

# Rapid City Regional Airport

Public Open House – Preferred Development Alternative  
October 20, 2021

*This presentation includes planning level concepts and cost estimates. Further analysis and environmental clearance (including opportunities for public input) will occur prior to implementation.*



ENGINEERING, REIMAGINED

# Airport Master Planning

## ➤ What is an Airport Master Plan?

“An Airport Master Plan is a comprehensive study of an airport and usually describes the short-, medium- and long-term development plans to meet future aviation demand”

*Federal Aviation Administration (FAA)*

*Advisory Circular 150/5070-6B, Airport Master Plans*



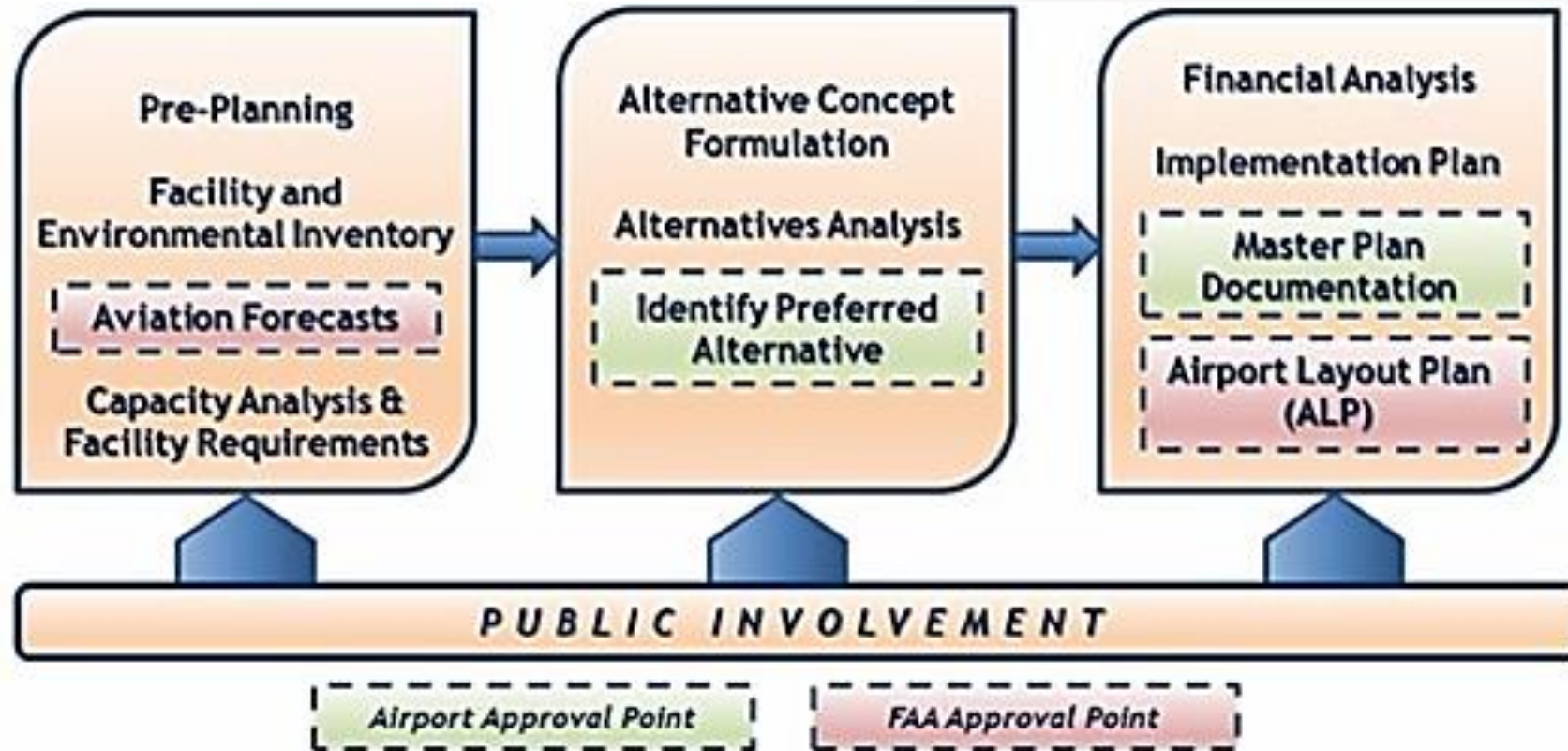
ENGINEERING, REIMAGINED

# Roles & Responsibilities

- RCRA / City of Rapid City
  - Provide Guiding Principles
  - Make Decisions
  - Review and Approve Master Plan and ALP
- FAA & SD Office of Aeronautics
  - Provide Technical Guidance
  - Approve Aviation Forecasts
  - Review Master Plan
  - Approve ALP
- Advisory Committees (Focus Groups & Strategic Partner Committee)
  - Identify Key Issues
  - Provide Input & Recommendations
- KLJ Planning Team
  - Manage Study
  - Complete Technical Work
  - Provide Analysis



# Airport Master Planning



# Focus Areas



## Airfield

- Continuity of Operations & Primary Runway Alternatives
  - Shift Runway 550'
  - Runway Alignment
- Crosswind Runway
- Instrument Approaches
- Taxiways

## Other Uses

- SD Army National Guard
- Air Traffic Control Tower
- US Forest Service
- SRE/Maintenance Buildings
- Air Cargo
- Nonaeronautical Development

## Terminal

- Gates / Parking Positions
- Deicing
- Rental Car Facilities
- Access & Parking

## General Aviation

- Hangars
- SASO
- Access/Parking
- Fueling



# Enplanements

Below are forecasted numbers through the planning period

These are actual numbers as of August 2021, the enplanement activity has been rebounding

Forecast	2019	2024	2029	2034	2039	2019 to 2029 CAGR	2019 to 2039 CAGR
Normal	343,926	416,470	514,497	616,987	736,334	4.11%	3.88%
Normal/Level	343,926	416,470	514,497	565,267	619,525	4.11%	2.98%
High	343,926	432,095	555,657	679,299	822,505	4.91%	4.46%
Preferred Normal/Level	343,926	416,470	514,497	565,267	619,525	4.11%	2.98%
FAA TAF	336,697	416,334	450,458	492,201	536,341	2.95%	2.36%

Month	2019 Actual	2020 Actual	2021 Actual	2021 Forecast
January	19,142	21,045	11,820	11,318
February	17,594	20,270	12,106	12,124
March	19,956	11,641	17,308	16,911
April	20,778	1,486	17,524	18,470
May	27,778	5,807	28,756	20,224
June	37,764	11,119	42,466	33,168
July	43,259	19,922	50,805	39,845
August	41,062	24,692	48,195	38,118
September	37,732	20,628	39,501	28,494
October	30,379	20,732		23,785
November	21,515	14,555		16,007
December	26,964	13,695		19,184
Total	343,926	185,592		277,647

# Runway



ENGINEERING, REIMAGINED

# Runway Deficiencies



- Runway 14-32 pavement will likely require reconstruction in the next 10 years during the high traffic season of summer.
  - Impacts the flying public
  - Economic impacts
  - Impacts to RAP
- Challenges
  - Meeting FAA Runway Gradient Standards
  - Limited Phasing Options
  - Requires Runway/Airport Closure



ENGINEERING, REIMAGINED



# Design Standards & Instrument Approach Capability

## ➤ Runway Protection Zones

- “The RPZ function is to enhance the protection of people and property on the ground”.
- Focus is on the type of use/activity within the RPZs

## ➤ Approach Surfaces

- “Approach surfaces are designed to protect the use of the runway in both visual and instrument meteorological conditions near the airport.
- Focus is on the height of objects within the approach surface



# Project Phasing / Constructability

- Need to be able to tie into existing runway grade
- Smallest construction phase would likely be 2,500'
  - Approximately 5,100' is available for takeoff and landing in that scenario
  - Insufficient length to accommodate scheduled airline service and larger business jets



CUT/FILL			
NUMBER	MINIMUM	MAXIMUM	COLOR
1	-3.00	-2.00	Red
2	-2.00	-1.00	Orange
3	-1.00	0.00	Yellow
4	0.00	1.00	Light Green
5	1.00	2.00	Dark Green





