Duluth Airport Master Plan

Taxiway Network and Apron Parking
Technical Advisory Committee (TAC) Meeting #4

August 12, 2020

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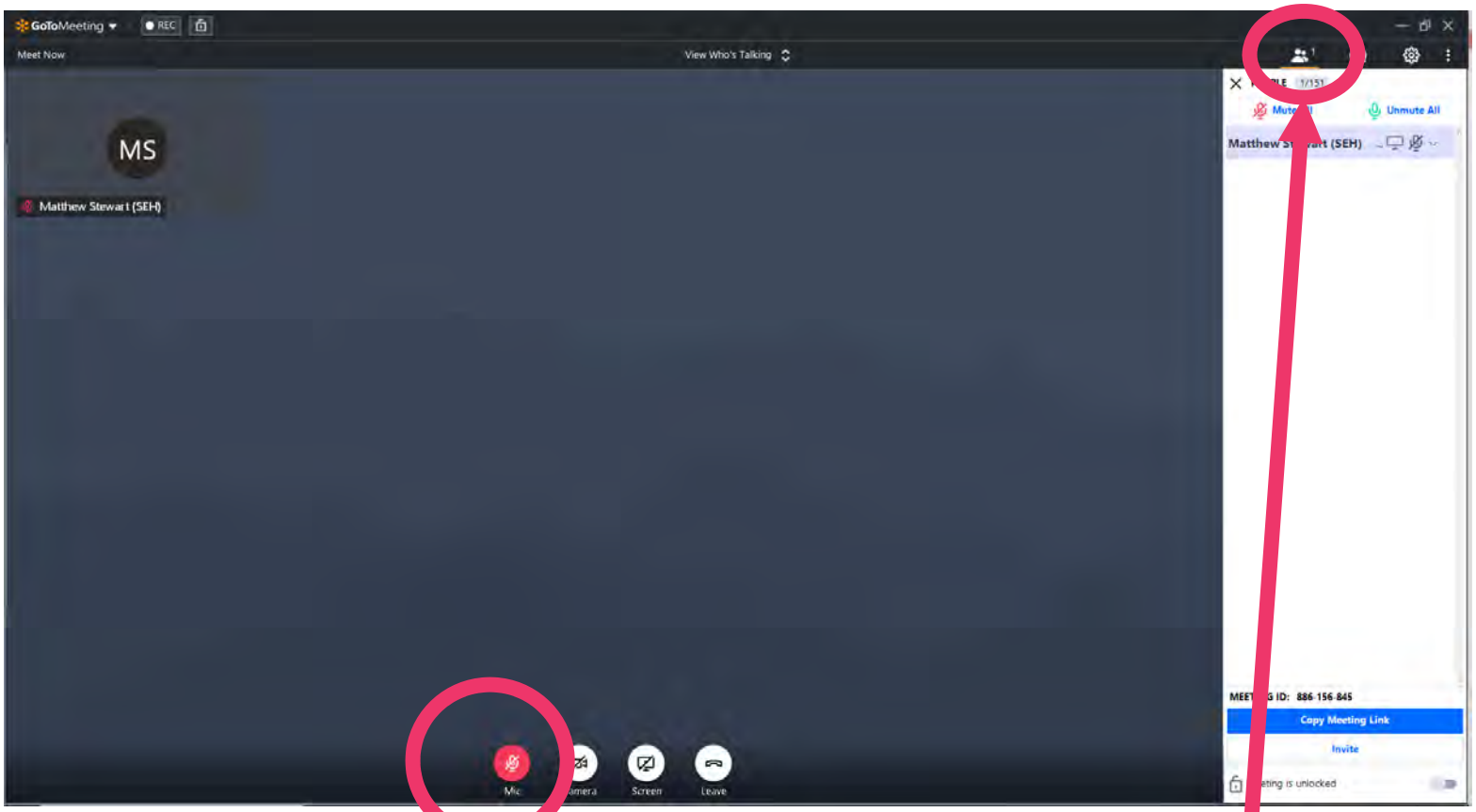
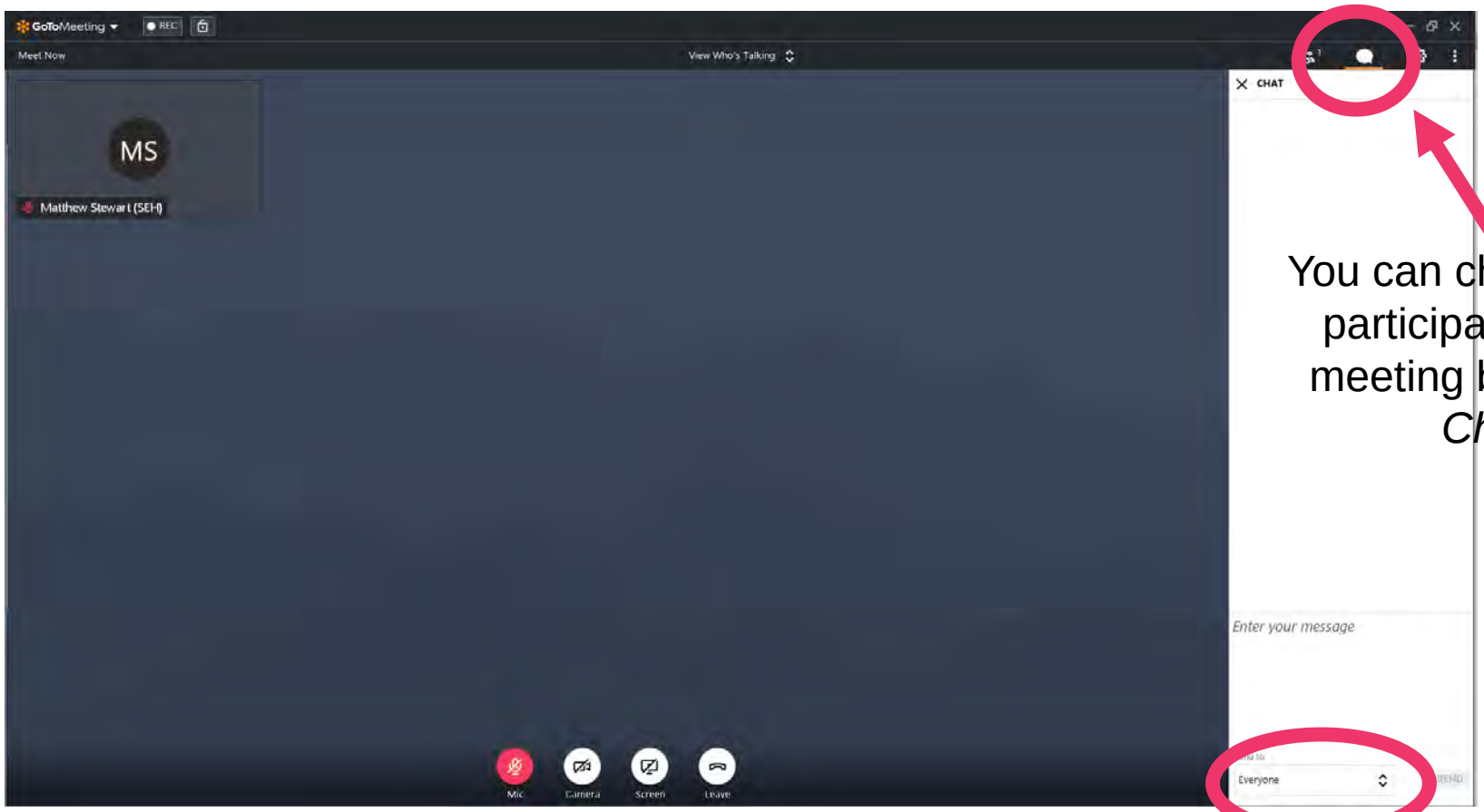
GoToMeeting Basics



Please mute your microphone to limit feedback noise when not talking.

Clicking on the person icon will list all attendees in the meeting.

Zoom Online Meeting Basics



You can chat with the participants in the meeting by clicking *Chat*.

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Introductions

Tom Werner C.M.
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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

<u>Meeting Goals:</u>

- Gather stakeholder feedback on:
  - Refined taxiway layout alternatives
  - Apron layout alternatives
  - Taxiway A layout and phasing

Taxiway Design Considerations

TDG requirements by aircraft type

	Civilian Aircraft Requirements				UFC / Military Aircraft		
	TDG 2 *CRJ-700*	TDG 3 *A-319*	TDG 4 *MD-90*	TDG 5 *A-330*	Class A *UC-35*	Class B *F-16*	Class B *C-5*
Pavement Width	35’	50’	50’	75’	50’	75’	75’
Paved Taxiway Shoulder Required	No	Recommended	Yes	Yes	N/A[1]	Yes[1]	Yes[2]
Paved Taxiway Shoulder Width	15’	20’	20’	30’	- [1]	10’ [1]	25’ [2]
Total pavement width	**65’**	**90’**	**90’**	**135’**	**50’**	**95’**	**125’**

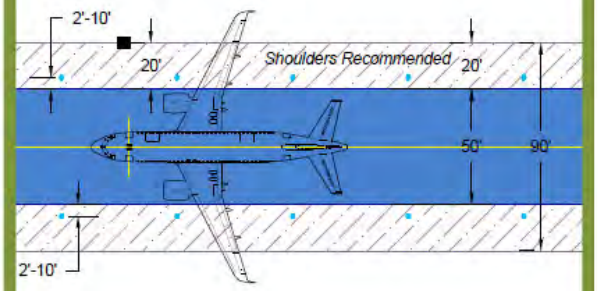
TDG 3 Eligible for FAA Funding

Notes:

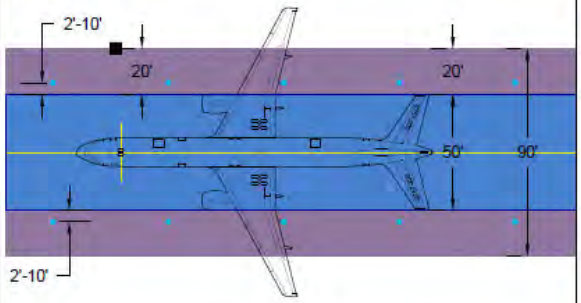
[1]Air Force taxiways devoted exclusively for fighter and trainer aircraft

