THE IMPACTS OF AC 150/5300-13A DESIGN CHANGE X ON AIRFIELD GROUND LIGHTING & TAXI GUIDANCE SIGNS

March 4, 2014

PRESENTATION AGENDA

• Overview of AC 150/5300-13A (Design Change X)
• Review of Engineering Brief No. 9x
• Impact of changes on taxiway edge, taxiway centerline lighting
• What this means for taxi guidance sign design/installation criteria
A HISTORICAL LOOK AT AC 150/5300-13A

- Taxiway design driven by Airplane Design Group (ADG)
  - Wingspan and tail height, not aircraft undercarriage
- TW intersections designed to judgmental over steering (JOS) with the least amount of pavement surface

<table>
<thead>
<tr>
<th>Group #</th>
<th>Tail Height (ft [m])</th>
<th>Wingspan (ft [m])</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>&lt; 20' (&lt; 6m)</td>
<td>&lt; 49' (&lt; 15m)</td>
</tr>
<tr>
<td>II</td>
<td>20' - &lt; 30' (6m - &lt; 9m)</td>
<td>49' - &lt; 79' (15m - &lt; 24m)</td>
</tr>
<tr>
<td>III</td>
<td>30' - &lt; 45' (9m - &lt; 13.5m)</td>
<td>79' - &lt; 118' (24m - &lt; 36m)</td>
</tr>
<tr>
<td>IV</td>
<td>45' - &lt; 60' (13.5m - &lt; 18.5m)</td>
<td>118' - &lt; 171' (36m - &lt; 52m)</td>
</tr>
<tr>
<td>V</td>
<td>60' - &lt; 66' (18.5m - &lt; 20m)</td>
<td>171' - &lt; 214' (52m - &lt; 65m)</td>
</tr>
<tr>
<td>VI</td>
<td>66' - &lt; 80' (20m - &lt; 24.5m)</td>
<td>214' - &lt; 262' (65m - &lt; 80m)</td>
</tr>
</tbody>
</table>

AC 150/5300-13A DESIGN CHANGE X

- Taxiways designed with newly formulated Taxiway Design Groups (TDG)

Table 4-2. Design standards based on Taxiway Design Group (TDG)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DIM (See Figure 4-2)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxiway Width</td>
<td>W</td>
<td>25 ft (7.5 m)</td>
<td>35 ft (10.5 m)</td>
<td>50 ft (15 m)</td>
<td>50 ft (15 m)</td>
<td>75 ft (23 m)</td>
<td>75 ft (23 m)</td>
<td>82 ft (25 m)</td>
</tr>
<tr>
<td>Taxiway Edge Safety Margin</td>
<td>M</td>
<td>5 ft (1.5 m)</td>
<td>7.5 ft (2.5 m)</td>
<td>10 ft (3 m)</td>
<td>10 ft (3 m)</td>
<td>15 ft (5 m)</td>
<td>15 ft (5 m)</td>
<td>15 ft (5 m)</td>
</tr>
<tr>
<td>Taxiway Shoulder Width</td>
<td>10 ft (3 m)</td>
<td>10 ft (3 m)</td>
<td>20 ft (6 m)</td>
<td>20 ft (6 m)</td>
<td>25 ft (7.5 m)</td>
<td>35 ft (10.5 m)</td>
<td>40 ft (12 m)</td>
<td></td>
</tr>
<tr>
<td>Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline</td>
<td>J</td>
<td>70 ft (21 m)</td>
<td>70 ft (21 m)</td>
<td>160 ft (49 m)</td>
<td>160 ft (49 m)</td>
<td>240 ft (73 m)</td>
<td>350 ft (107 m)</td>
<td>350 ft (107 m)</td>
</tr>
</tbody>
</table>

Note: Use this dimension or the dimension specified in Table 4-1, whichever is larger, when 180 degree turns between parallel taxiways are required.
AC 150/5300-13A DESIGN CHANGE X

- TDG based on main gear width (MGW) and cockpit to main gear distance (CMG)

Figure 4-1. Taxiway Design Groups (TDGs)
AC 150/5300-13A DESIGN CHANGE X

• Ensures safe and efficient designs while minimizing excess pavement
  – Designs based on TDG and ADG allow more precise taxiway design
  – Allows for cockpit over centerline steering
  – Optimizes pavement fillets
  – The MGW and CMG add flexibility to taxiway/taxilane designs

ENGINEERING BRIEF NO. 9X

• Existing taxiway edge and centerline lighting systems are not changed and not impacted by AC 150/5300-13A change
• When an airport performs upgrades or modifications to taxiways, the new design criteria is applicable
• Fillets may consist of straight lines instead of curves
  – arcs or chords
• New TW edge light design in appearance and quantity of lights
IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

- TEL on outside of turning radius and along curve fillets use current ‘-30G’ guidelines

IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

- L-1 gradual taper – lights should align with outer straight segment
IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

- Spacing used on the straight section should continue along L-1 taper

IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

- Light is positioned at intersection of L-1 and L-2 taper, and on opposite edge of TW directly across
IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