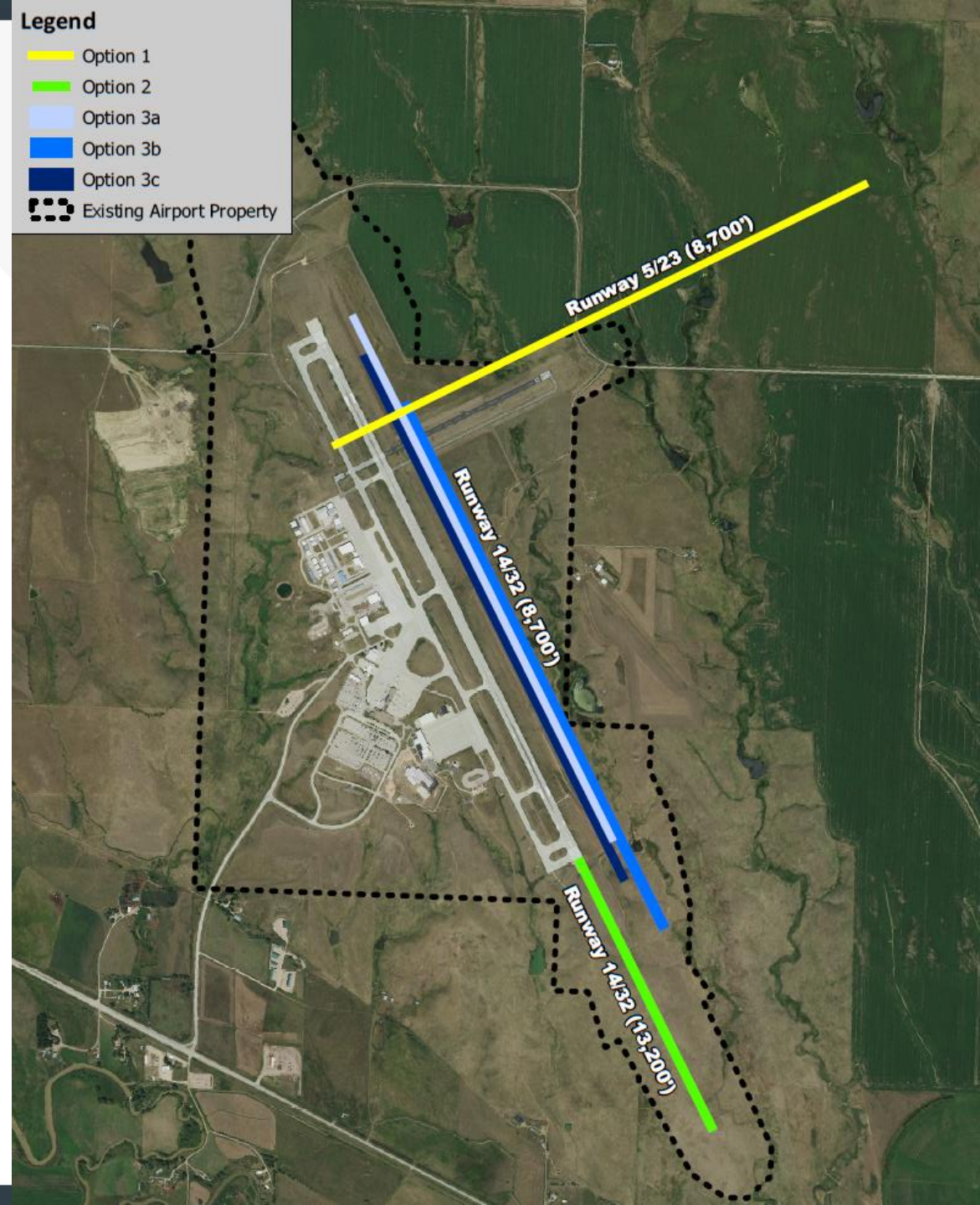
# Runway Options

## Options Considered But Discarded

- 1 Expand Crosswind Runway 5-23
- 2 Extend Existing Runway 14-32

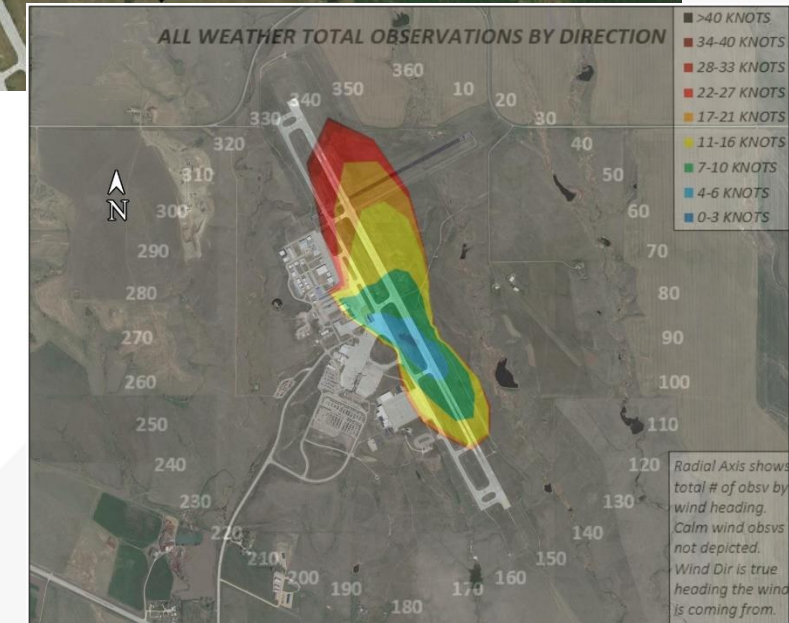
## Options Carried Forward For Further Analysis

- 3a New Runway 14-32  
Offset 550' from existing & no shift
- 3b New Runway 14-32  
Offset 550' from existing & 1,500' shift
- 3c New Runway 14-32  
Offset 550' from existing & 600' shift



# Options Considered but Discarded

- Option 1: Expand Crosswind Runway
  - Requires relocation or closure of Long View Road
  - Requires significant land acquisition
  - Provides poor wind coverage
    - 72.65% at 10.5 knots (Rwy 14-32 with 97.23%)





# Options Considered but Discarded

- Option 2: Extend Runway 14-32
  - Extend 4,500' (8,700' → 13,200')
  - Allows for greater phasing flexibility
  - Requires significant land acquisition
  - High cost due to significant earthwork
    - Potentially \$150M-\$200M
    - Terrain drops to south faster than the runway is allowed to (.8% for last quarter)
    - 70'+ of fill would have to be brought in to build up a "plateau" for the runway and taxiway





# Constructing a New Runway

## Options 3a, 3b and 3c

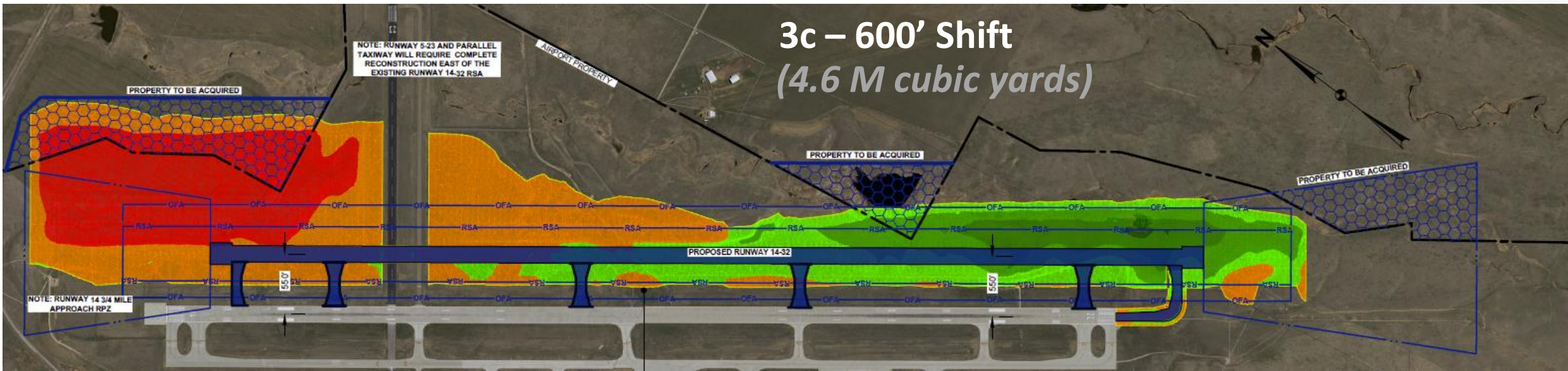
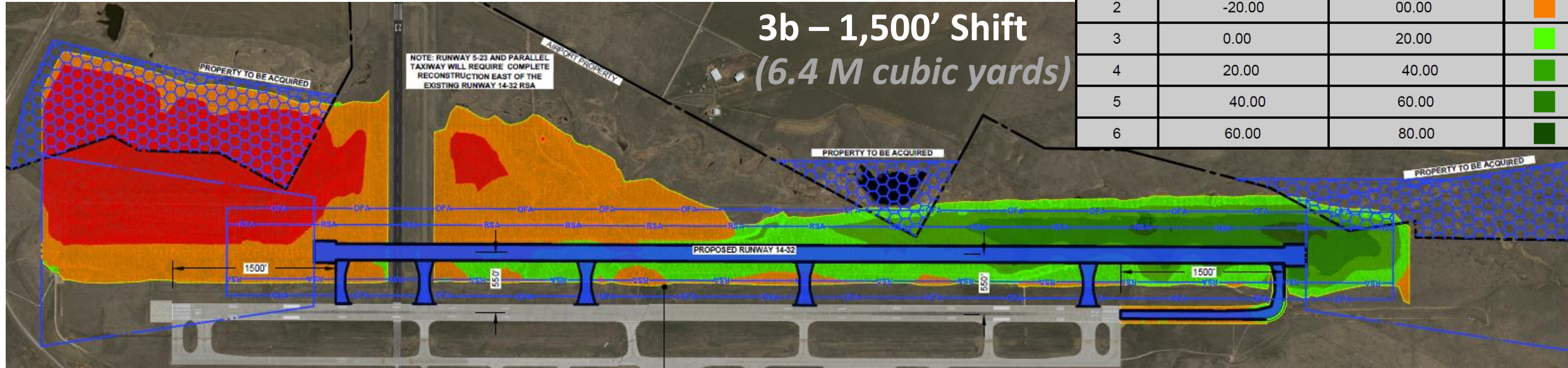
- ✧ Offset 550' from Existing Runway 14-32
- ✧ Convert existing runway to a taxiway
- ✧ Increase developable space
- ✧ Difference is the southerly shift
  - ✧ Degree a shift is necessary is primarily dependent on:
    - ✧ FAA Design Standard Policy
    - ✧ Desired Instrument Approach Capability
  - ✧ Greater shift results in more earthwork and higher costs





# Example Earthwork (Cut/Fill)

CUT/FILL			
NUMBER	MINIMUM	MAXIMUM	COLOR
1	-40.00	-20.00	Red
2	-20.00	00.00	Orange
3	0.00	20.00	Light Green
4	20.00	40.00	Green
5	40.00	60.00	Dark Green
6	60.00	80.00	Dark Green





# Runway Option Summary

Category	Reconstruct	Option 3a	Option 3b	Option 3c
Operational Performance				
Alignment	14-32	14-32	14-32	14-32
Runway Length	8,700'	8,700'	8,700'	8,700'
Best Planning Tenets and Other Factors				
Impact to RAP Operations	Requires Runway Closure to Air Carrier	No Runway Closure Required Requires Displaced Threshold When Constructing Connecting Taxiways Runway Threshold Displacement Occurs for Part of Construction		
Timeframe Estimates	2-3 Construction Seasons	3 Construction Seasons		
North RPZ (14 end) South RPZ (32 end)	Road in RPZ Clear	Road in RPZ Clear	Clear Clear	Clear for ¾-Mile Approach Clear
Adds Developable Space	No	Yes	Yes	Yes
Environmental				
Wetland Impacts	No	3a, 3b and 3c are similar		
Env. Sensitive Areas	None	3a, 3b and 3c are similar		
Estimated Land Acquisition	None	55 Acres	100 Acres	70 Acres
Fiscal Factors				
Planning Level Estimate	\$55 Million	\$70 Million	\$85 Million	\$75 Million



# Final Runway Decision

- A hybrid alternative of option 3a and 3c was chosen
- Precision instrument approach procedures on both ends
- Potential extension/shift of 600' to the southeast