[2]Army and Air Force airfields

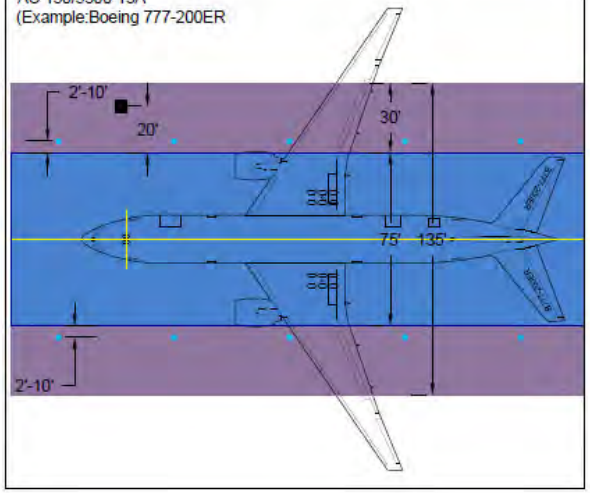
TDG 3 (FAA Critical Aircraft)
AC 150/5300-13A
(Example: A319 and A320 family



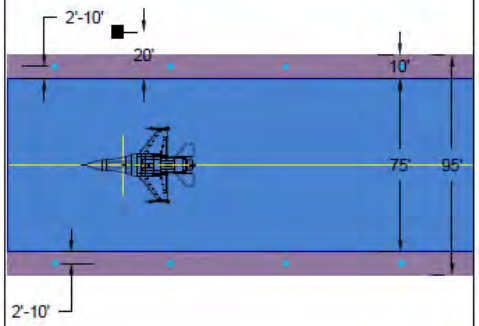
TDG 4
AC 150/5300-13A
Example: Boeing 757-200



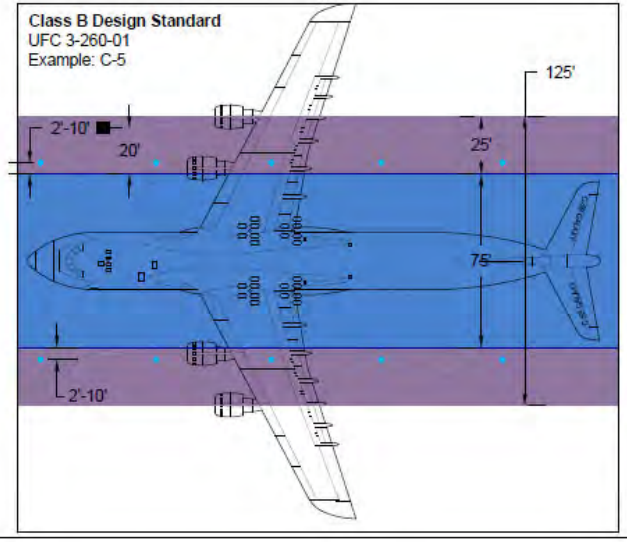
TDG 5
AC 150/5300-13A
(Example:Boeing 777-200ER



Class B Fighter Aircraft
UFC 3-260-01
Example: F-16



Class B Design Standard
UFC 3-260-01
Example: C-5



Legend

Feet
0 12.5 25 50

- Required Taxiway Pavement
- Recommended Shoulder Pavement
- Required Shoulder Pavement
- Taxiway Edge Light
- Taxiway Sign (Size 1 or 2)

TDG turn fillets vary with each TDG grouping

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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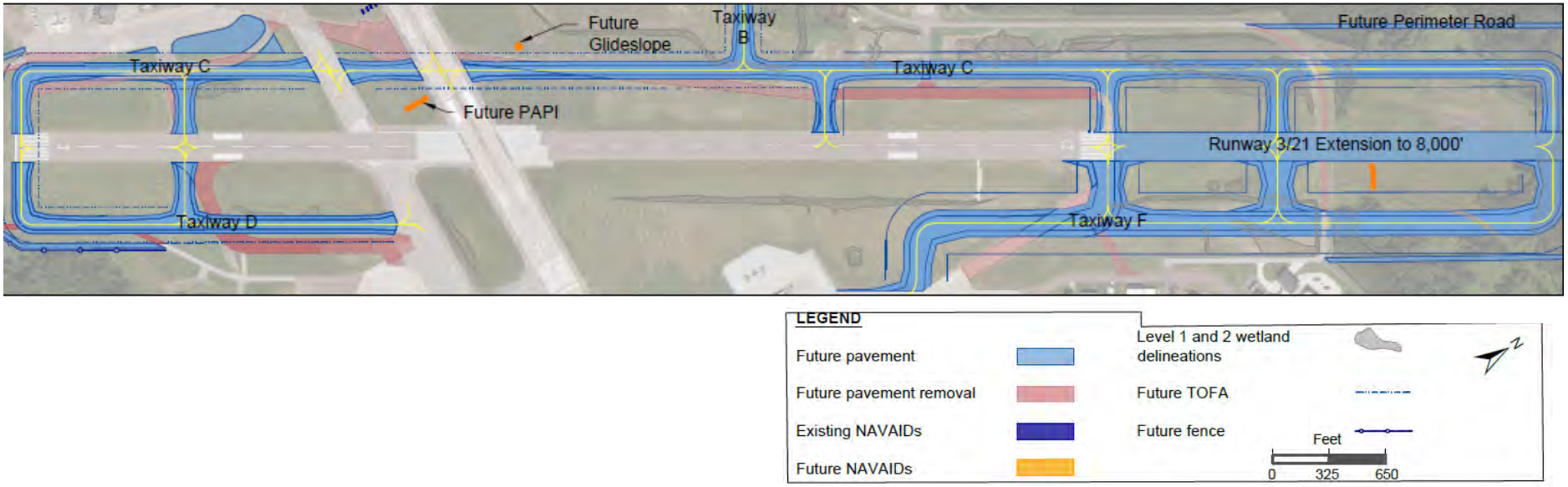
Runway 27 Glideslope and PAPI Location

- 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)

Taxiway C Alternative 1 (Current ALP)

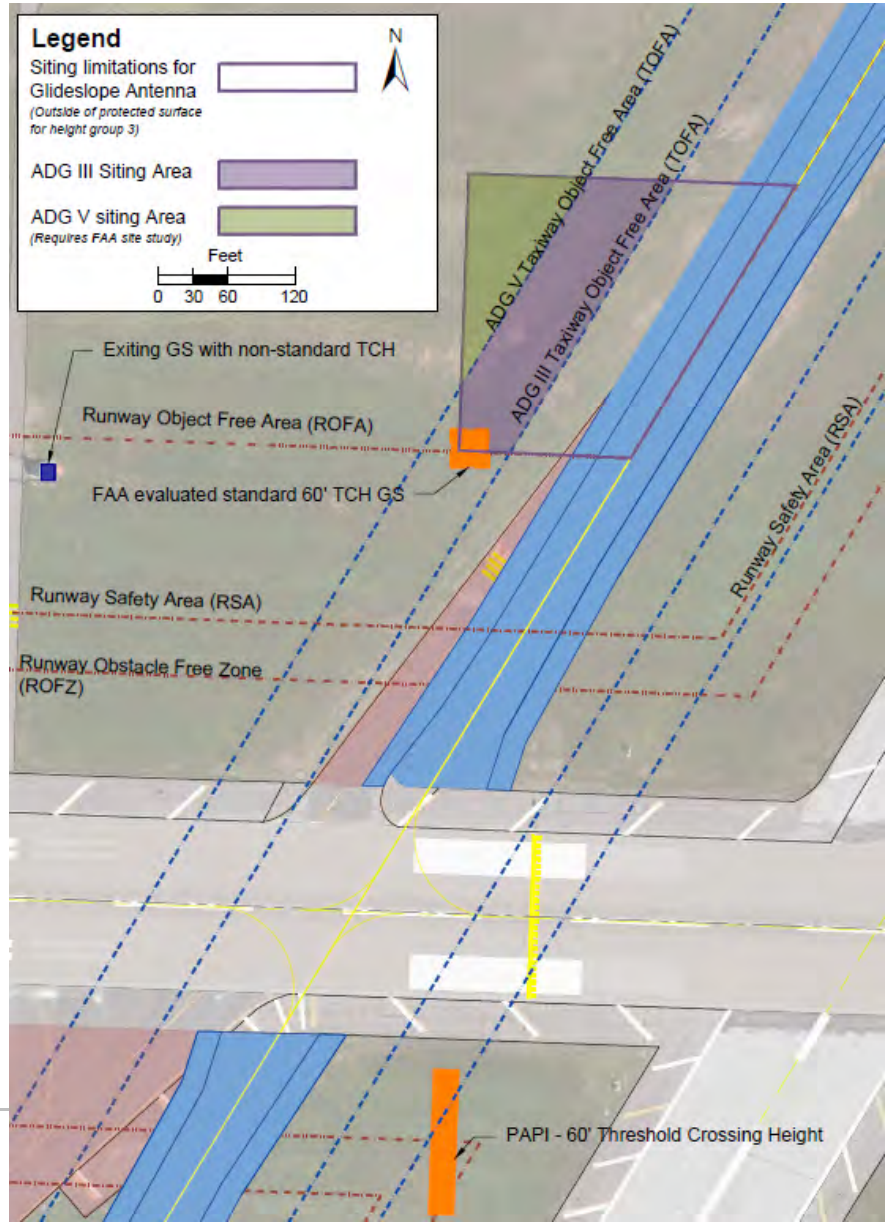


Civilian Critical Aircraft Design Standards (Current ALP)

