ORIGINATION FORM

Proposed Revisions to the Specifications

(Please provide all information - incomplete forms will be returned)

Date: 4-15-14

Specification Section: 620

Originator: Alan El-Urfali

Articles/Subarticles: 620-2.1, 620-2.6, 620-2.7, 620-2.7.1, 620-2.7.3,620-3.2

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Will the proposed revision involve Design Standard Index changes? Yes ○ No ◉

Roadway Design staff contacted (name):

Will the proposed revision involve PPM changes? Yes ○ No ◉

Roadway Design staff contacted (name):

Will the proposed revision involve CPAM changes? Yes ○ No ◉

Construction staff contacted (name):

Will the proposed revision involve Pay Item changes? Yes ○ No ◉

Estimates staff contacted (name):

Will the proposed revision involve SDG changes? Yes ○ No ◉

Structures staff contacted (name):

Will the proposed revision involve APL changes? Yes ○ No ◉

Product Evaluation staff contacted (name):

Will this revision necessitate any of the following:

Design Bulletin ☐ **Construction Bulletin** ☐ **Estimates Bulletin** ☐

Are all references to external publications current? Yes ◉ No ○

If not, what references need to be updated (please include changes in the redline)?

Why does the existing language need to be changed?

The maximum length of ground rod assemblies stated in 620-3.2 is not applicable to items “e. Equipment Shelters and fencing” and “f. Communication Towers”. Clarify that listing of products includes testing/listing by NRTLs

Summary of the changes:

Deletion of items “e.” and “f.” from list in 620-3.2 and minor restructuring of content. Added text to clarify that NRTLs other than UL are sufficient to satisfy requirements for “listing”.

Are these changes applicable to all Department jobs? Yes ◉ No ○

If not, what are the restrictions?

Contact the State Specifications Office for assistance in completing this form.

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M E M O R A N D U M

DATE: April 30, 2015

TO: Specification Review Distribution List

FROM: Daniel Scheer, P.E., State Specifications Engineer

SUBJECT: Proposed Specification: **6200201 Grounding and Lightning Protection.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

This change was proposed by Jeff Morgan of the Traffic Engineering and Operations Office to modify the language for current Department practice.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or online at http://www2.dot.state.fl.us/SpecificationsEstimates/Development/IndustryReview.aspx . Comments received after **May 27, 2015**, may not be considered. Your input is encouraged.

DS/dt
Attachment

GROUNDING AND LIGHTNING PROTECTION.
(REV 4-16-15)

SUBARTICLE 620-2.1 is deleted and the following substituted:

620-2.1 Ground Rods: Use ground rods meeting the requirements of UL 467 that are listed by an OSHA nationally recognized testing laboratory (NRTL). ~~UL listed g~~Ground rods must be made of copper-clad steel with a nominal diameter of 5/8 inches. Ground rod sections must be a minimum of eight feet in length and manufactured for the sole purpose of providing electrical grounding.

SUBARTICLE 620-2.6 is deleted and the following substituted:

620-2.6 Air Terminals: Use ~~UL listed~~ air terminals that comply with UL 96A and NFPA 780 standards and are listed by a NRTL.

SUBARTICLE 620-2.7 is deleted and the following substituted:

620-2.7 Surge Protective Devices (SPDs): Provide ~~surge protective devices (~~SPDs~~)~~ to protect electronics from lightning, transient voltage surges, and induced current.

Install SPDs on all power, data, video and any other conductive circuit. SPD requirements for lighting must meet the minimum requirements of Section 992 and the Design Standards. SPDs for traffic control devices, including ITS equipment, must be listed on the Department's Approved Product List (APL).

Provide primary and secondary surge protection on AC power at traffic control device field sites.

SUBARTICLE 620-2.7.1 is deleted and the following substituted:

620-2.7.1 SPD for 120 Volt or 120/240 Volt Power: Install a SPD at the utility disconnect to the cabinet. Ensure that the SPD at the utility disconnect includes L-N, L-G, and N-G protection and has a maximum surge current rating of 50 kA per phase or greater. ~~Verify that t~~The SPD ~~has been labeled to indicate that the unit is~~ must meet the requirements of UL 1449, Third Edition and be listed by a NRTL.

Ensure an SPD is provided where the supply circuit enters the cabinet. Locate the SPD on the load side of the main disconnect and ahead of any and all electronic devices and connected in parallel with the AC supply. Ensure that the SPD in the cabinet includes L-N, L-G, and N-G protection and has a maximum surge current rating of 50 kA per phase or greater. ~~Verify that t~~The SPD ~~has been labeled to indicate that the unit is~~ must meet the requirements of UL 1449, Third Edition and be listed by a NRTL.