ENGINEERING, REIMAGINED

# New Runway 14-32 Timeline



**\*Please note this is an aggressive schedule**



ENGINEERING, REIMAGINED



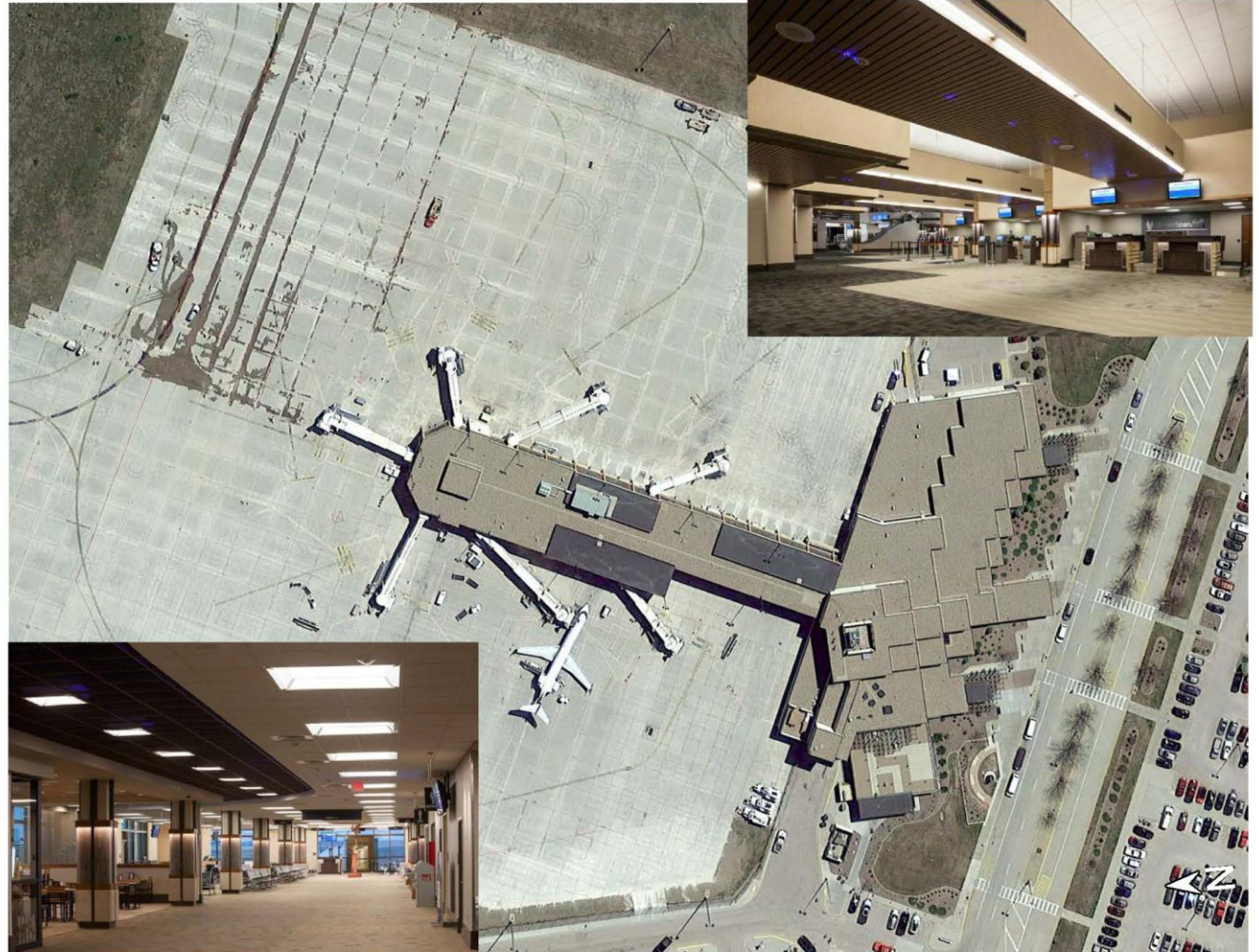
# Airline Passengers



ENGINEERING, REIMAGINED

# Passenger Terminal Needs

- Need for additional gates and parking positions
- Need for baggage screening system
- Expand baggage claim and car rental counter space
- Provide options for ticketing area expansion
- Provide an area for storage of GSE



# Terminal Study

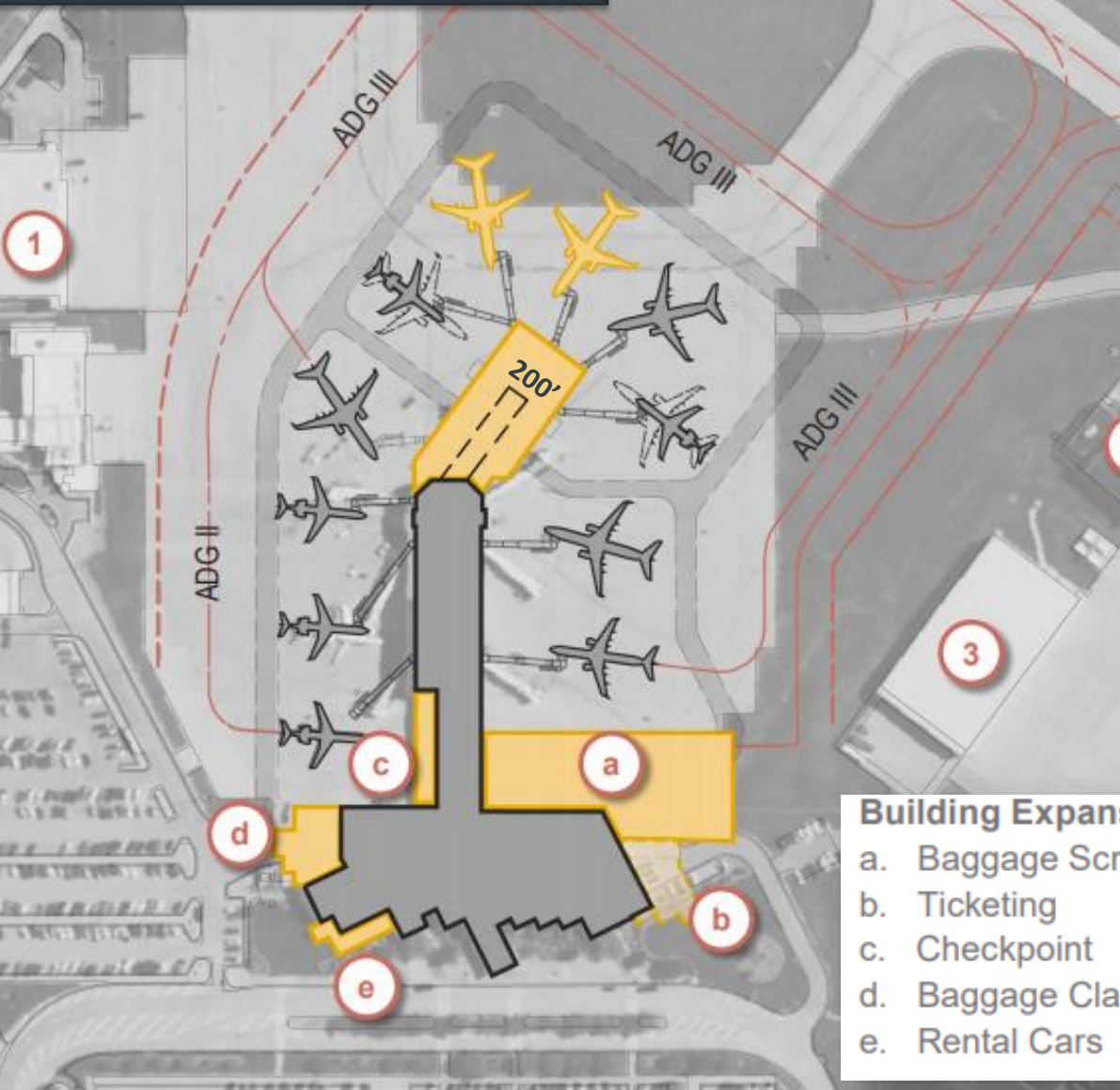
- Increasing Activity
  - Annual
  - Peak Day / Design Day
  - Peak Hour / Design Hour
- Expansion Concepts
  - Concourse
  - Arrivals Area
    - Baggage Claim
    - Car Rental Offices
  - Departures Area
    - Ticketing
    - Baggage screening & makeup
  - Administration and Concessions

RAP Demand Comparison	2019			Forecast	
	Existing	Recommended	Capacity Threshold	2029	Capacity Threshold
General					
Annual Enplanements	343,926			514,497	
Aircraft Gates/PBB	7	8		10	
Aircraft Positions	9	8		10 +2	
Public Space					
Circulation (public seating, ticketing, concourse, bag claim, general circ)	26,090 s.f.	36,340 s.f.	✗	48,120 s.f.	✗
Ticket Lobby Queue	2,735 s.f.	3,370 s.f.	✗	4,530 s.f.	✗
Passenger Security Screening & TSA Offices	7,843 s.f.	6,380 s.f.	✓	8,780 s.f.	✗
Passenger Holdrooms	8,843 s.f.	13,770 s.f.	✗	22,490 s.f.	✗
Baggage Claim (retrieval/device/meeter&greeter)	5,359 s.f.	8,100 s.f.	✗	8,390 s.f.	✗
Restrooms (pre/post security)	3,229 s.f.	5,160 s.f.	✗	6,830 s.f.	✗
Other (Misc Tenant, information)	656 s.f.	650 s.f.	✓	650 s.f.	✓
Airline Space					
Ticketing (counter, ATO)	4,735 s.f.	4,550 s.f.	⚠	6,150 s.f.	✗
Outbound Baggage Screening	595 s.f.	18,000 s.f.	✗	18,000 s.f.	✗
Outbound Baggage Makeup	4,617 s.f.	6,960 s.f.	✗	12,320 s.f.	✗
Airside Ops/Storage	744 s.f.	760 s.f.	✗	990 s.f.	✗
Inbound Bag Claim Laydown	3,395 s.f.	3,900 s.f.	✗	3,900 s.f.	✗
Inbound/Outbound Baggage Circulation	3,325 s.f.	1,630 s.f.	✓	2,430 s.f.	✓
Baggage Service Offices (BSO)	0 s.f.	400 s.f.	⚠	400 s.f.	⚠
Concessions					
Landside/Storage (includes Rental Cars)	5,639 s.f.	4,270 s.f.	✓	5,370 s.f.	⚠
Airside/Storage	1,882 s.f.	3,330 s.f.	✗	4,980 s.f.	✗
Non-Public Space					
Airport Administration	2,474 s.f.	4,130 s.f.	✗	4,130 s.f.	✗
Restrooms/Circulation	1,423 s.f.	2,570 s.f.	✗	3,060 s.f.	✗
Airport Operations (Maintenance,Janitorial,Storage,Shops)	6,703 s.f.	2,490 s.f.	✓	3,230 s.f.	✓
Building Systems (MEP,Communications/IT,Loading Docks,Structure)	14,676 s.f.	13,290 s.f.	⚠	17,370 s.f.	✗
TOTAL GROSS (sq ft)	104,963 s.f.	140,050 s.f.	✗	182,120 s.f.	✗