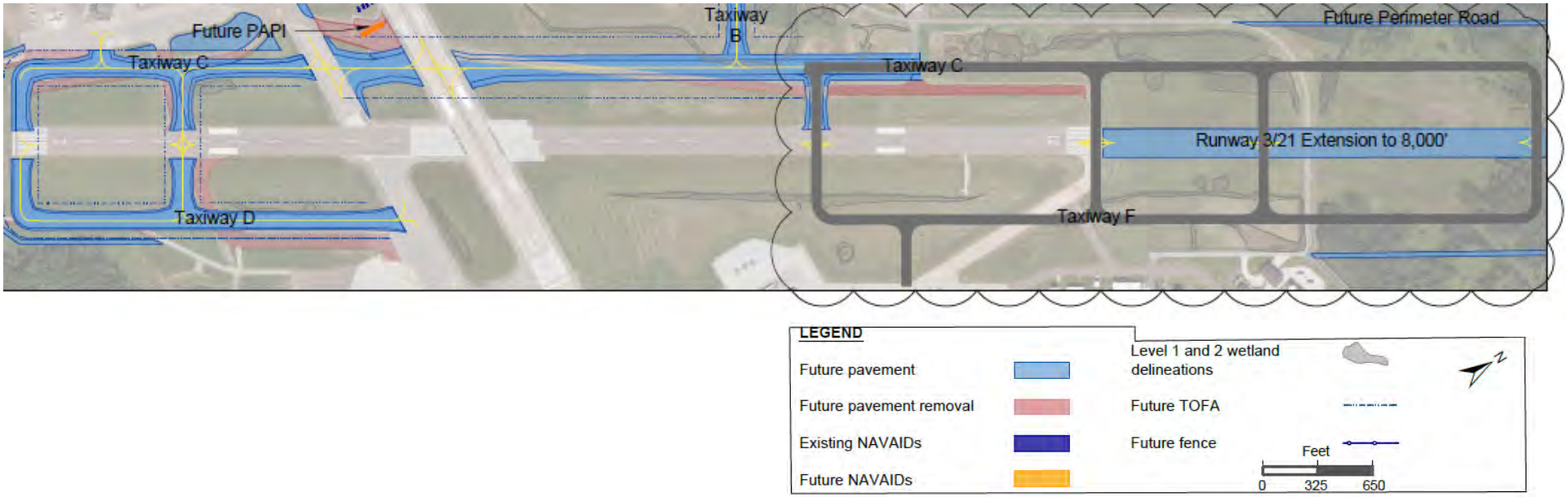
- Taxiway C - 50' wide with 20' shoulders
- Taxiway D extended to Runway 3 - 50' wide with 20' shoulders
- Meets Runway to Taxiway C/L separation (400' minimum)
- Taxiway B Extension - 50' wide with 20' shoulders
- Taxiway F - 75' wide with 25' wide shoulders
- Tower ramp potential pavement expansion 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.



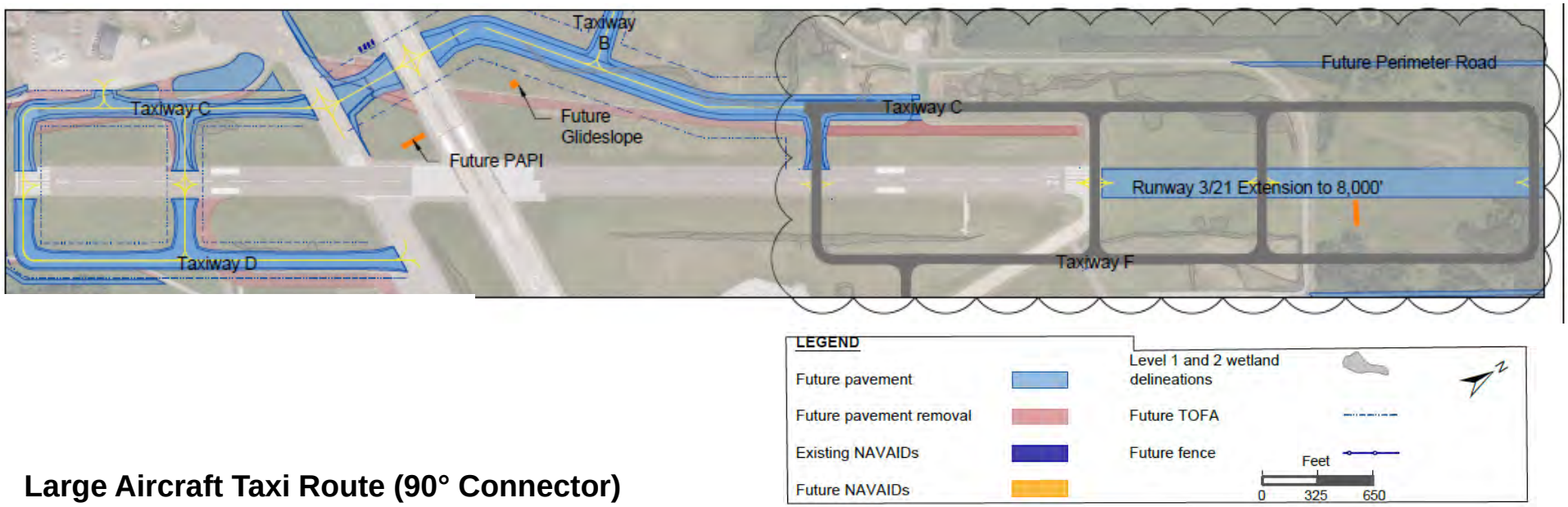
Taxiway C Alternative 2



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.

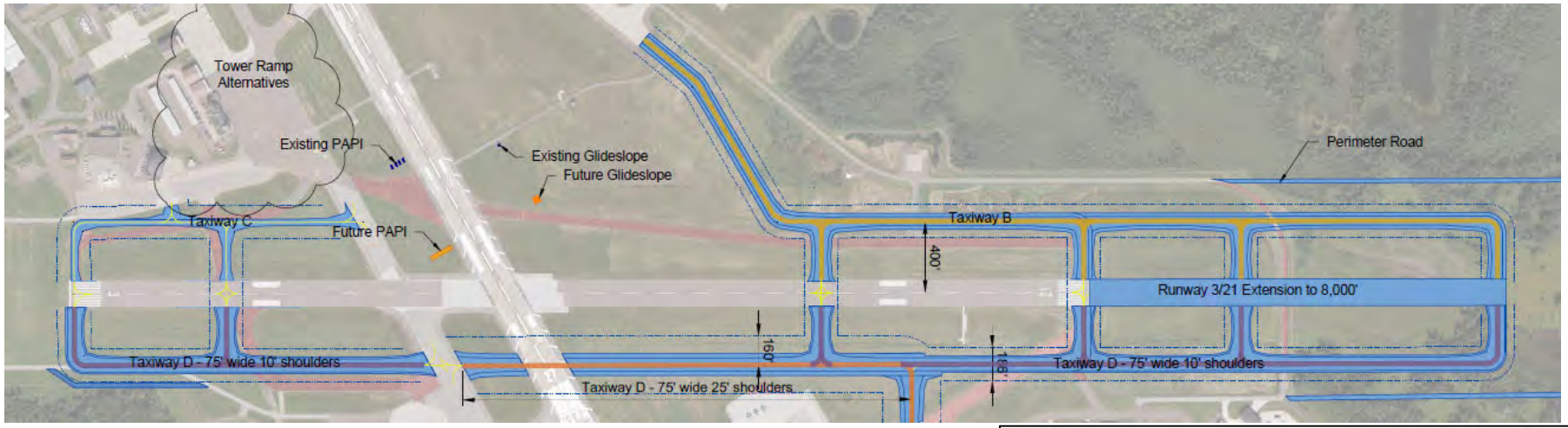
Taxiway C Alternative 3

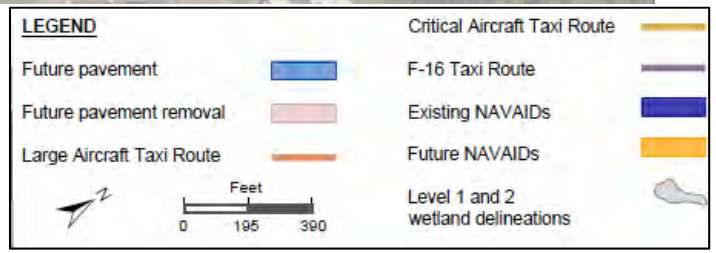


Large Aircraft Taxi Route (90° Connector)

- 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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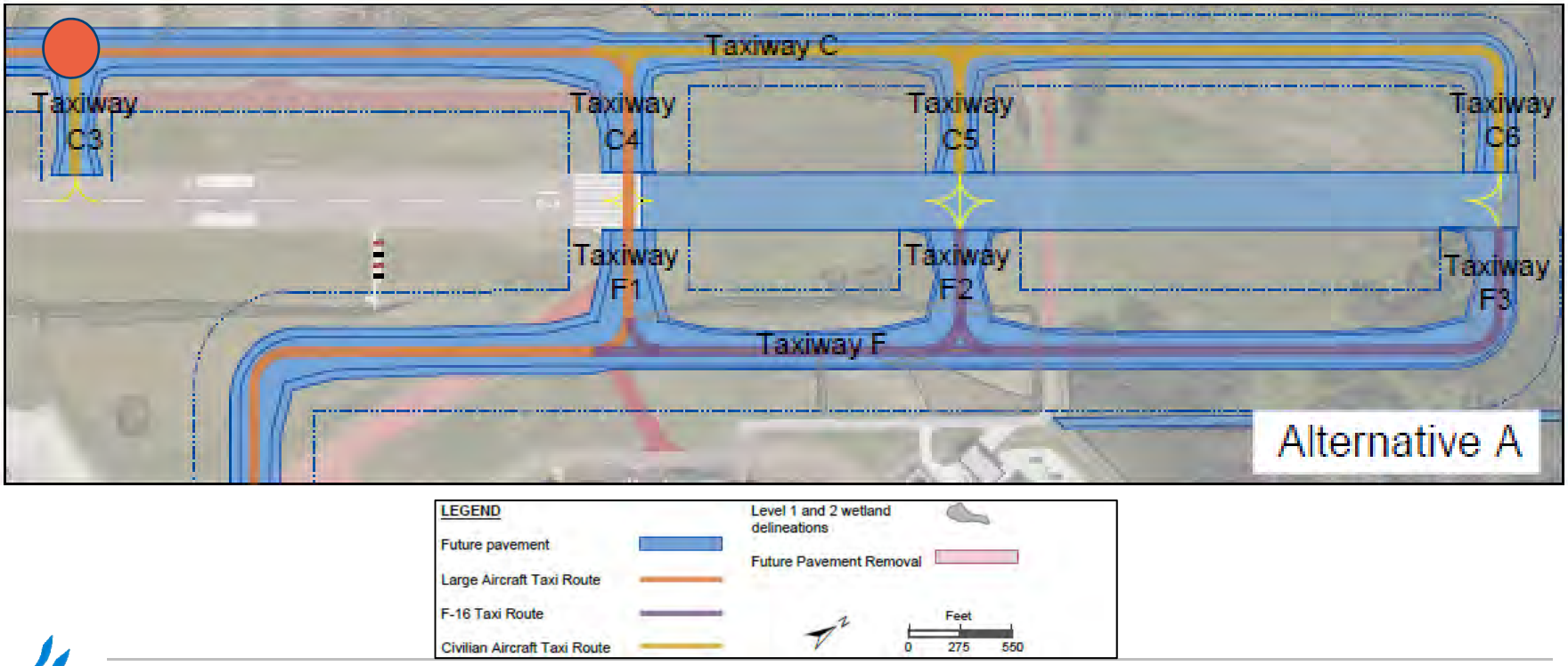
Taxiway C Connectors – Large Aircraft Taxi Route