• Light is positioned at intersection of L-2 and curve fillet

IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

• Where there is no curve fillet (R-fillet = 0) light is positioned at intersection of the two L-2 tapers
IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

• Apex light is required to define two tapered straight segments converging at a single point
• Maximum spacing of lights along L-2 taper is 100'

IMPACT ON TAXIWAY EDGE LIGHTS FOR STANDARD TURNS

• No less than three edge lights should be installed on a curve fillet – similar to '#'30G' figure 17, note 4
IMPACT ON TAXIWAY EDGE LIGHTS FOR 180 DEGREE TURNS

- Follow design rules as standard turns
- Placing lights on opposite side is recommended

IMPACT ON TAXIWAY EDGE LIGHTS FOR OBTUSE TURNS

- Less than 90 degrees
IMPACT ON TAXIWAY EDGE LIGHTS FOR ACUTE TURNS

• Greater than 90 degrees

IMPACT ON TAXIWAY CENTERLINE LIGHTING

• Straight sections equally spaced at 50 ft. per ‘-30G’
• Centerline radius less than 75’
  – 1200 RVR and greater – 25’ spacing
  – Below 1200 RVR – 12.5’ spacing
IMPACT ON TAXI GUIDANCE SIGN DESIGN/INSTALLATION

- AC 150/5340-18F Standards for Airport Sign Systems
- Three sign sizes
- Sign selection
  - Legend effectiveness
  - Aircraft clearance
  - Jet blast
  - Snow removal operations
- Sign must provide 12” of clearance from the aircraft
- Measured when aircraft wheels are at defined pavement edge

IMPACT ON TAXI GUIDANCE SIGN DESIGN/INSTALLATION

- Table 1 provides sign size and offset
- Taxiway sign locations from intersecting taxiways shown in Table 2-3, “Taxiway Centerline to Fixed Movable Object” of AC 150/5300-13A - Incorrect
  - Changed to Table 4-1 Design Standards based on ADG
- Uses values based on ADG

<table>
<thead>
<tr>
<th>Sign size</th>
<th>Legend Height [inches (cm)]</th>
<th>Legend Panel Height [inches (cm)]</th>
<th>Installed (max.) [inches (cm)]</th>
<th>Perpendicular distance from defined pavement edge to near side of sign [feet (m)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12(30)</td>
<td>18(46)</td>
<td>36(91)</td>
<td>10(20) (3.6)</td>
</tr>
<tr>
<td>2</td>
<td>15(38)</td>
<td>24(61)</td>
<td>36(91)</td>
<td>20(35) (6-10.5)</td>
</tr>
<tr>
<td>3</td>
<td>18(46)</td>
<td>30(76)</td>
<td>42(107)</td>
<td>35(60) (10.5-18)</td>
</tr>
</tbody>
</table>
**IMPACT ON TAXI GUIDANCE SIGN DESIGN/INSTALLATION**

- Design Standards based on ADG

**Table 4-1. Design standards based on Airplane Design Group (ADG)**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DIM (See Figure 3-26)</th>
<th>ADG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>TAXIWAY PROTECTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSA</td>
<td>49 ft (15 m)</td>
<td>79 ft (24 m)</td>
</tr>
<tr>
<td>Taxiway OFA</td>
<td>89 ft (27 m)</td>
<td>131 ft (40 m)</td>
</tr>
<tr>
<td>Taxiway OFA</td>
<td>79 ft (24 m)</td>
<td>115 ft (35 m)</td>
</tr>
<tr>
<td>TAXIWAY SEPARATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway/Runway Centerline to Parallel Taxiway/Taxiway Centerline</td>
<td>J</td>
<td>70 ft (21 m)</td>
</tr>
<tr>
<td>Taxiway Centerline to Fixed or Movable Object</td>
<td>K</td>
<td>46.5 ft (14 m)</td>
</tr>
<tr>
<td>Taxiway Centerline to Parallel Taxiway Centerline</td>
<td>L</td>
<td>64 ft (19.5 m)</td>
</tr>
<tr>
<td>Taxiway Centerline to Fixed or Movable Object</td>
<td>M</td>
<td>39.5 ft (12 m)</td>
</tr>
<tr>
<td>WINGTIP CLEARANCE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway Wingtip Clearance</td>
<td>N</td>
<td>20 ft (6 m)</td>
</tr>
<tr>
<td>Taxiway Wingtip Clearance</td>
<td>O</td>
<td>15 ft (4.5 m)</td>
</tr>
</tbody>
</table>

**IMPACT ON TAXI GUIDANCE SIGN DESIGN/INSTALLATION**

- Design Standards based on ADG-5 and TDG-6
CONCLUSION

• Familiarize yourself with AC 150/5300-13A and Engineering Brief No. 9x
• Some impact on edge light design based on taxiway geometry changes
• No significant changes to taxiway centerline lighting
• Although sign layouts remain the same, certain taxi guidance sign design/installation may be impacted
  – Consider locating taxiway signs with relation to centerline versus defined edge