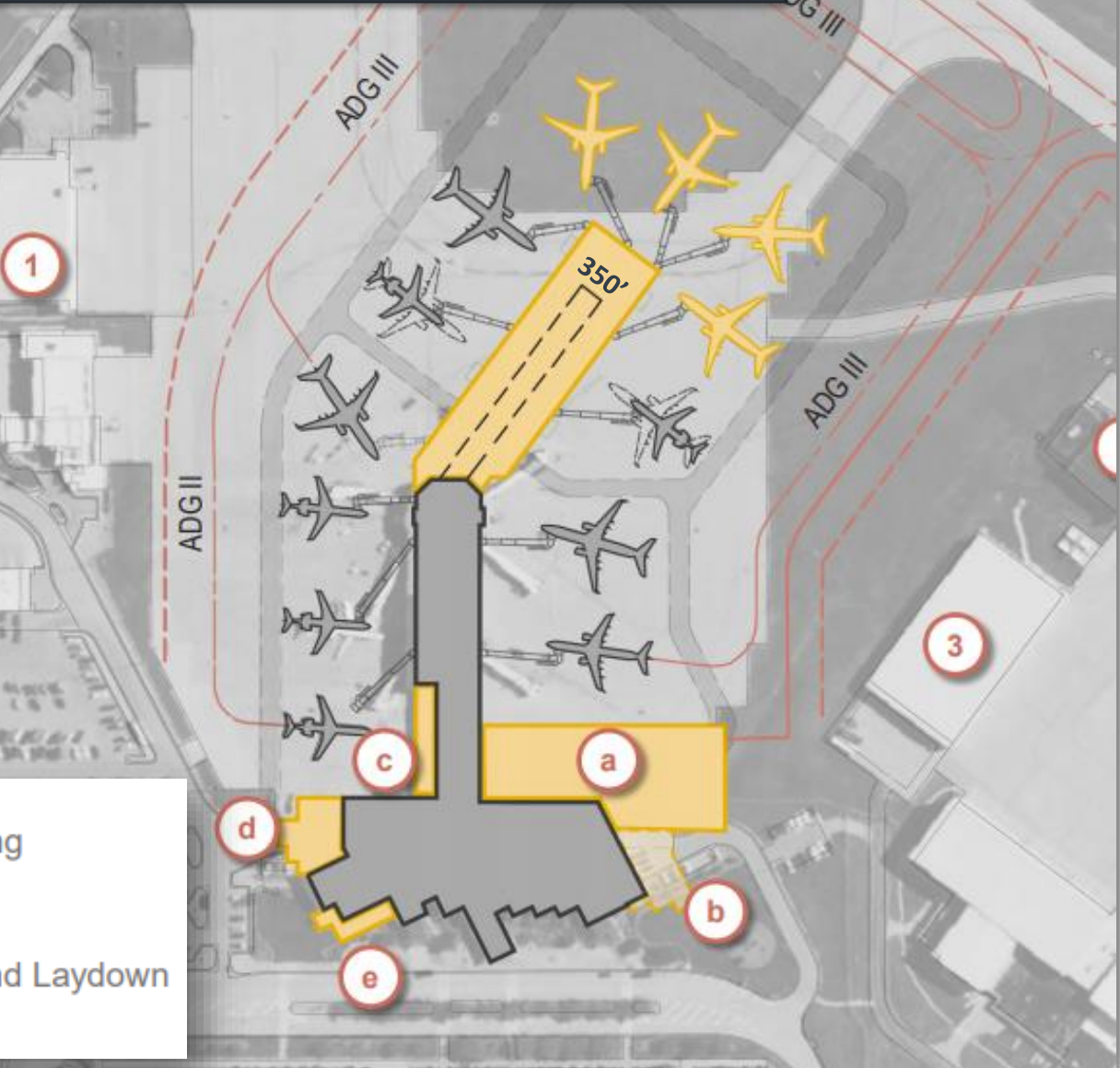
Partial ("Future") Build

10 Gates  
11 Parking Spaces  
Estimated Cost \$67-\$94 Million



Full (Ultimate") Build

12 Gates  
13 Parking Spaces  
Additional Estimated Cost \$13-\$70 Million

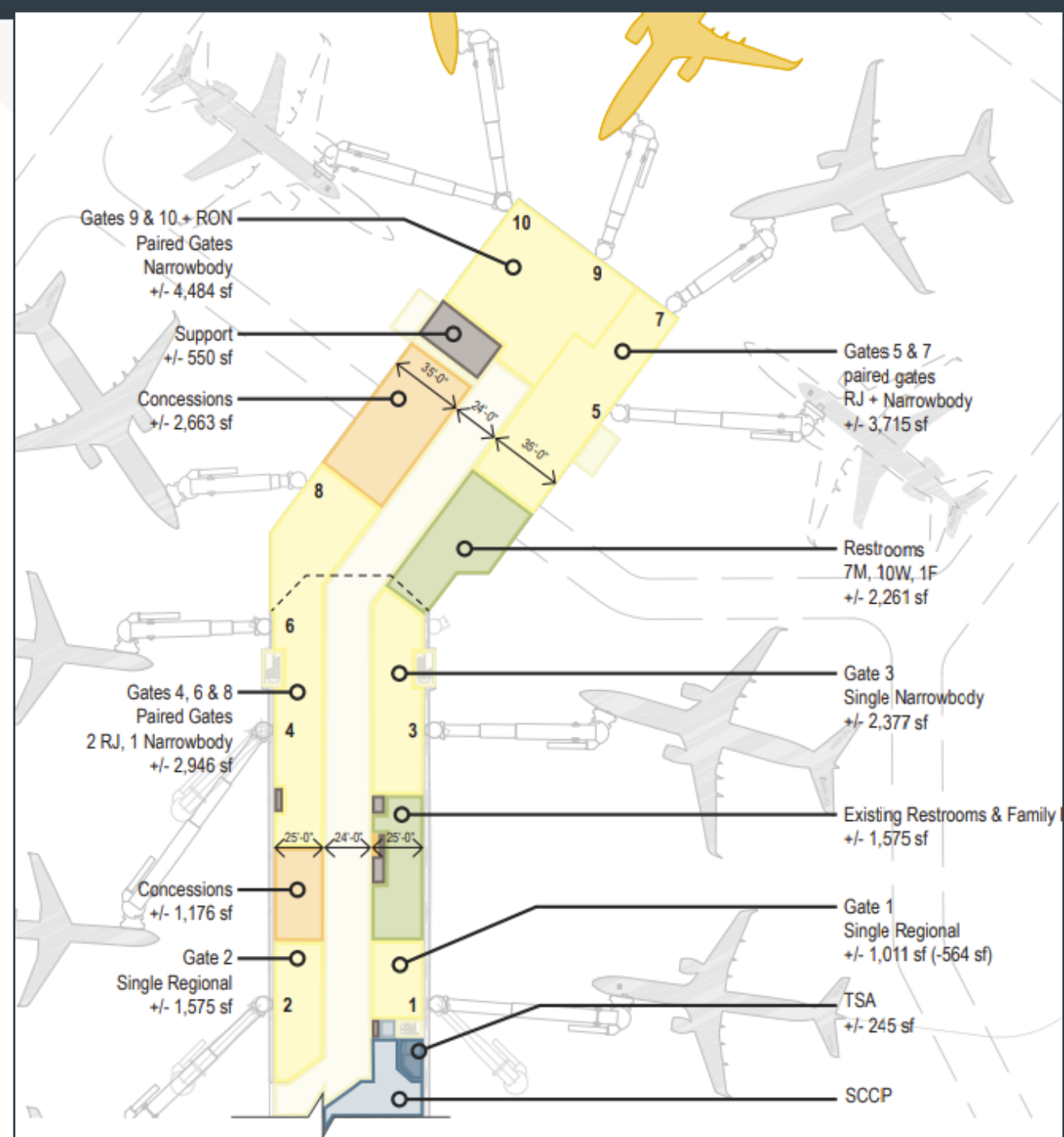


- Building Expansion**
- a. Baggage Screening
  - b. Ticketing
  - c. Checkpoint
  - d. Baggage Claim and Laydown
  - e. Rental Cars

