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May 4, 2007

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Mr. Rick Marinelli
Manager, Airport Engineering Division
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Washington, DC 20591

VICE CHAIR

Michael J. DeVoy, P.E.
R.W. Armstrong & Associates

Subject: ACC Review Comments – FAA Advisory Circular Draft Change, 150/5340-30C, Design and Installation for Airport Visual Aids

Dear Mr. Marinelli:

SECRETARY/TREASURER

Evan Futterman
HNTB Corporation

On behalf of the Airport Consultants Council (ACC), I would like to thank you for the opportunity to provide input on FAA Advisory Circular Draft Change, 150/5340-30C, *Design and Installation for Airport Visual Aids*. On behalf our Engineering Committee, we offer the attached comments and request feedback using the table herein.

IMMEDIATE PAST CHAIR

Belinda G. Hargrove
TransSolutions, LLC

The ACC members who contributed considerable time vetting and consolidating these comments to ensure that they accurately reflect the consultant community's views are ACC Engineering Committee Chair and Vice Chair, Susan Winslow, with Delta Airport Consultants, Inc., and John Burns, with The Burns Group, respectively.

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Sincerely,

Paula P. Hochstetler
ACC President

cc. Susan Winslow
John Burns

PRESIDENT

Paula P. Hochstetler

ACC Comments	Accept/ Decline	FAA Response
<p><u>Elevated Stop Bar Light location:</u></p> <p>Para. 4.5.d requires elevated light to be located max. 10' from defined TW edge, and should not be closer than TW edge lights at airports subject to snow removal.</p> <p>RECOMMEND: Max distance from defined TW edge be increased to 12'.</p> <p>REASON: Major airports typically install TW edge lights 10' from edge. Stop bar lights often are retrofit installation; with current standard, in most cases the stop bar light would need to be installed directly over conduit connecting TW edge lights, requiring unnecessary reconfiguration of the existing conduit /cable for the TW edge light circuit. Allowing elevated stop bar light up to 12' from TW edge, the light in most cases would avoid the conduit for TW edge lights. Impact on stop bar light visibility is negligible.</p>		
<p><u>Counterpoise:</u> Para. 12.5 has several requirements for counterpoise that can be better put in context or qualified based on successful historical counterpoise installation at specific airports.</p> <p>1. Along runway and taxiway edges, AC says install counterpoise 8" below grade, and half distance from edge of pavement to cable/conduit (Great Lakes Region practice).</p> <p>RECOMMEND: Allow also installation above cable/conduit, particularly with paved shoulders, or for modifications of portions of a circuit installed by this method, with qualification that this can be allowed if historically successful at the airport.</p> <p>REASON: Many airports use counterpoise directly above cable/conduit, and if historically successful why introduce a second method at an airport. Also, for new edge lighting in existing shoulder pavement, installation counterpoise half way from defined (traffic) edge would require additional cutting of existing shoulder pavement.</p>		
<p>2. The AC provides for counterpoise in rigid pavement to be connected to in-pavement light bases and associated rebar cage, while in flexible pavement (as well as for elevated lights) the conduit is not connected to the in-</p>		

<p>pavement light base.</p> <p>RECOMMEND: As a minimum, allow an airport the alternative of not using counterpoise for in-pavement lights, or not connecting counterpoise to the light base (and rebar cage) in rigid pavement, based on historical successful practice at an airport.</p> <p>REASON: Opinion on counterpoise in full strength pavement (flexible and rigid) still varies within the industry (e.g, if there is any benefit for counterpoise in full-strength pavement, and certainly if to connect to the light base). Allowing an airport to determine if to use the new method or if to stay with a method that is historically successful at that airport, can result in cost savings and provide installation consistency at an airport. Note that many airports presently stay with their own counterpoise policy if this has proven successful.</p>		
<p>3. RECOMMEND: In the second sentence of the second paragraph, add “or stranded” after “solid.”</p> <p>REASON: As currently written, L-108 allows both bare solid and stranded wire for counterpoise.</p>		
<p>4. RECOMMEND: In the third sentence of the last paragraph, change “type TW insulated” to “tinned copper.”</p> <p>REASON: Tinned copper wire will resist corrosion; insulating the wire defeats the intention of providing a low resistance path.</p>		
<p>PAPI: Para. 7.5.c (PAPI) provides extensive calculation (and rationale for establishing the “lowest possible on-course signal,” and that this (instead of glide angle or glide path) should be used to determine distance of PAPI from threshold (if no ILS). Figure 79 indicates “aiming angle” or “visual approach path,” which suggests the glide path or angle. Further, 7.5.c calculates distance D1 (based on no runway slope) in terms of cotangent, while Figure 79 calculates distances (d, with runway grade) in terms of tangent. Seems like this can be made clearer and simpler.</p> <p>RECOMMEND: Correlate 7.5.c (PAPI) with Figure 79, and put calculations on similar basis (cotangent or tangent – tangent suggested as being more familiar to engineers who graduated a long time ago).</p>		