Alternative A

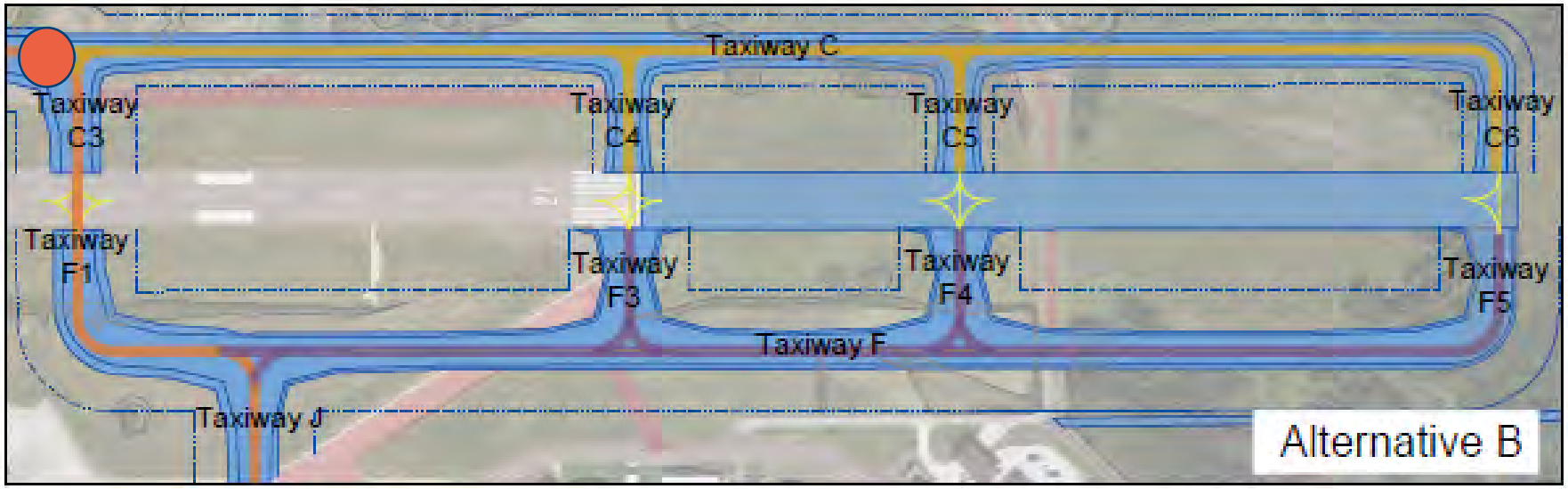
- Large aircraft would cross Runway 3/21 at the existing end of Runway 21 (Taxiway C4). Route designed to Class B, large aircraft standards (75' with 25' shoulders)
- Taxiway C, north of C4, would accommodate the civilian critical aircraft (50' wide with 20' shoulders)
- Taxiway F, north of the F1, would 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

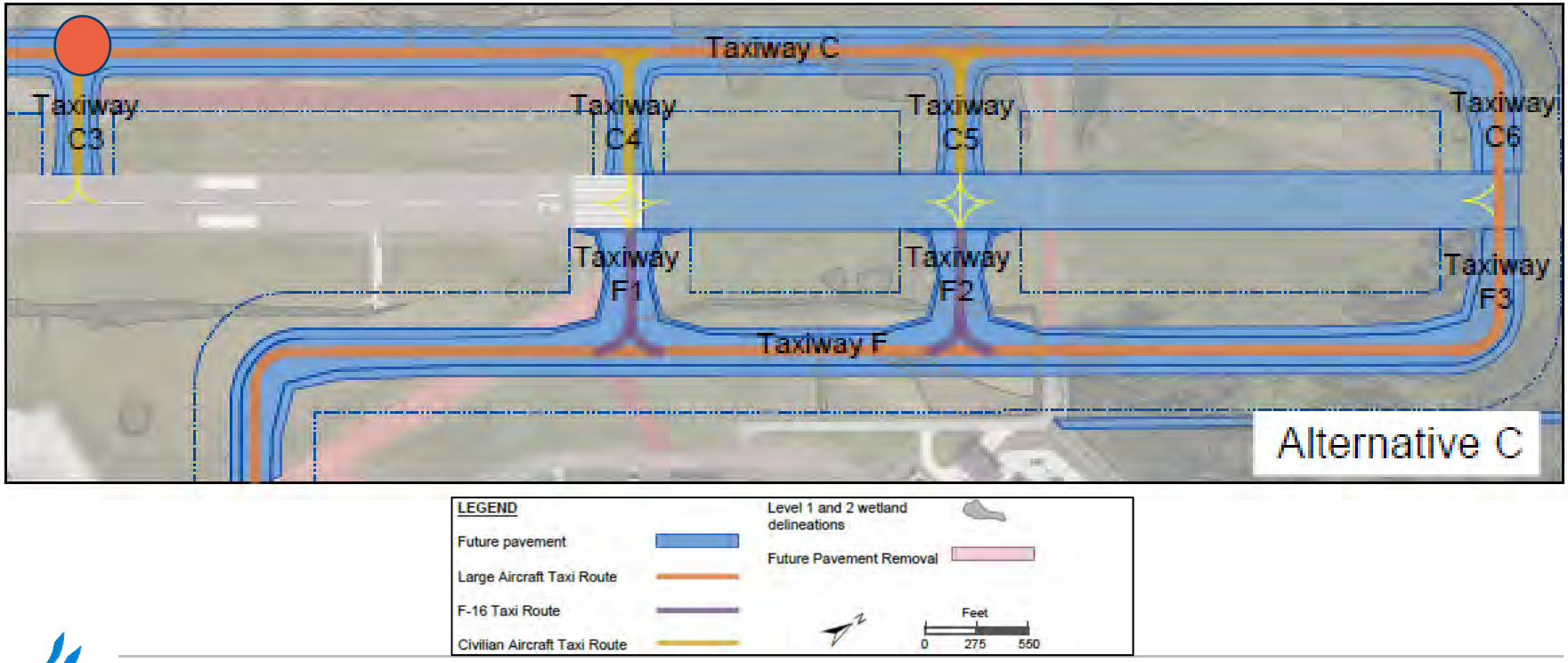
- Large aircraft (Class B, large) would cross Runway 3/21 at Taxiway C3/ F1. While it minimizes large aircraft pavement, these taxiway are located in the middle 1/3 of an 8,000' and considered a "high energy" area by the FAA. Connectors should be located outside of this area where feasible.
- Taxiway 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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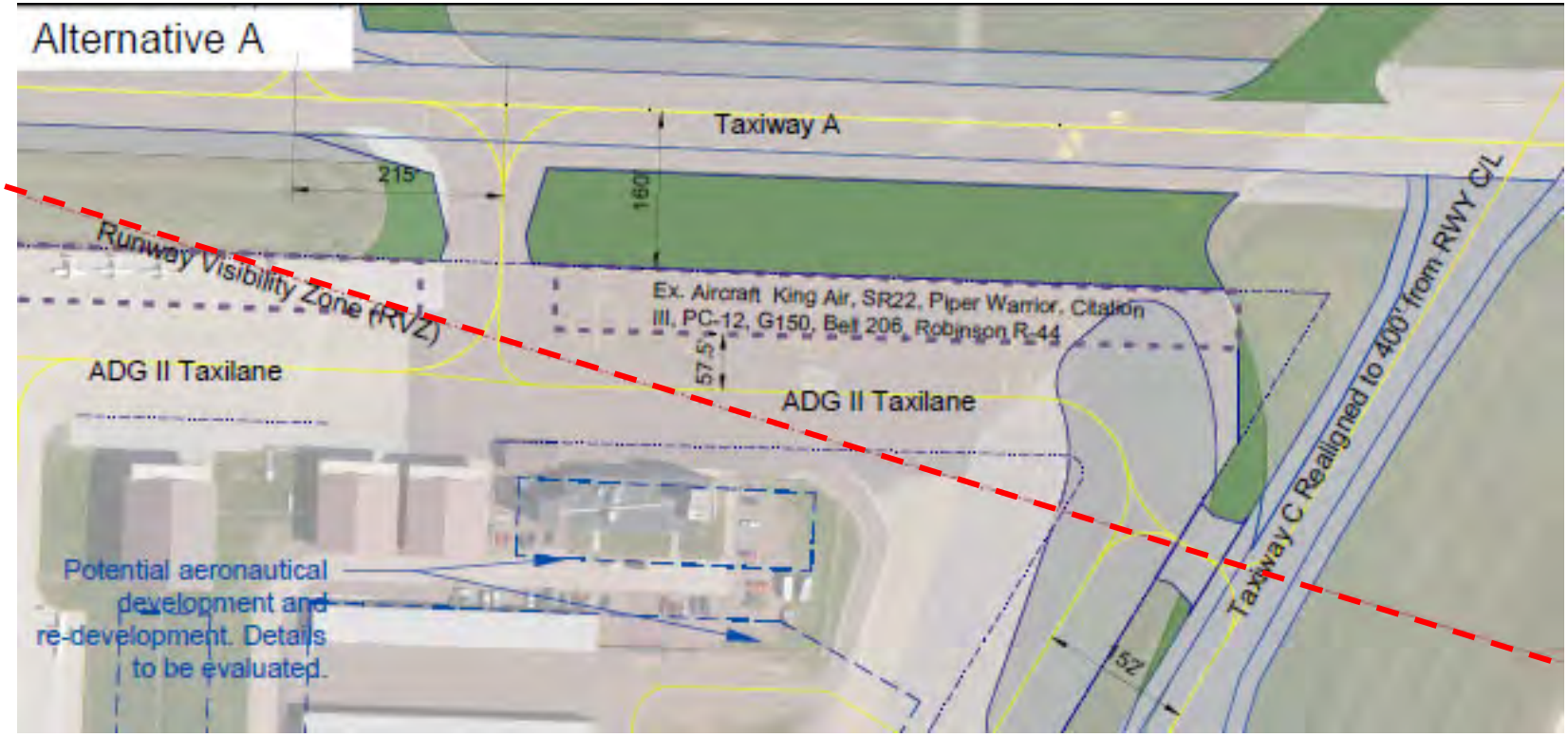
Aircraft Parking Areas