# “Future” Concourse Build

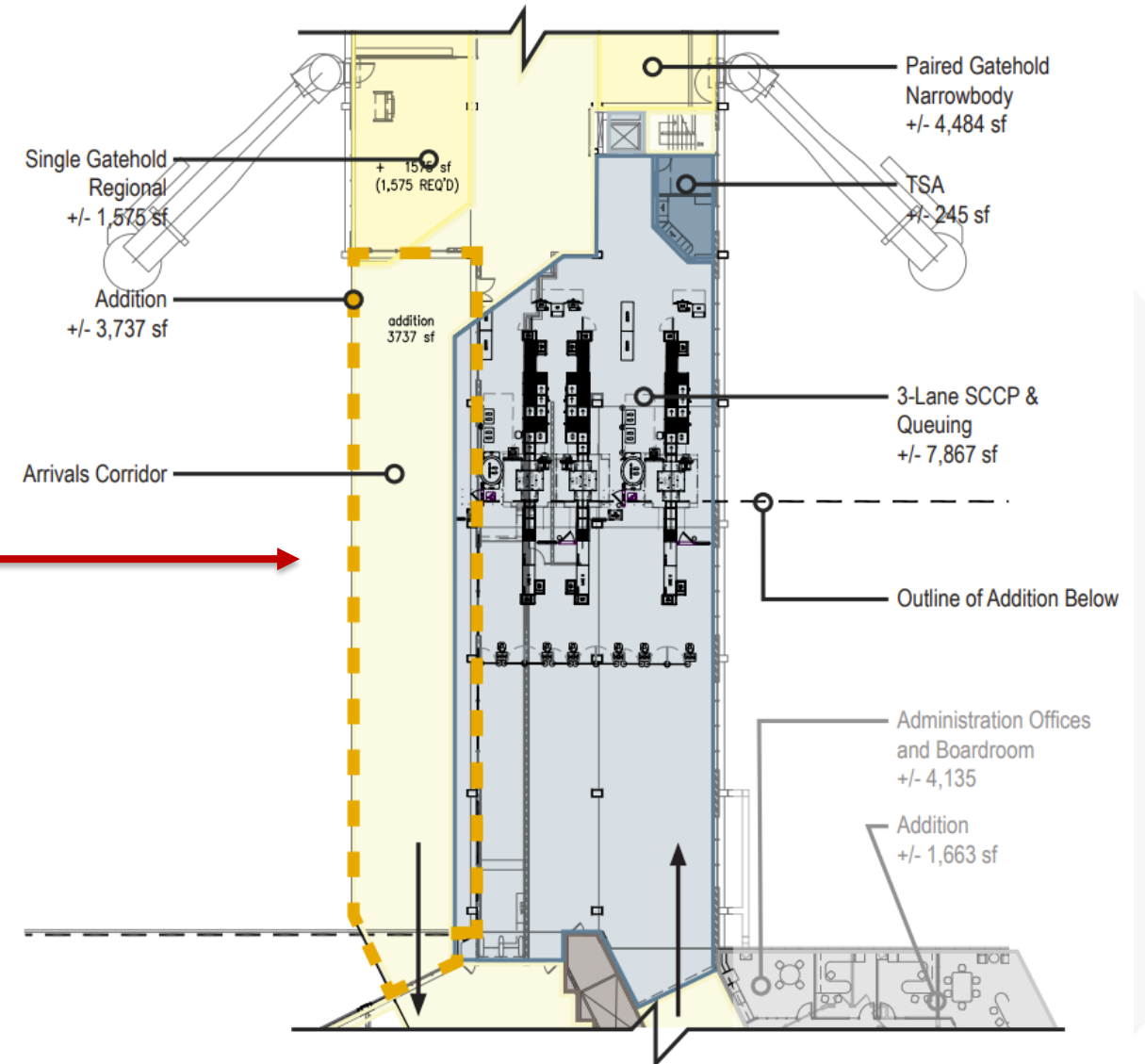
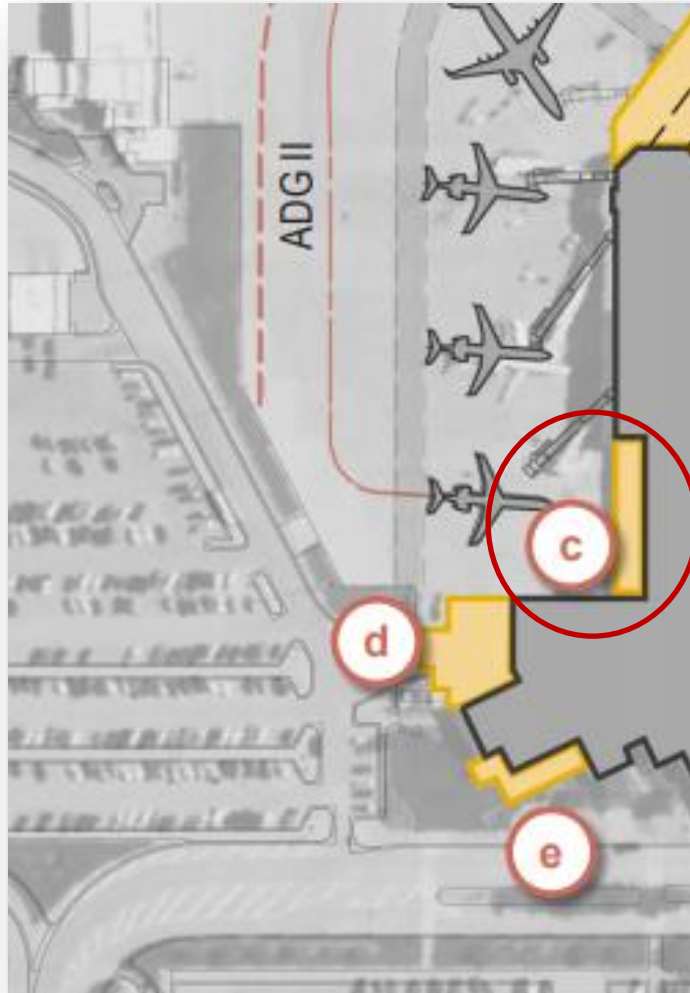
## Color Key Legend

- Gate Holdroom
- Circulation
- Concessions (F & B, Retail)
- Passenger Amenity Space
- Restrooms
- Program Space (Support, Operations, etc.)
- Vertical Circulation
- TSA Lease Space
- Security Screening Checkpoint / Queuing





# Security Checkpoint – Expansion Concepts



# Departure Area Expansion Concepts

## ➤ Ticketing

## ➤ Baggage screening & makeup

### 4. Baggage Makeup Addition (+/- 20,000 sf)

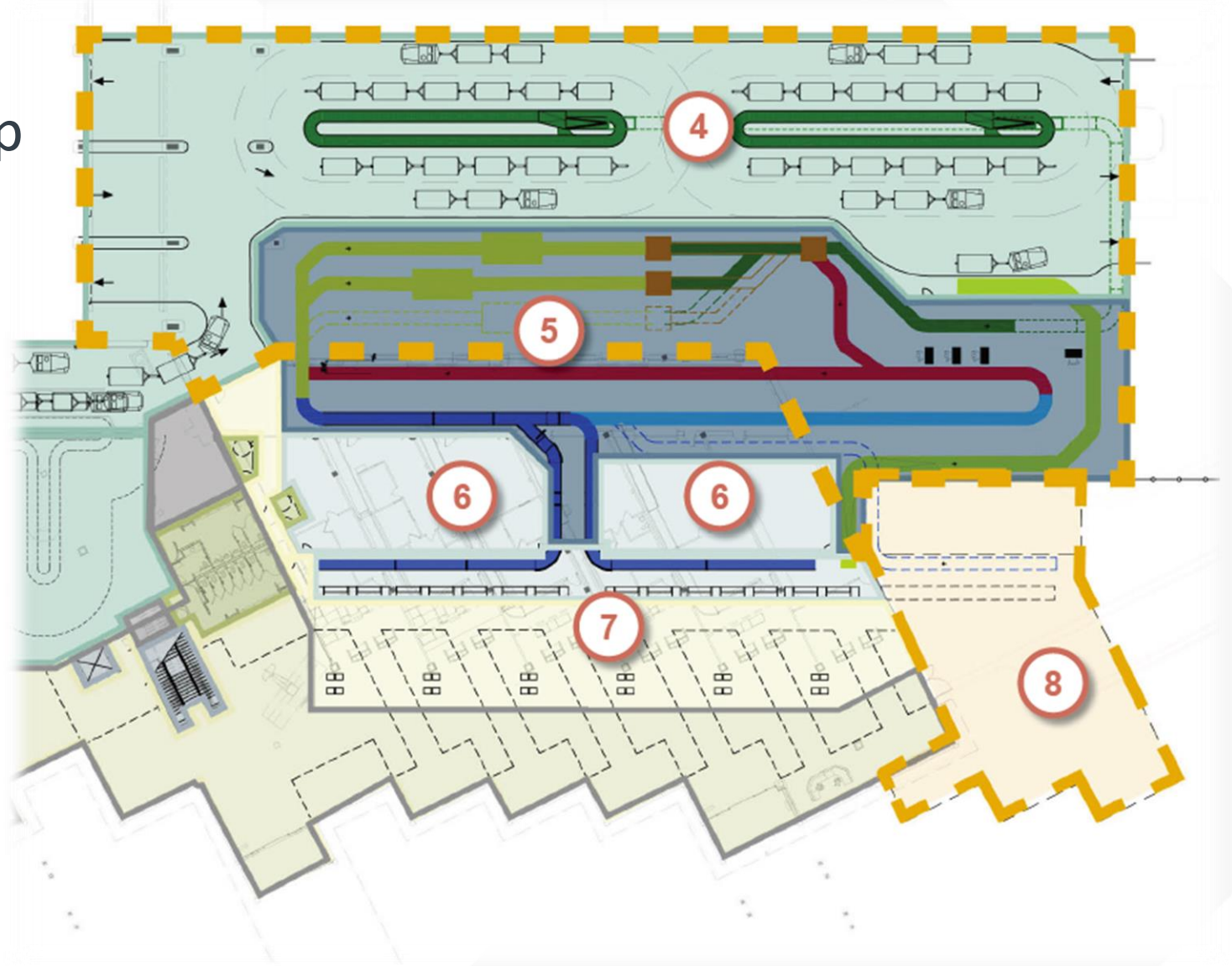
- Two 160 LF Baggage Makeup carousels
- 24-cart capacity

### 5. Baggage Screening area (+/- 15,000 sf)

### 6. Airport Ticket Offices (ATOs)

### 7. New Ticket Counters & Scales: 28 positions

### 8. Future Ticketing Hall expansion (+/- 6,000 sf)



# Rental Car Deficiencies

- Rental car staff must take time to transport cars to/from storage lot and ready/return parking lot
- A need for 300 storage spaces have been indicated
- Hail damage has been a significant issue