Ensure that the SPD has a visual indication system that monitors the weakest link in each mode and shows normal operation or failure status and also provides one set

of normally open (NO)/normally closed (NC) Form- C contacts for remote alarm monitoring. The enclosure for a SPD shall have a NEMA 4 rating.

SUBARTICLE 620-2.7.3 is deleted and the following substituted:

620-2.7.3 SPDs for Low-Voltage Power, Control, Data and Signal Systems: Install a specialized SPD on all conductive circuits including, but not limited to, data communication cables, coaxial video cables, and low-voltage power cables. Ensure that these devices comply with the minimum functional requirements shown in Table 1 for all available modes (i.e. power L-N, N-G; L-G, data and signal center pin-to-shield, L-L, L-G, and shield-G where appropriate).

Table 1
SPD Minimum Requirements

Circuit Description	Clamping Voltage	Data Rate	Surge Capacity	Maximum Let-Through Voltage
12 V~~DC~~DC	15-20 ~~V~~volts	N/A	5kA per mode (8x20 µs)	<150 Vpk
24 V~~AC~~AC	30-55 ~~V~~volts	N/A	5kA per mode (8x20 µs)	<175 Vpk
48 V~~DC~~DC	60-85 ~~V~~volts	N/A	5kA per mode (8x20 µs)	<200 Vpk
120 V~~AC~~AC at POU	150-200 ~~V~~volts	N/A	20kA per mode (8x20 µs)	<550 Vpk
Coaxial Composite Video	4-8 ~~V~~volts	N/A	10kA per mode (8x20 µs)	<65 Vpk (8x20 µs/1.2x50µs; 6kV, 3kA)
RS422/RS485	8-15 ~~V~~volts	Up to 10 Mbps	10kA per mode (8x20 µs)	<30 Vpk
T1	13-30 ~~V~~volts	Up to 10 Mbps	10kA per mode (8x20 µs)	<30 Vpk
Ethernet Data	7-12 ~~V~~volts	Up to 1 Gbps	1kA per mode (10x1000 µs)	<30 Vpk
POE	60-70 ~~V~~volts	Up to 1 Gbps	5kA per mode (8x20 µs	<200Vpk (100kHz 0.5µs; 6kV, 500A)

Ensure that SPDs ~~are listed and~~ meet the requirements of UL 497B or UL 497C, as applicable, and are listed by a NRTL.

SUBARTICLE 620-3.2 is deleted and the following substituted:

620-3.2 Minimum Grounding Resistance: Obtain a resistance to ground of 5 ohms or less for the following elements. Install multiple ground rod assemblies totaling a maximum length of up to 80 feet, as required to achieve minimum grounding resistance.

~~a~~1. Power service for traffic control devices
~~b~~2. Signal and ITS cabinets
~~c~~3. ITS Poles/Structures with electronic equipment
~~d~~4. DMS and DMS structures
~~c. Equipment Shelters and fencing~~
~~f. Communication Towers~~

~~Install a single ground rod assembly for these elements.~~
~~a. Conventional lighting~~
~~b. External lighting for signs~~
~~c. Signal cable & span wire~~
~~d. Aerial interconnect messenger wire~~
~~e. Pedestals for pedestrian signals~~
~~f. Pull boxes with metal covers when 120V (or greater) AC power is present~~
~~g. Splice vaults with wire grounding units~~

Install a minimum of one primary ground rod assembly. If a grounding and lightning protection system using a single ground rod assembly does not achieve the required resistance to ground, extend the length of the ground rod assembly an additional 20 feet or install an additional ground rod assembly 40 feet away and connect it to the main ground rod assembly to create a ground rod array. Continue installing ground rod assemblies connected in an array until the required resistance is obtained or until the maximum required total length of ground rod is installed.

Grounding systems formed from horizontally constructed conductive radials are permitted if site conditions prohibit the use of vertically driven rods as permitted by the NEC Article 250.53(G). A grounding system consisting of the maximum total length of ground rod required is acceptable in cases where soil conditions prevent the grounding system from achieving the required resistance to ground. Submit the site resistance measurement to the Engineer.

Install a single ground rod assembly for these elements.
~~a~~1. Conventional lighting
~~b~~2. External lighting for signs
~~c~~3. Signal cable & span wire
~~d~~4. Aerial interconnect messenger wire
~~e~~5. Pedestals for pedestrian signals
~~f~~6. Pull boxes with metal covers when 120 ~~V~~volts (or greater) AC power is present
~~g~~7. Splice vaults with wire grounding units.