Duluth Airport Master Plan
Taxiway Network and Apron Parking
Technical Advisory Committee (TAC) Meeting #4

August 12, 2020

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Introductions

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Meeting Agenda

- Taxiway Design Standards and User Needs - Review
- Refined Taxiway Alternatives – Taxiway C, F and D
- Apron layouts and aircraft parking
- Taxiway A layout and reconstruction phasing

Meeting Goals:
- Gather stakeholder feedback on:
  - Refined taxiway layout alternatives
  - Apron layout alternatives
  - Taxiway A layout and phasing
Taxiway Design Considerations
# TDG requirements by aircraft type

<table>
<thead>
<tr>
<th>Civilian Aircraft Requirements</th>
<th>UFC / Military Aircraft</th>
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<tbody>
<tr>
<td>TDG 2 CRJ-700</td>
<td>TDG 3 A-319</td>
</tr>
<tr>
<td>Pavement Width</td>
<td>35'</td>
</tr>
<tr>
<td>Paved Taxiway Shoulder Required</td>
<td>No</td>
</tr>
<tr>
<td>Paved Taxiway Shoulder Width</td>
<td>15’</td>
</tr>
<tr>
<td>Total pavement width</td>
<td>65’</td>
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</tbody>
</table>

Notes:
1 Air Force taxiways devoted exclusively for fighter and trainer aircraft
2 Army and Air Force airfields
Runway 3/21 Taxiway Network Alternatives
Design Alternatives
Runway 3/21 Taxiway Network Design Considerations

• Large aircraft (UFC Class B, large) need taxi route to the Guard Ramp (via Foxtrot)
  • 75’ wide with 25’ shoulders

• Must provide access for the 148th to utilize the ultimate Runway 3/21 length of 8,000’ (UFC Class B, fighter jet)
  • 75’ wide with 10’ shoulders

• Civilian critical aircraft (A-320) outside the large aircraft taxiway route
  • 50’ wide with 20’ shoulders
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Runway 27 Glideslope and PAPI Location

• Runway 27 glideslope and PAPI are in the potential future Taxiway C areas

• When a PAPI is installed on a runway with an ILS, the TCH for the PAPI should match that of the ILS

• Must be located outside of protected runway surfaces

• Current non-standard conditions
  • Runway 27 Glideslope TCH – 80’
  • Runway 27 PAPI TCH – 91’
  • Non standard conditions mitigated through higher ILS minimums. (3/4 mile visibility instead of typical ½ mile)
Civilian Critical Aircraft Design Standards (Current ALP)

- Taxiway C - 50' wide with 20' shoulders
- Taxiway D extended to Runway 3 - 50' wide with 20' shoulders
- Meets Runway to Taxiway C/L separation (400' minimum)
- Taxiway B Extension - 50' wide with 20' shoulders
- Taxiway F - 75' wide with 25' wide shoulders
- Tower ramp potential pavement expansion feasible
- Standard 60' TCH for RWY 27 Glideslope and PAPI
Glideslope and PAPI Location

- FAA funded glideslope siting study in 2017
- FAA had positive findings for a location that provided a 60’ TCH for Runway 27. This location was feasible following the realignment of Taxiway C (ADG III, per current ALP)
- Additional study required for alternative locations or new taxiway layout.
Taxiway C Alternative 2

Large Aircraft Taxi Route
- Taxiway C South of A - 50' wide / 20' shoulders
- Taxiway C North of A - 75' wide / 25' shoulders providing access to the 148th’s Ramp
- Taxiway D extended to Runway 3 (75' wide / 10' shoulders)
- Meets RWY to TWY C/L separation (400' minimum)
- Tower ramp potential pavement expansion
- Non-standard Threshold Crossing Height (TCH) - 77.54' TCH for PAPI / 74.04' TCH for GS, may require additional study by the FAA.
Taxiway C Alternative 3

Large Aircraft Taxi Route (90° Connector)
- Taxiway C South of A - 50' wide / 20' shoulders
- Taxiway C North of A - 75' wide / 25' shoulders providing access to the 148th's Ramp
- 90 Degree Connector to Runway 9/27 allows for standard TCH for RWY 27 Glideslope and PAPI. PAPI and glideslope can also be coincident.
- Taxiway D extended to Runway 3 (75' wide / 10' shoulders)
- Meets RWY to TWY C/L separation (400' minimum)
- Tower ramp potential pavement expansion
Taxiway D Alternative

Full Length Taxiway D

- West side Taxiway C and B – Serves civilian critical aircraft - 50' wide / 20' shoulders
- East side becomes full length Taxiway D.
  - South of 9/27 – 75’ wide / 10’ shoulders (F-16s)
  - North of 9/27 – 75 wide / 20’ shoulders (Large aircraft)
- Allows for standard TCH for RWY 27 Glideslope and PAPI.
  Would require additional FAA study. PAPI and glideslope can also be coincident.
Design Considerations