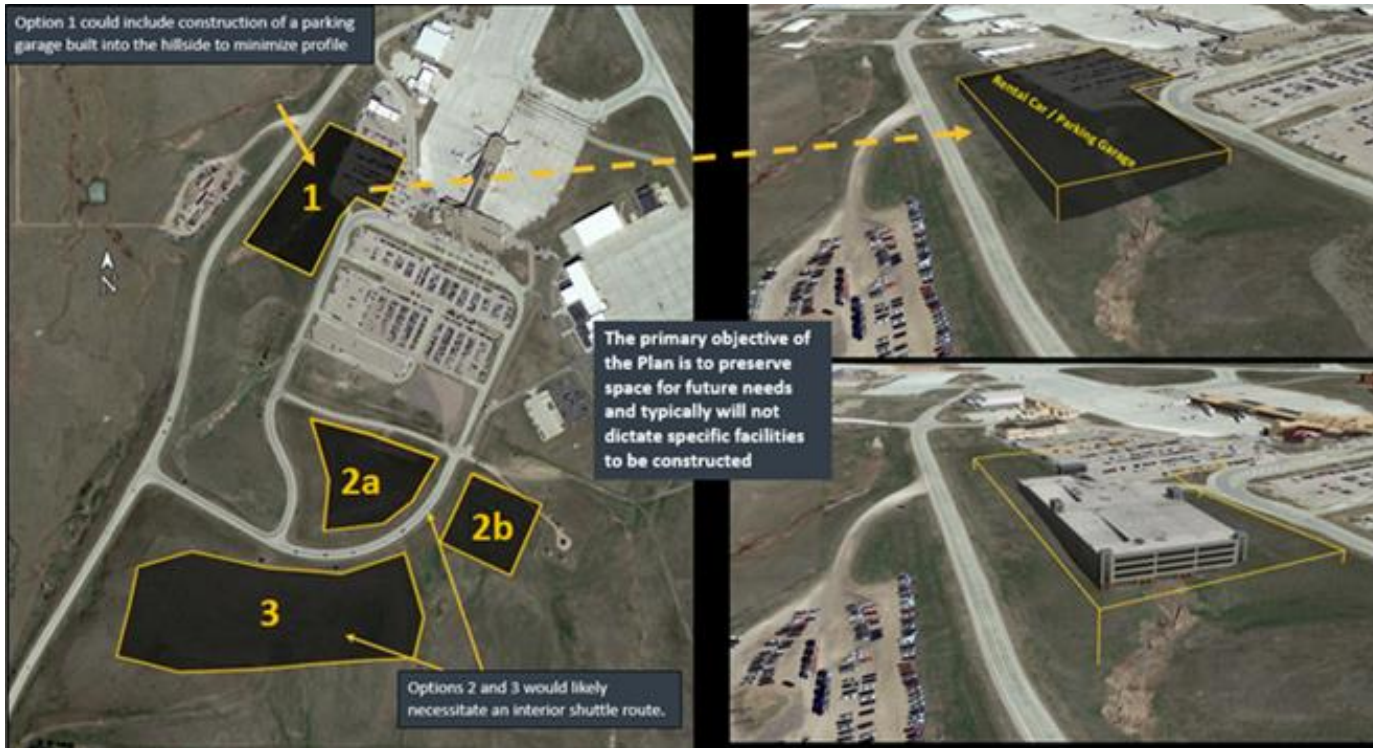
Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Ready/Return						
Peak Hour Transactions/Demand*	323	286	347	428	471	516
Capacity/(Deficiency)		37	(24)	(105)	(148)	(193)
Storage						
Rental Car Storage Demand	133	300+				
Capacity/(Deficiency)		(167+)				

Source: KLJ Analysis; \*Estimated





# Rental Car Development



- Three areas were evaluated for future needs
- Area 1 was the best option with a parking garage built into the hillside
  - Offers needed parking spaces
  - Otherwise undevelopable space
  - Sits at a lower profile to preserve some views
  - Covered parking protects cars from the elements

# Public Parking Deficiencies

- Public parking spaces needs are driven by passenger enplanements on the peak day of the peak month
- Projected using a ratio of 2.0 spaces per 1,000 annual enplanements

Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Enplanements	343,926	416,470	514,497	565,267	619,525
Public Parking Demand (with 10% daytime accumulation)	756	916	1,131	1,243	1,362
Effective Public Parking Supply	984	984	984	984	984
Capacity/(Deficiency)	228	68	-147	-259	-378

Source: KLJ Analysis; **RED** indicates a deficiency to existing facilities





# Public Parking Development



- Four areas were evaluated to develop and preserve for future needs
- Area 1 would best serve employee parking needs
- Ideal areas for public parking were determined to be area 2a and area 2b while the rest would be preserved for future development

# Hotel Development

- Yellow options were explored for a small hotel like AeroStay Hotel at Sioux Falls Airport
- A development group looked at siting a hotel to the east of the parking area as shown in red
- The red option recommended by the development group was chosen



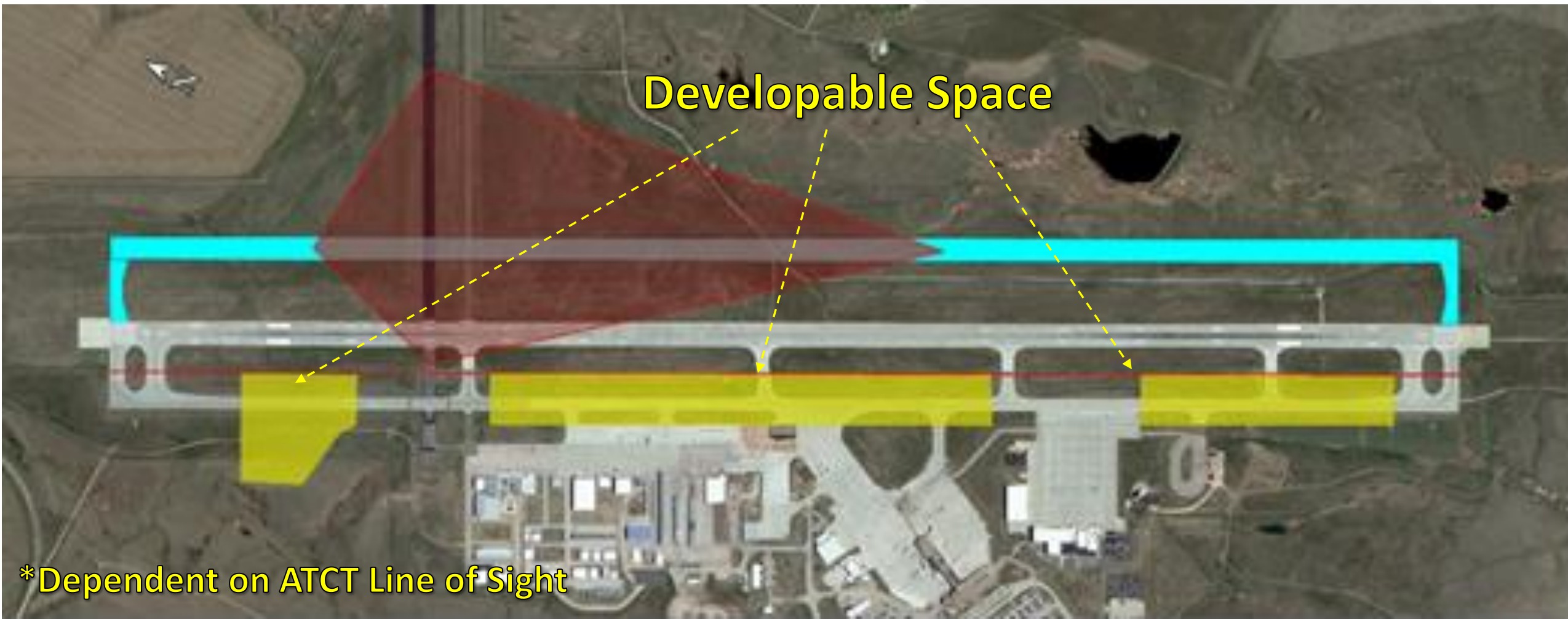
# General Aviation (GA)



ENGINEERING, REIMAGINED



# Increased Developable Space



Developable Space

\*Dependent on ATCT Line of Sight

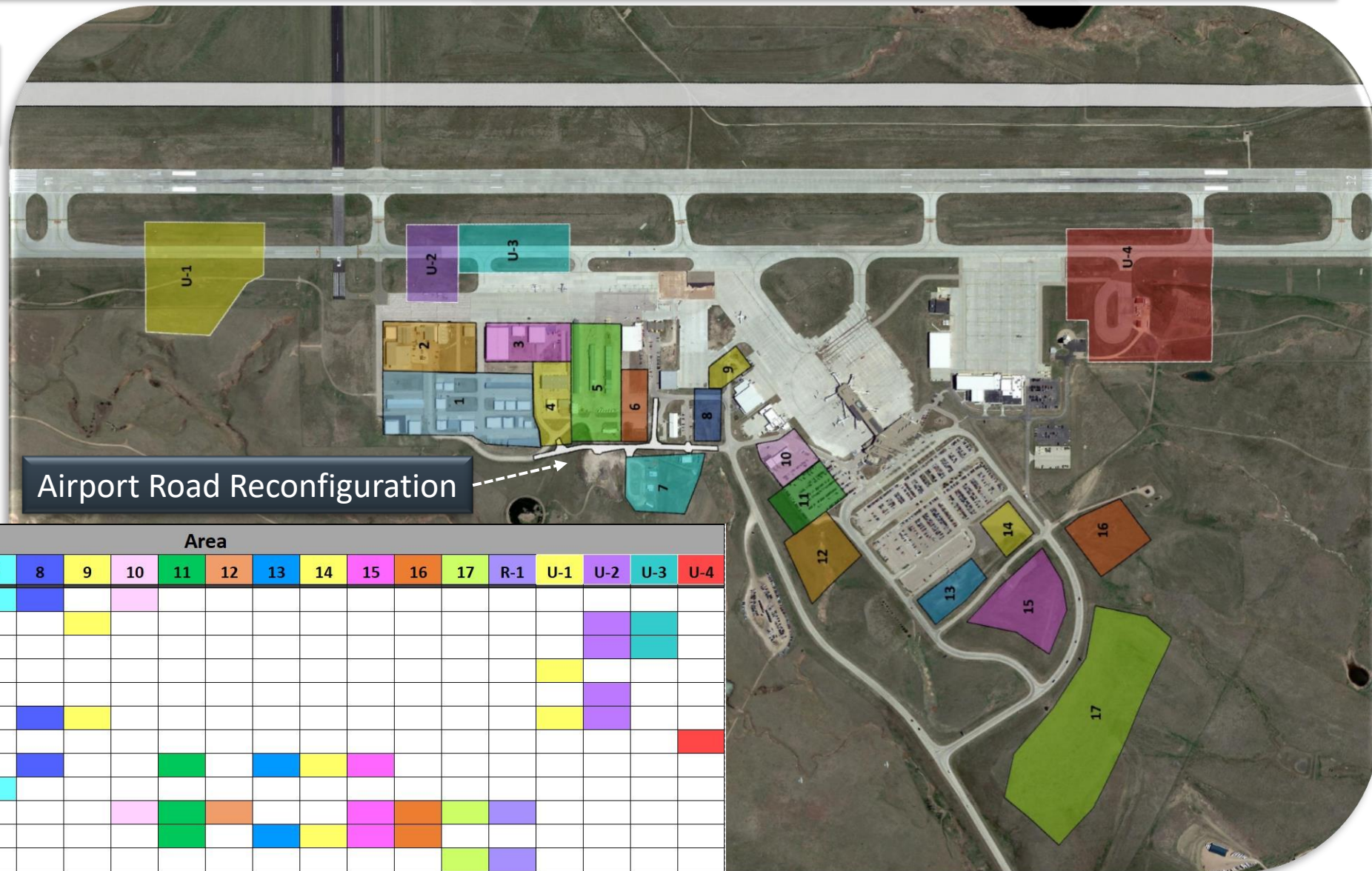
# Development Areas

Determine developable areas & put space to its best use

## Constraints/Challenges

- Terrain
- Design Standards
- Existing Leaseholds

- ## Constraints/Challenges
- Terrain
  - Design Standards
  - Existing Leaseholds