<p>Simplify establishing lowest possible on-course signal (3rd box aiming less 1.5 minutes (half the transition factor between green and red). Provide more detail on siting distance from threshold and the possible adjustments that may be required. Consider the PAPI siting discussion and approach provided in UFC 3-535-01, para. 12.3.1.2 and Figure 12.6, which can be adjusted for the new aiming.</p>		
<p><u>Fixture Mounting Bases:</u> Chapter 11 Drainage provisions for L-868 bases are discussed in 11.2.</p> <p>RECOMMEND: Revise references to lighting system drainage to clarify application to the entire system, including L-867 bases as well as L-868.</p> <p>REASON: Other sections of the chapter reference system drainage, but all occur within discussions for in pavement and load bearing locations. There is no such discussion of drainage for L-867 bases specifically.</p>		
<p><u>Figures:</u> Appendix 1 Figures 24 & 25, 2400 V primary power is depicted.</p> <p>RECOMMEND: This should be revised, as 2400 V primary power is only allowed for replacement equipment, not new design, per AC 150/5345-10F.</p>		
<p><u>Section 12.5</u> Below is a proposed alternate writing of the section</p>		
<p><u>Section 12.6</u> Below is a proposed alternate writing of the second paragraph of this section.</p>		

12.5 COUNTERPOISE SYSTEM – SERIES CIRCUITS (Alternative writing)

The purpose of a counterpoise system is multifaceted. When properly installed the counterpoise system performs the following functions:

1. Provides a low resistance preferred path for safe dissipation of lightning discharge energy to ground without causing damage to equipment/cables or injury to personnel.
2. Provides equal potential bonding between all elements of the airfield lighting system.
3. By virtue of the base can (or stake mounts) and copper counterpoise conductor being buried in the earth, the counterpoise system provides an extremely low earth resistance for the airfield lighting system.

4. The counterpoise system will maintain all interconnected components at earth potential and protect personnel from possible contact with energized base cans, mounting stakes or fixtures.

The counterpoise is a separate lightning protection, grounding and bonding system and should not be confused with the grounding and bonding conductors required by the National Electrical Code (NEC) for parallel (voltage) circuits. The NEC required grounding conductors for parallel circuits shall be routed within the conduits to reduce the overall circuit impedance expediting the operation of the overcurrent device. The constant current regulator (CCR) output overcurrent protection monitors the actual CCR output current and does not rely on a low impedance return path for proper operation.

The counterpoise conductor is a #2 AWG bare copper wire, stranded, annealed or soft drawn (ASTM B3 or B8). The #2 AWG bare copper counterpoise conductor is connected to each base can, mounting stake, each metallic airfield lighting component and the airfield lighting vault building ground system. If a base can rebar cage is included in the design, bond the rebar cage to the counterpoise conductor with a #2 AWG bare copper wire. All metallic airfield lighting components on the output side of the CCR shall be connected to the counterpoise system.

The #2 AWG bare copper counterpoise conductor is installed nominally 8 inches above and directly centered over the duct or cable it is protecting. The counterpoise conductor height above the protected cable and/or conduit is calculated to ensure the cables and/or conduits are within a 45 degree zone of protection below the counterpoise. The nominal counterpoise conductor height may have to be adjusted due to project specific criteria.

Wide duct banks or cable runs may require multiple counterpoise conductors. Where multiple counterpoise conductors are used they should be interconnected at a maximum of 300 foot intervals.

Where cable or duct runs cross, the counterpoise conductors shall be interconnected. New counterpoise conductors shall be interconnected to existing counterpoise systems. A maximum effort shall be made to find and interconnect all such crossings and existing counterpoise conductors.

The counterpoise conductor shall be connected to ground rods spaced an average of 500 feet apart.

Install a #6 AWG green copper bonding jumper between the airfield lighting fixture/sign/etc and the base can.

Ensure all counterpoise connections are UL 467 listed for direct earth burial and concrete encasement and UL 96 listed for use in lightning protection systems.

When the counterpoise conductor is installed in materials that accelerate the corrosion of the copper conductor, the counterpoise shall be tinned or have other suitable corrosion protection.

12.6 SAFETY GROUND – PARALLEL CIRCUITS (second paragraph alternative)

When airfield lighting circuits are powered by parallel (voltage) circuits a green grounding conductor shall be installed in each conduit with the parallel circuit conductors. The parallel circuits shall be installed in accordance with the National Electrical Code (NEC). The NEC required grounding and bonding conductors shall be sized in accordance with NEC Article 250. The grounding conductors for parallel circuits shall be routed within the conduits to reduce the overall circuit impedance expediting the operation of the overcurrent device.

The grounding/bonding conductor is connected to each base can, mounting stake, each airfield lighting component and the airfield lighting vault building ground system. All metallic airfield lighting components shall be connected to the grounding conductor.

Install a #6 AWG green copper bonding jumper between the airfield lighting fixture/sign/etc and the base can.

Ensure all grounding and bonding connections are properly listed for their application. All connections to base can, stakes, etc. shall be UL 467 listed for direct earth burial and concrete encasement.

When a parallel circuit system is installed in areas with an average lightning flash density greater than or equal to 3 flashes per square kilometer then the counterpoise system as described in 12.5 above shall be installed. A United States map showing the average ground flash density per square kilometer is in Annex L of NFPA 780.