**Taxiway C**
- Glide slope study if Taxiway C is designed as a full parallel taxiway for ADG V aircraft
- Apron layout alternatives will tie into how the Tower Ramp connects to Taxiway C and Taxiway A

**Taxiway D**
- Future glideslope signal analysis if selected as a preferred alternative
  - Glideslope siting can provide standard TCH, but modeling needed of a taxiway in a new location.
- Known grading challenges on Taxiway F
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Taxiway C Connectors – Large Aircraft Taxi Route

Alternative A
- Large aircraft would cross Runway 3/21 at the existing end of Runway 21 (Taxiway C4). Route designed to Class B, large aircraft standards (75’ with 25’ shoulders)
- Taxiway C, north of C4, would accommodate the civilian critical aircraft (50’ wide with 20’ shoulders)
- Taxiway F, north of the F1, would accommodate Class B, Fighter Standards (75' wide with 10' shoulders)
- Taxiway C3 would be use as a runway exit for GA aircraft and some commercial traffic
Taxiway C Connectors – Large Aircraft Taxi Route

Alternative B

- Large aircraft (Class B, large) would cross Runway 3/21 at Taxiway C3/ F1. While it minimizes large aircraft pavement, these taxiway are located in the middle 1/3 of an 8,000' and considered a "high energy" area by the FAA. Connectors should be located outside of this area where feasible.
- Taxiway C, north of C3 would accommodate the civilian critical aircraft (50' wide with 20' shoulders)
- Taxiway F, north of Taxiway J, would accommodate the F-16 UFC Standards (75' wide with 10' shoulders)
**Taxiway C Connectors – Large Aircraft Taxi Route**

**Alternative C**
- Large aircraft (UFC Class B, large) would cross Runway 3/21 at the end of the 8,000' runway (Taxiway C6)
  - Entire Taxiway C, would accommodate the large aircraft (75' wide Taxiway and 25' shoulders)
- Mid-runway connectors on Taxiway C would be designed for the civilian critical aircraft (50' wide and 20' shoulders)
- Taxiway F from F3 to the Guard Ramp would accommodate Class B, Large Aircraft (75' wide and 25' shoulders)
- Taxiway F1 and Taxiway F2 would accommodate the F-16 UFC standards (75' wide and 10' shoulders)
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Aircraft Parking Areas
Tower Ramp

• Runway Visibility Zone (RVZ)
  • Standard is to not allow for aircraft parking in the RVZ

• Modification of Standards for existing conditions
  • A 24-hour tower helps justify stationary items in the RVZ (parked aircraft, buildings, etc.)
Tower Ramp
Tower Ramp
Tower Ramp
South Tower Ramp
Monaco Ramp
Midfield Ramp

Alternative 1

Alternative 2

Legend:
- Future pavement
- Future pavement removal
- Aircraft Parking
- Runway Visibility Zone (RVZ)
- Future TOFA
- Future Perimeter Road

Potential Aeronautical Re-development area. Details to be evaluated.
Midfield Ramp
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Terminal Ramp

Future terminal ramp expansion. Final size to be determined based on aircraft movement and safety clearances.

Legend

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Future pavement</td>
<td>[image]</td>
</tr>
<tr>
<td>Future pavement removal</td>
<td>[image]</td>
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Taxiway A Network Alternatives
Taxiway A Design Considerations

- Final alignment of Taxiway A and its connectors will be finalized with a preferred alternative, connector design would remain the same.

- Taxiway C connector would meet design considerations for the Runway 3/21 Taxiway Network.
Taxiway A Alternatives

• Large Aircraft Taxi Route
  • Taxiway A1, A3 and A5
  • 75’ wide taxiway with 25’ shoulders

• Taxiway A2 could be considered for UFC fighter jet standards as it could be an F-16 exit. (75’ wide, 10’ shoulders)
Taxiway A – Alternative 2A
75’ Wide with 25’ Shoulders
Taxiway A – Alternative 2B
75’ Wide with 25’ Shoulders

Majority of TAC Group favored this alternative in TAC Meeting #3
Taxiway A Preliminary Phasing

Phasing Notes:

**Phase A:**
- Subphases (denoted by A-1, A-2, etc.) will be designed to preserve access to terminal gates.
- May be beneficial to do first if air service remains constrained due to the impacts of COVID-19.
- Full taxi route along 9/27 may be preserved for portions of this phase which minimizes IAP impacts.

**Phase B:**
- Can be broken into two phases.
- Full taxi route along 9/27 may be preserved in some sub-phases, minimizing IAP impacts, but will eliminate GA parking locations. Subphasing to preserve IAP’s may increase costs.

**Phase C:**
- No ability to provide full length taxi route along 9/27. IAP minimum will be raised to 1-mile during construction.
- Potential to be the most costly phase.
- Mill & Overlay expected to preserve pavement in a generally serviceable condition until approximately 2024.
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Next Steps

• Further detailed planning of selected preferred alternatives

• Additional refinement of apron layouts and aircraft parking needs based on feedback

• Preferred apron layout alternatives will be combined and further studied for potential development and re-development areas
Questions and Discussion
Thank You!