[illegible]

# North GA Development



ENGINEERING, REIMAGINED



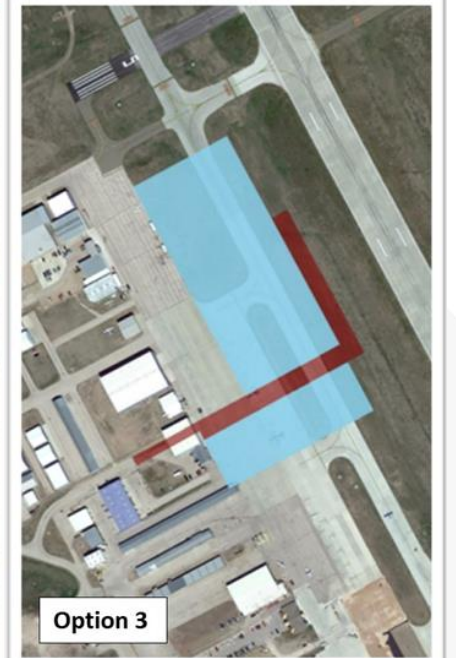
# North GA Development

- Area north of Lacroix Court
- The layout from the prior master plan is Option 1
- Two final options were considered but Option 1 was the final decision based on the following:
  - Most new box hangars revolving around current hangars
  - A 100' x 100' hangar with additional apron space
  - Preserving future apron frontage



# Ultimate North GA Development

- More GA space will become available with the runway shift
- Three options were evaluated that offered additional apron space, hangar configuration and landside access
- Option 1 was decided because it provided the best access
- No detailed layout was developed but an idea of what can be done with the space is portrayed



ENGINEERING, REIMAGINED



# Ultimate North Aeronautical Development

- With the runway shift, earthwork and infrastructure, an additional development area could be used for Cargo or other aeronautical uses
- Two other areas (presented later) were more practical for future cargo development
- This area does offer easy road access for cargo to be loaded and unloaded or other Aeronautical Development



ENGINEERING, REIMAGINED



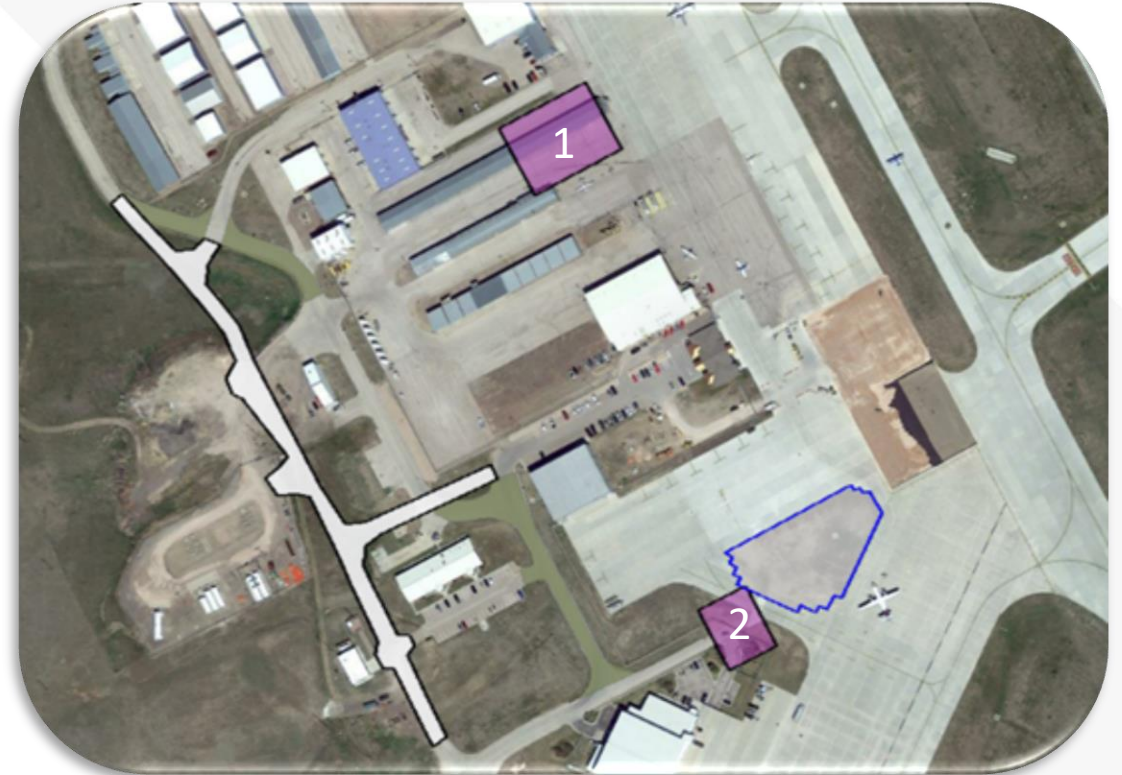
# Middle GA Development



ENGINEERING, REIMAGINED

# Large Hangar Development

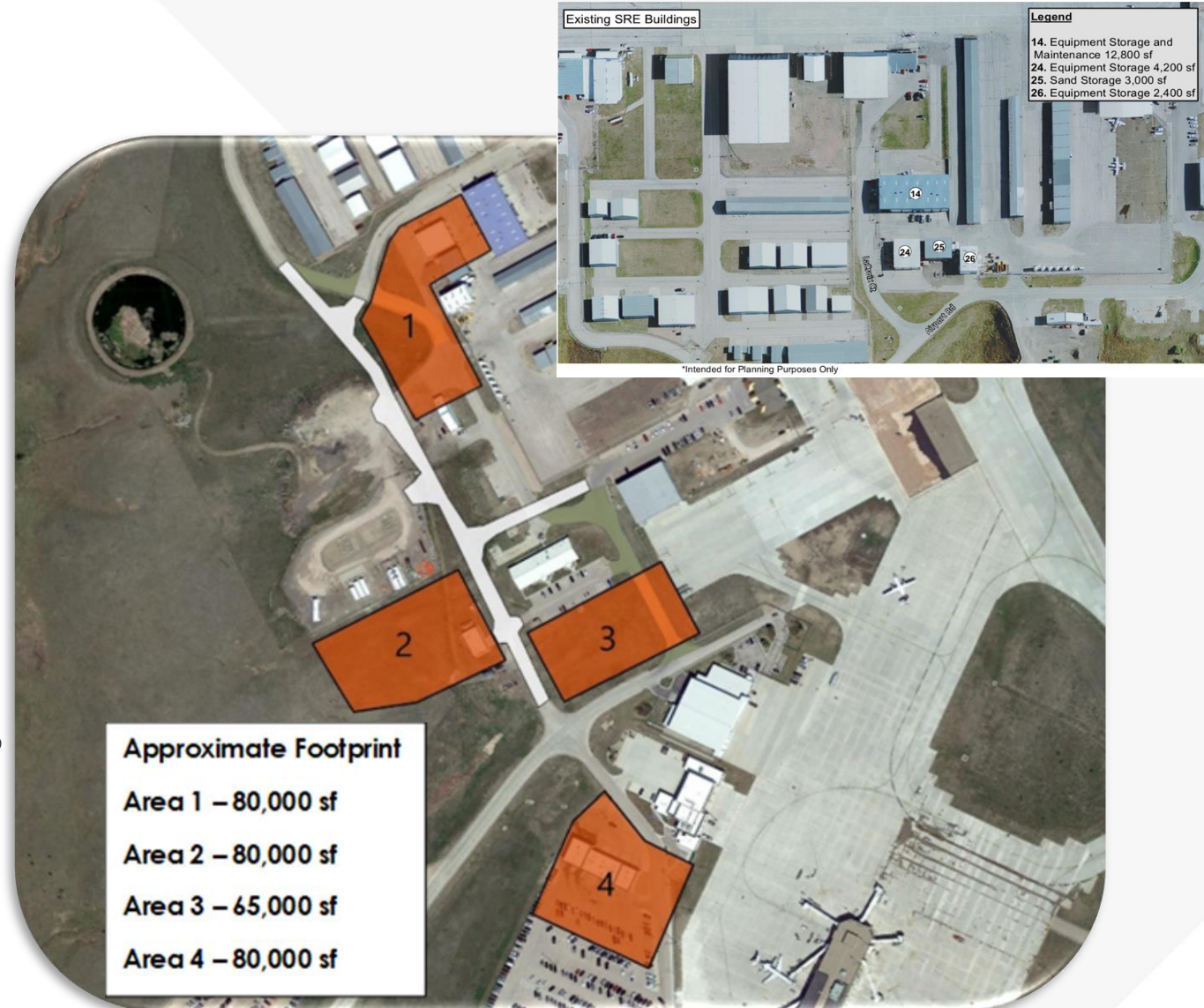
- Two areas were considered for additional large hangar space
- Option 2 was eliminated due to lack of space, access and parking
- Option 1 was the most feasible area and was arranged to offer easy access to the apron, access road and parking



ENGINEERING, REIMAGINED

# Ops/Maintenance/SRE Development

- Currently there is a lack of storage for Snow Removal Equipment (SRE), the building is old and it is hard to maneuver in the area based on the current configuration
- RAP would like operations and maintenance in the same building
- Area 2 and 3 were decided to be better for future GA expansion and Area 4 was best for rental car needs
- Area 1 was the preferred alternative with expansion space and landside and airside access





