation (loop wire placed against a sharp sawcut corner, sawcut not deep enough, non-durable splice, etc.). A loop having these deficiencies may work just fine for a year or two (through the burn-in and warranty periods) and then, without warning, quit working. Consequently, vigilant inspection during loop installation is very important. Since intersection loops can be installed in a day or two, the amount of inspection time for monitoring this activity is not excessive.
2. **Installation of the grounding system** - Although it is possible to dig-up the tops of ground rods and expose ground wires after-the-fact, the process is a bit awkward. In addition, certain items (such as the tightness of the connection between ground rods attached end to end or, for that matter, the number of ground rods attached end-to-end) cannot be readily determined after the rods have been installed. Post-construction electrical testing of the grounding system is helpful but not fool-proof. The soil could be dampened prior to testing by a devious contractor to temporarily increase soil conductivity. The readings might be good even though the required grounding system was not installed. Conversely, a conscientious contractor who installs the required amount of grounding rod could be thwarted by inherently "difficult" (i.e. highly non-conductive) soil. The only way to fairly evaluate the situation is for the inspector to be there when the grounding system is installed. Once again, since grounding installation only takes a day or so to accomplish, the amount of inspection time required is not excessive.

3. **Foundation installation** - There are many elements of a signal support foundation that are difficult or impossible to check after construction is complete: foundation depth, arrangement of reinforcing steel, amount of concrete cover over the reinforcing, and so on. In addition, an inspector should be on-site to perform needed concrete testing activities (preparation of cylinders for compressive strength tests, temperature checks, air entrainment checks, slump checks, etc.). Foundation installation takes from a couple of days to a week to complete, which is a little longer than for grounding or loops, but the inspection time will still be well-spent.
4. **Conduit installation** - It takes a lot of inspector time to provide full-time on-site inspection for conduit installation. In addition, conduit installation is usually not as critical of an item with respect to signal performance in comparison to grounding, loops, or foundations. Therefore, a reasonable alternative approach is to make random spot checks of conduit depth and compaction quality at specified intervals (say, every 50 feet at the intersection and every 200 feet on interconnect runs) during the course of the project. If the conduit is found to be too shallow then further investigation can be performed in areas of non-compliance. The contractor might be required to re-install deficient areas or a monetary penalty might be applied to non-conforming areas.

Under a tailored inspection program there is still the need to provide post-construction inspection. We must still go up in a bucket truck and check the overhead wiring system and the tightness of overhead hardware, we still need to run all of our cabinet checks, and we still need to verify the proper operation of all pedestrian buttons, vehicle detectors, and phase indications. However, by using a tailored inspection approach we can do a reasonable job of inspecting those areas of construction that are not properly investigated using a post-construction only inspection.

I would like to conclude this article by emphasizing that full-time inspection is still the preferred course of action. However, if your agency just cannot bring itself to pay for full time inspection, then you should at least try this tailored approach. Half a banana is better than no banana at all.