Tower Ramp

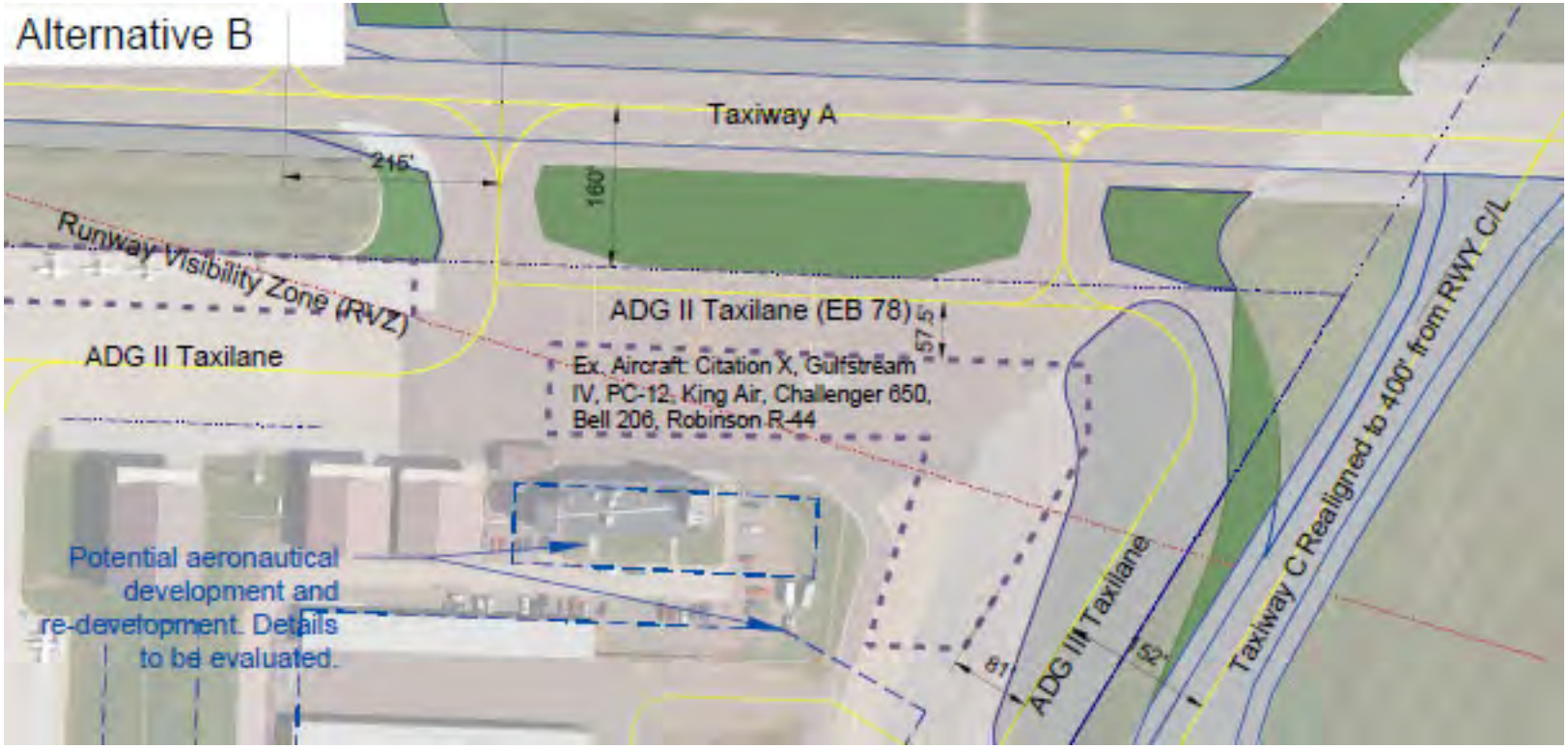
- Runway Visibility Zone (RVZ)
  - Standard is to not allow for aircraft parking in the RVZ

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

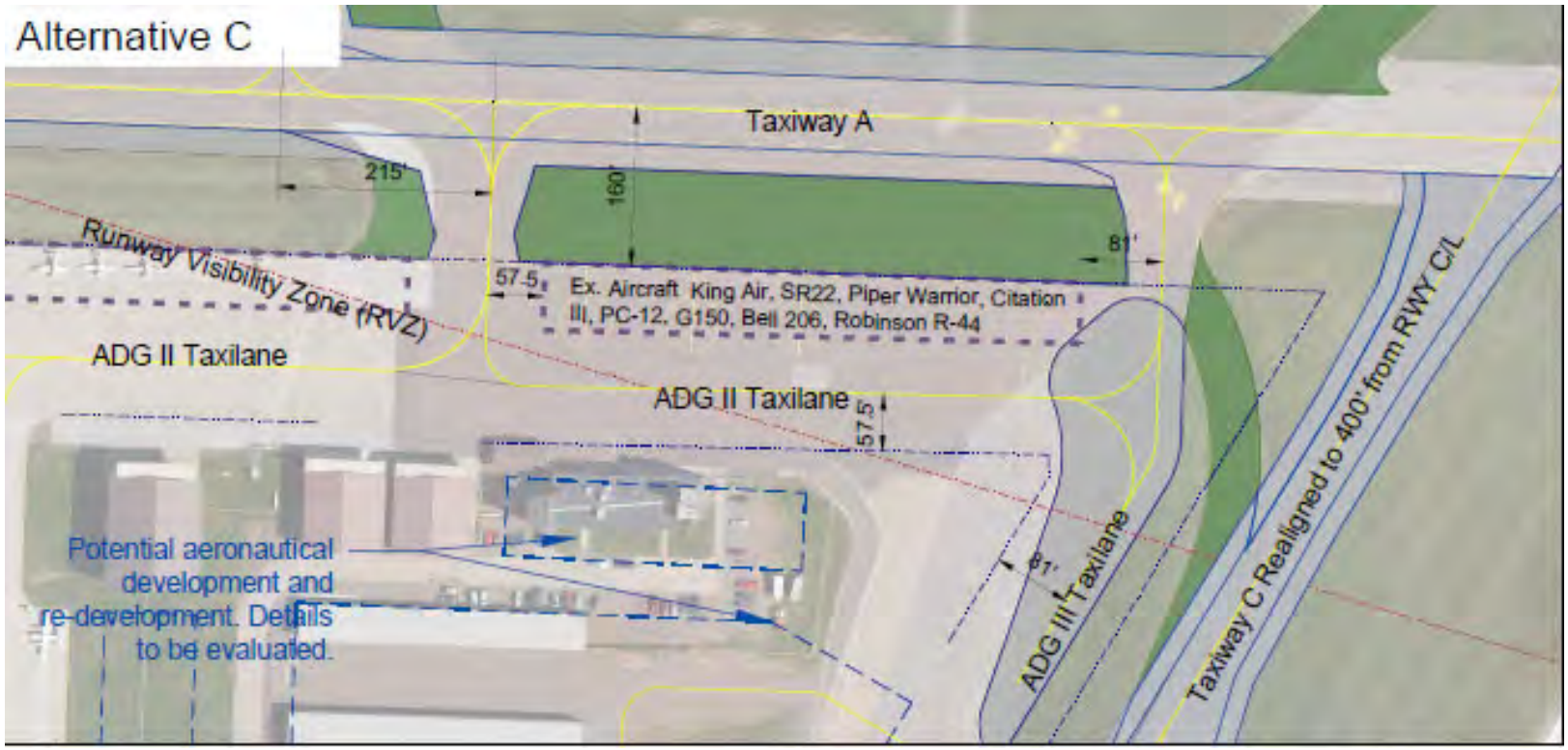
Tower Ramp


Alternative A
Taxiway A
215'
160'
Runway Visibility Zone (RVZ)
Ex. Aircraft King Air, SR22, Piper Warrior, Citation III, PC-12, G150, Bell 206, Robinson R-44
57.5'
ADG II Taxilane
ADG II Taxilane
Taxiway C Realigned to 400' from RWY C/L
52'
Potential aeronautical development and re-development. Details to be evaluated.

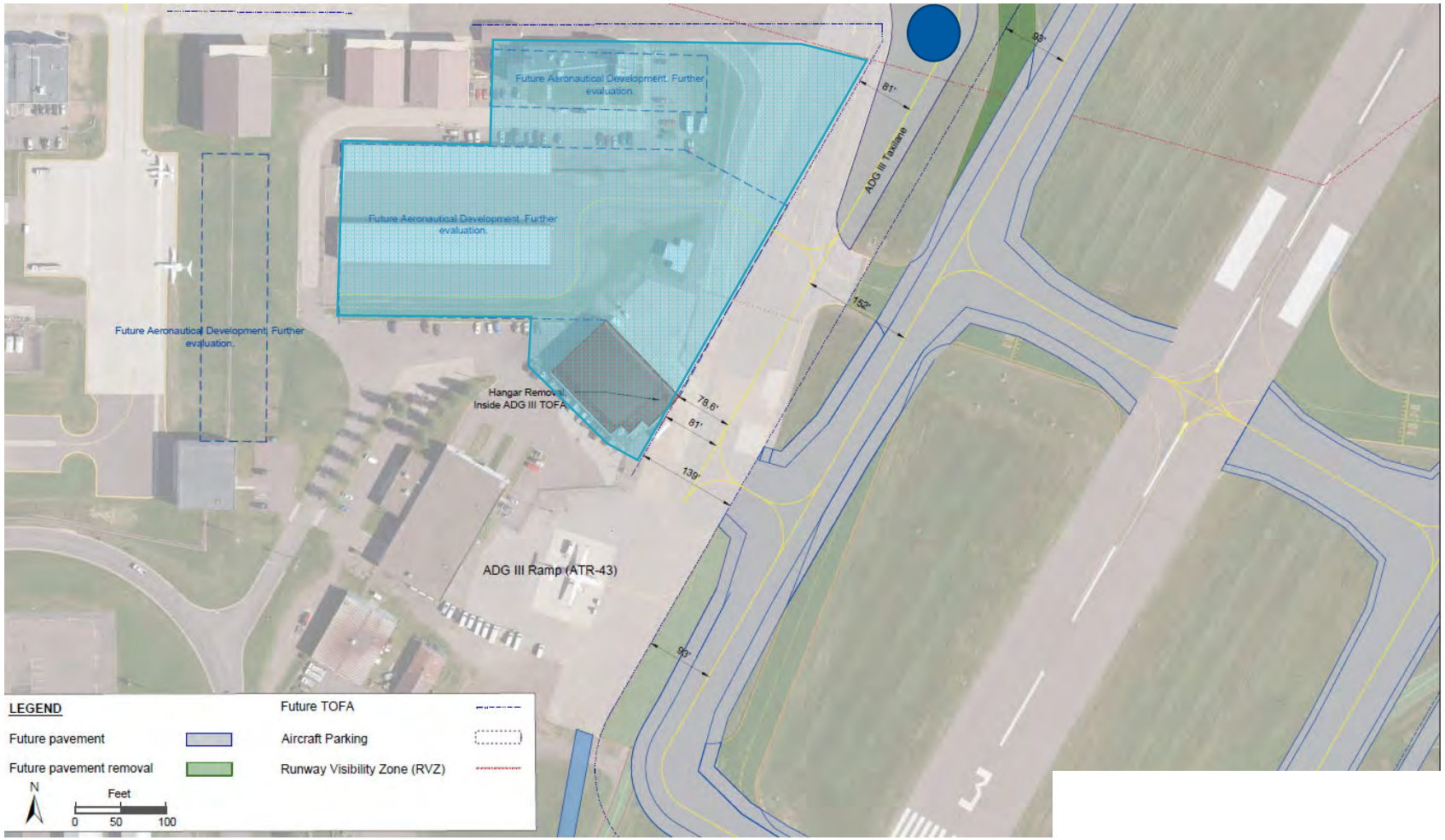
Tower Ramp


Alternative B
Taxiway A
215'
160'
Runway Visibility Zone (RVZ)
ADG II Taxilane (EB 78)
57'
ADG II Taxilane
Ex. Aircraft: Citation X, Gulfstream IV, PC-12, King Air, Challenger 650, Bell 206, Robinson R-44
Potential aeronautical development and re-development. Details to be evaluated.
81'
ADG III Taxilane
52'
Taxiway C Realigned to 400' from RWY C/L

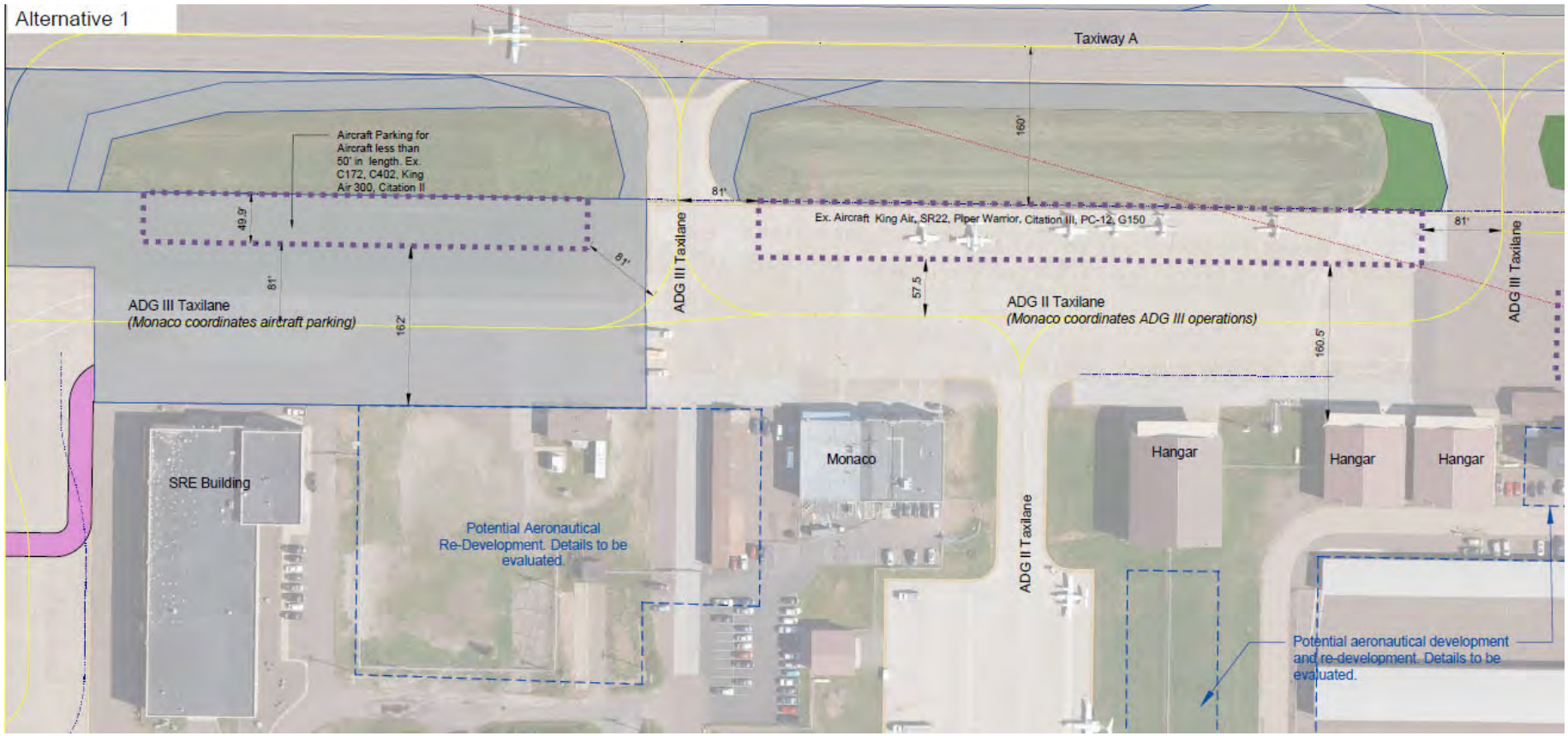
Tower Ramp


Alternative C
Taxiway A
215'
160'
81'
Runway Visibility Zone (RVZ)
57.5'
Ex. Aircraft King Air, SR22, Piper Warrior, Citation III, PC-12, G150, Bell 206, Robinson R-44
ADG II Taxilane
ADG II Taxilane
57.5'
Potential aeronautical development and re-development. Details to be evaluated.
81'
ADG III Taxilane
Taxiway C Realigned to 400' from RWY C/L

South Tower Ramp



Monaco Ramp



LEGEND

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

N

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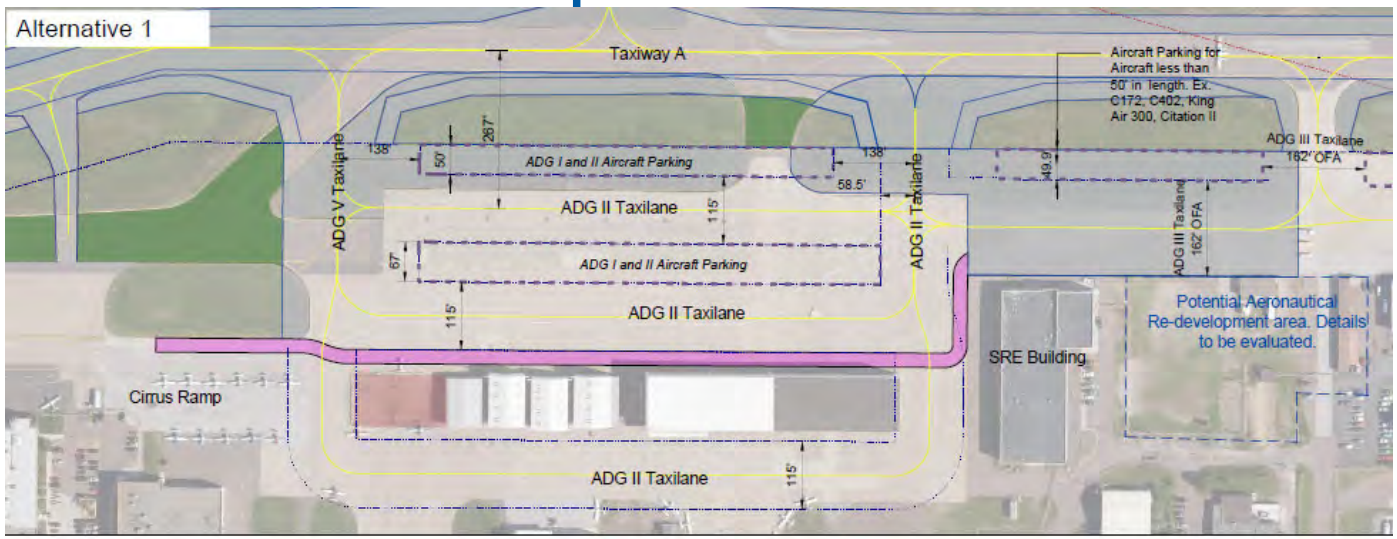
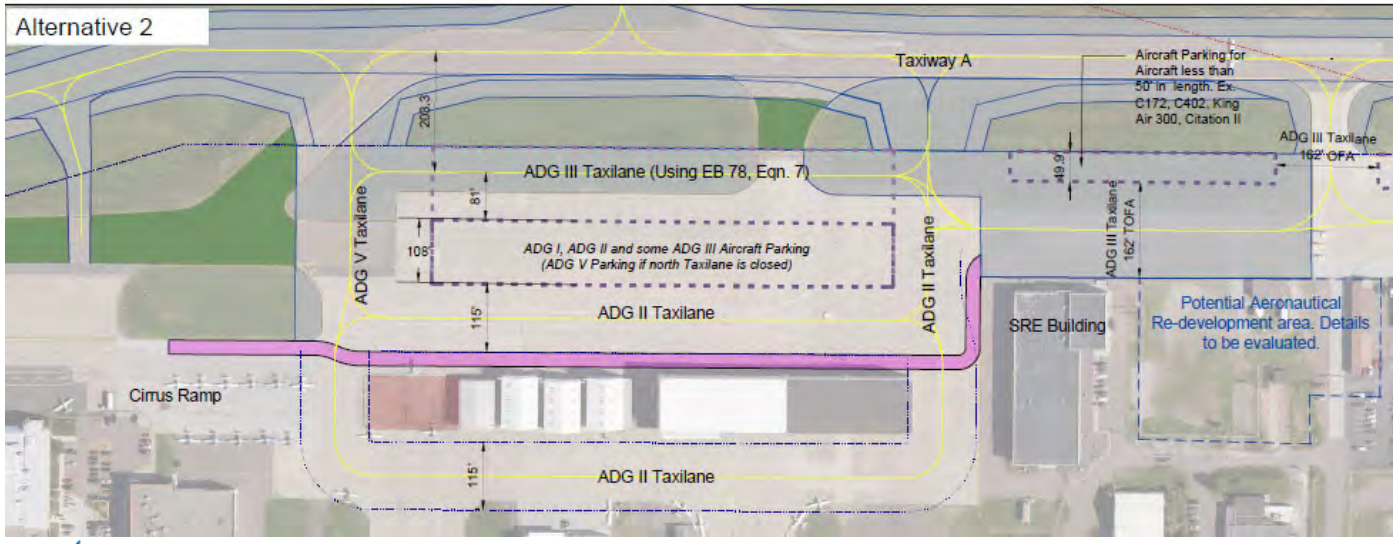
Midfield Ramp

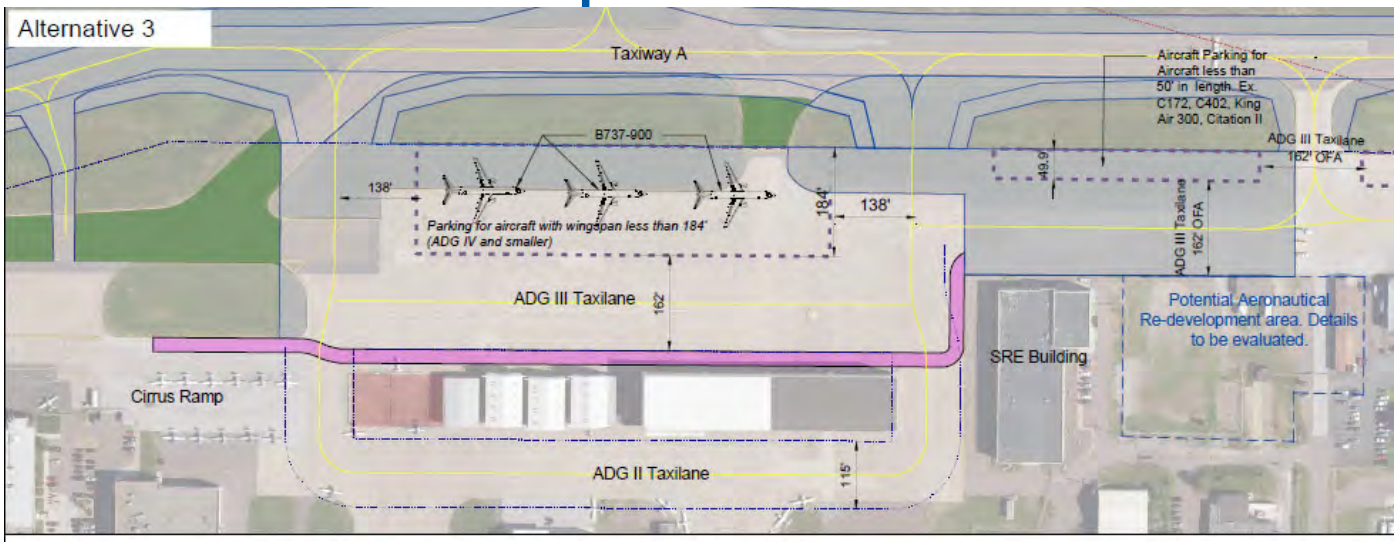


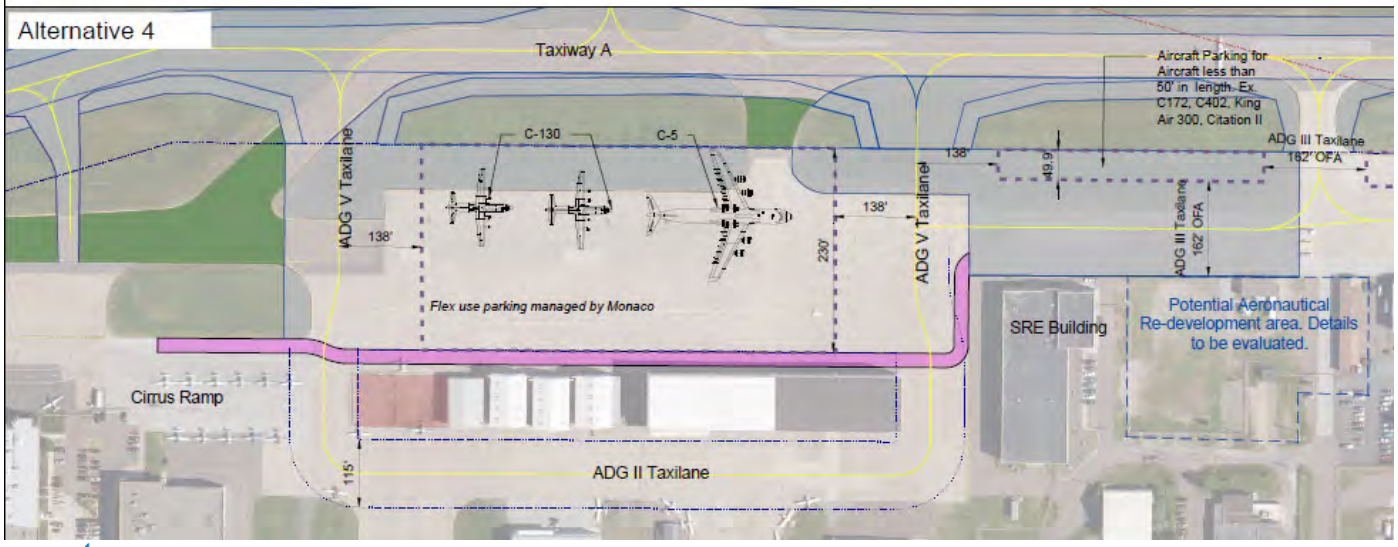


LEGEND

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

Midfield Ramp





LEGEND

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

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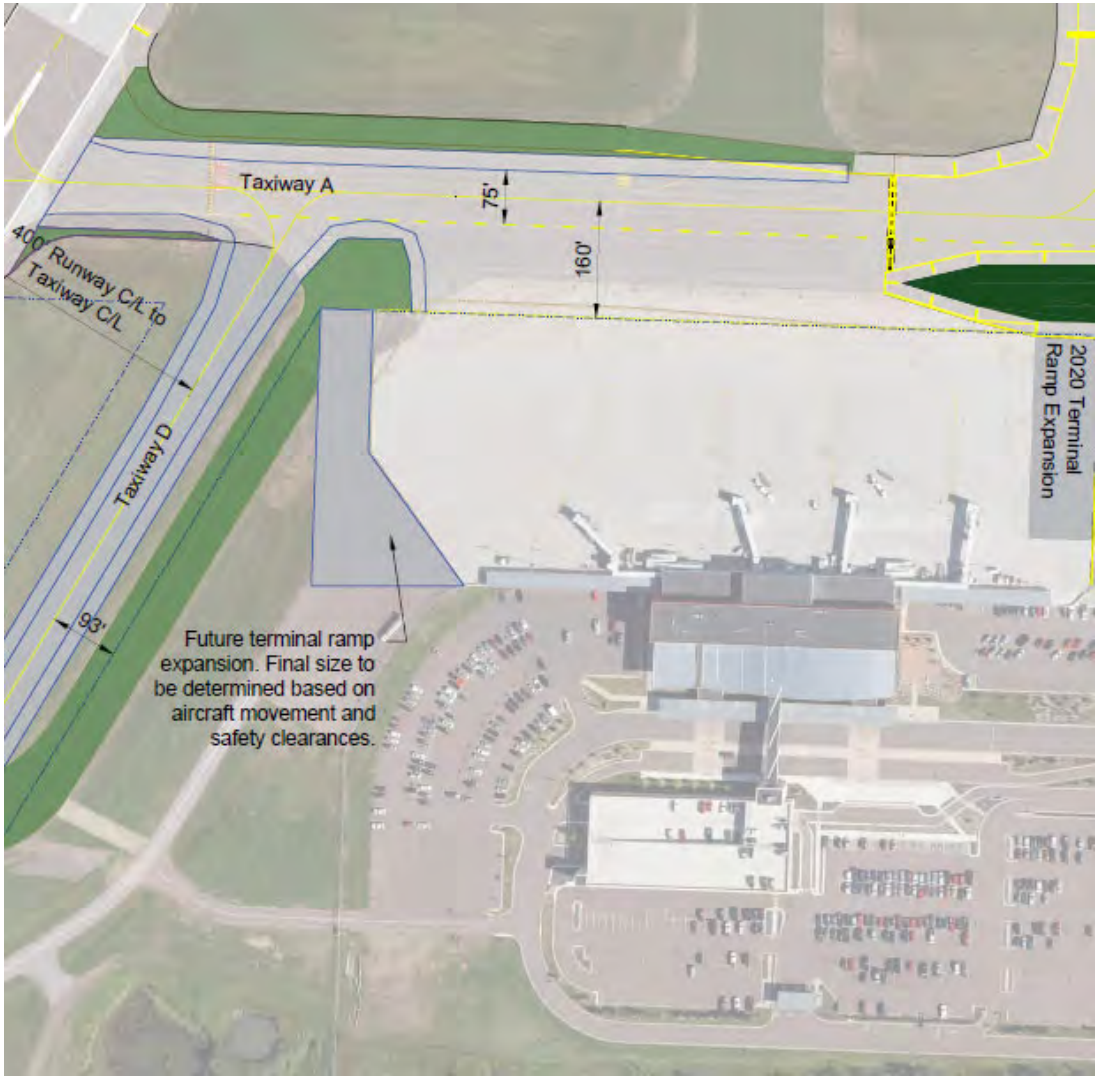
Terminal Ramp



Legend

Future pavement

Future pavement removal

Taxiway A Network Alternatives

Taxiway A Design Considerations

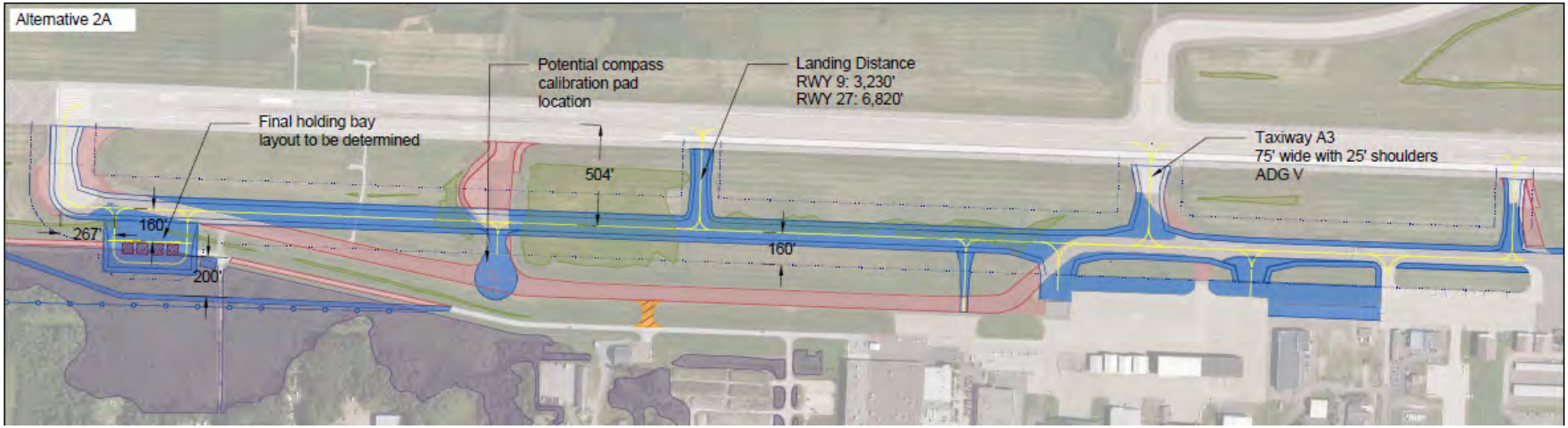
- Final alignment of Taxiway A and its connectors will be finalized with a preferred alternative, connector design would remain the same
- Taxiway C connector would meet design considerations for the Runway 3/21 Taxiway Network

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



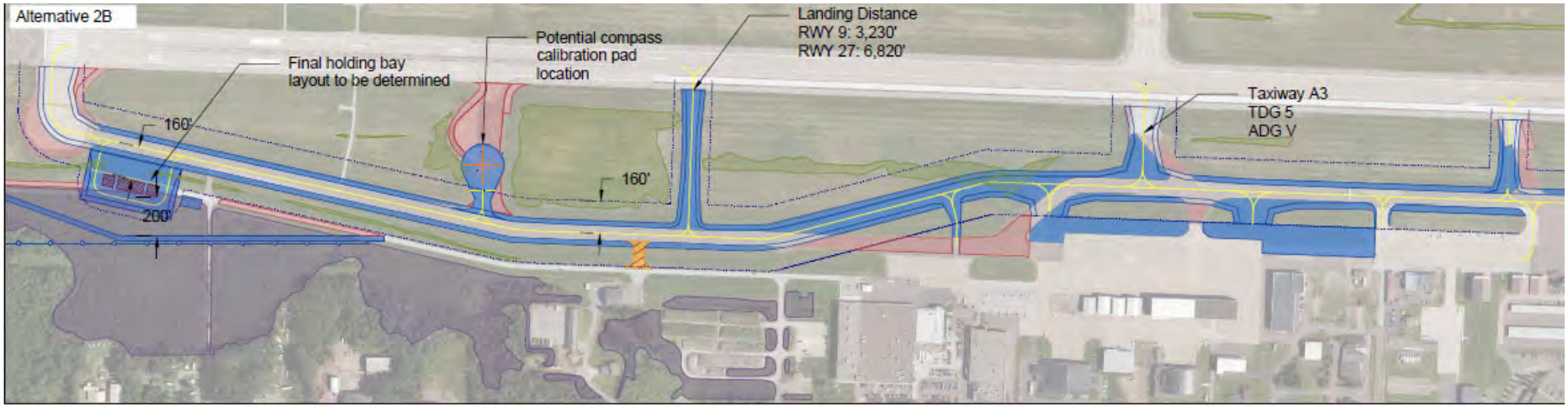
LEGEND

- Future pavement
- Future pavement removal
- Future TOFA
- Level 1 wetland delineations
- Level 2 wetland delineations
- Limited line of sight from ATCT

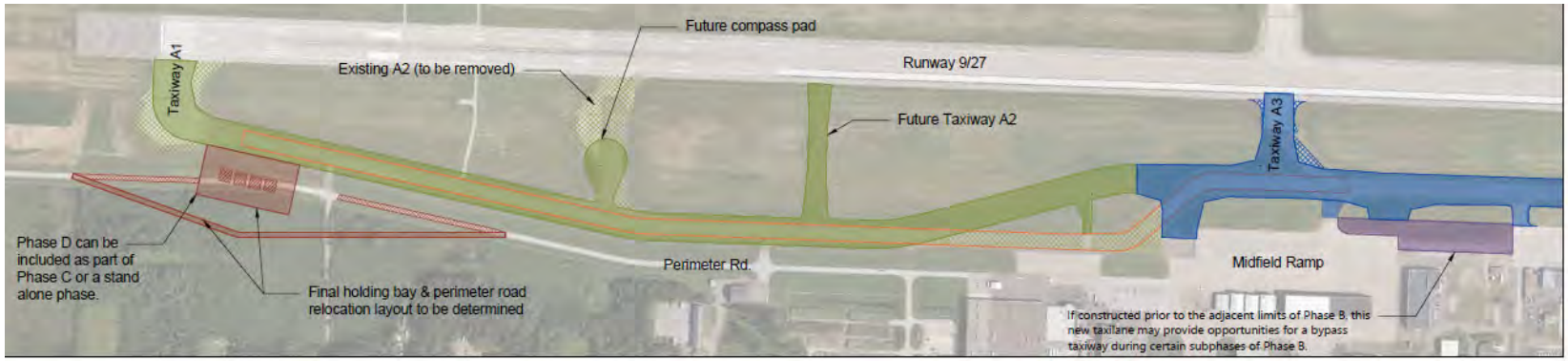
N

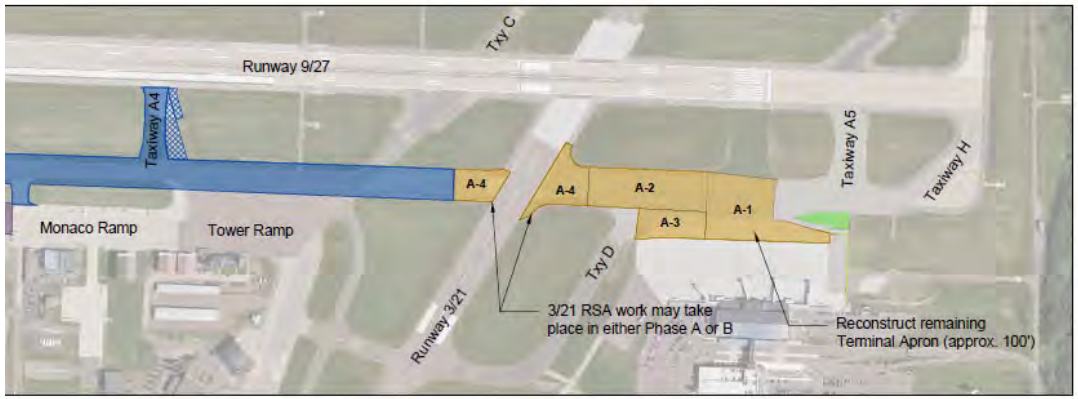
Taxiway A – Alternative 2B
75’ Wide with 25’ Shoulders

Majority of TAC Group favored this alternative in TAC Meeting #3



Taxiway A Preliminary Phasing





LEGEND			
Phase A Limits		Phase C Limits	
Phase B Limits		Phase C Removals	
Phase B Removal Area		2020 Mill & Overlay Limits	
		Holding Bay Construction (Phase D) *Can be included as part of Phase C or a stand alone phase.*	

N

Feet
0 250 500

Phasing Notes:

Phase A:
- Subphases (denoted by A-1, A-2, etc.) will be designed to preserv 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 IAPs 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!