# Air Cargo Development

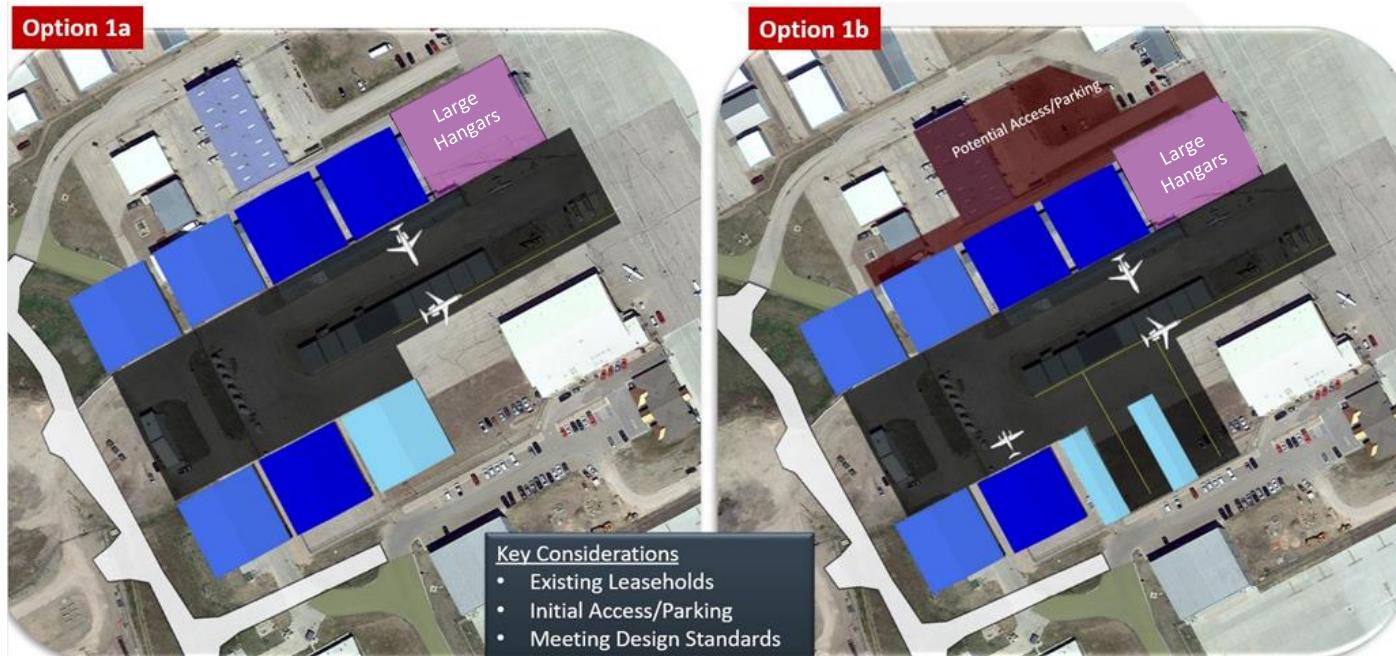
- Provide expansion areas for air cargo with airside/landside access and sufficient space for hangars and storage buildings.
- Option 3 was the near term alternative with Option 2 as a place holder for larger cargo development or other aeronautical development



ENGINEERING, REIMAGINED

# Middle GA Area Development

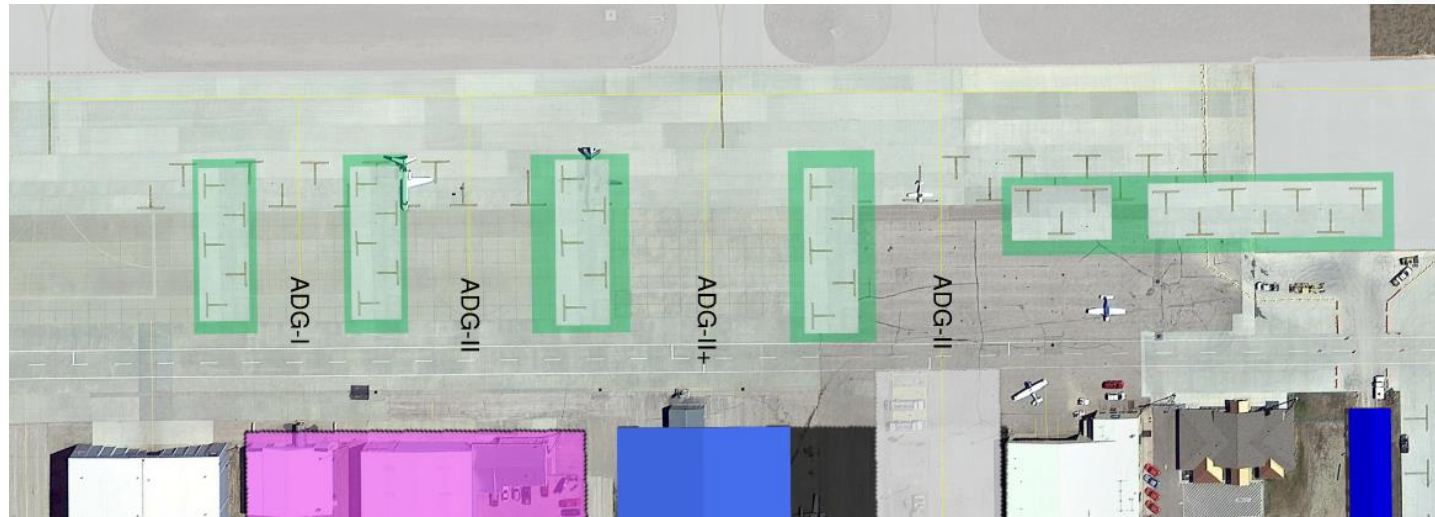
- Between Lacroix Ct. and Westjet Rd. considering large/corporate hangar development with maneuvering space not encroaching on the group II taxilane
- Two options were evaluated, and Option 1 was the preferred alternative
- Option 1 was updated for ops/maintenance/SRE area, reserved space for larger hangars, additional tiedown space and more customer parking for Westjet.





# Tiedown Configuration

- Current alignment perpendicular to the runway is less-than-optimal due to prevailing winds
- The preferred configurations minimizes impacts to existing tenants while offering easy maneuvering for aircraft
- Accommodated for ADG I-II aircraft
- Shift of tiedowns east was done to provide maneuvering clearance for ADG II aircraft



ENGINEERING, REIMAGINED



# Final GA Development

Google Earth



1000 ft



ENGINEERING, REIMAGINED

# Other Development



ENGINEERING, REIMAGINED



# Air Traffic Control Tower (ATCT) Development

- Tower is over 50 years old and may need to be replaced
- Does not have a clear line of sight to the following areas
  - Taxiway T2
  - East Terminal Apron
  - Taxiway B on Runway 23 End
- Was decided to keep the tower in the current area and preserve the space around it for future expansion





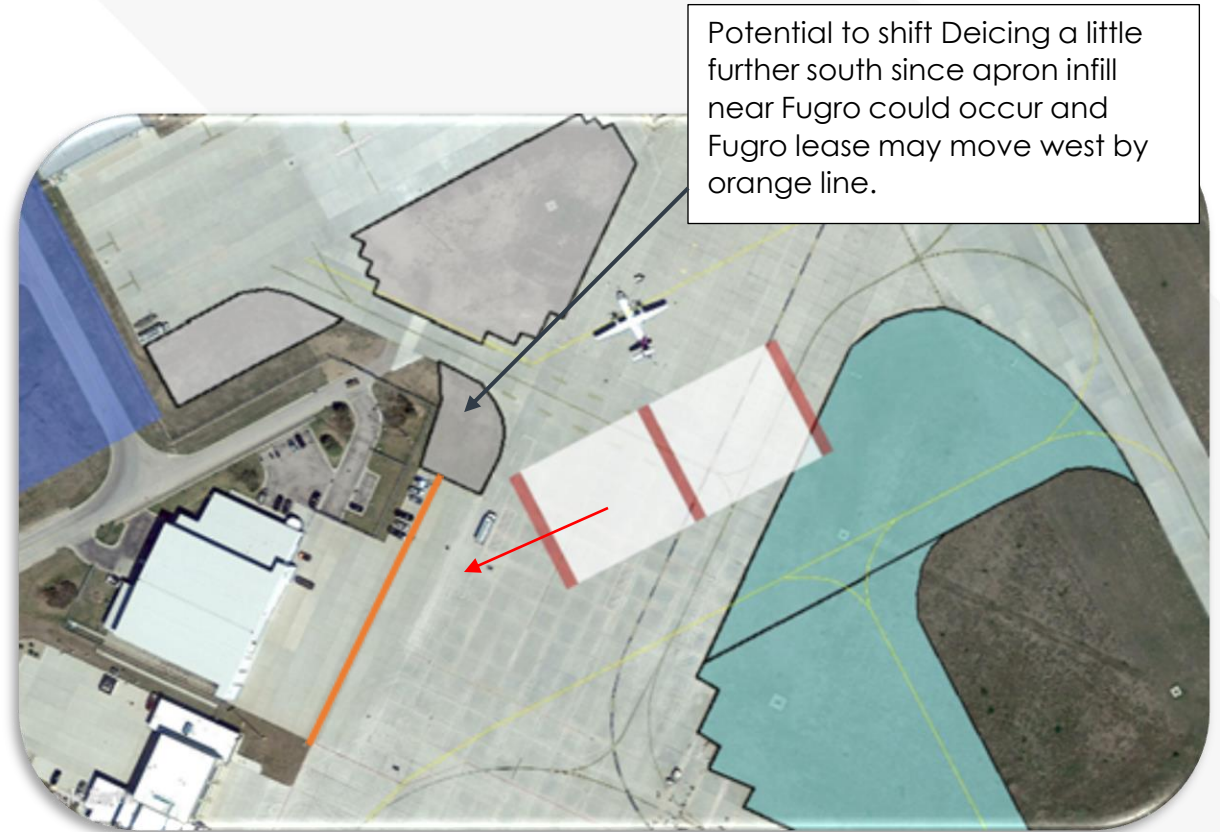
# U.S. Forest Service (USFS) Development

- Can accommodate C-130 aircraft but can only enter one at a time due to inadequate taxiway separation
- The state is interested in funding expansion but unsure of the amount
- The Missoula aerial firefighting apron was used for guidance
- A concept was developed with the minimum footprint to handle most larger tankers and phasing out the existing. The fire-retardant loading facility would be maintained with a new access road. Extra apron would be included for possible cargo operations for larger aircraft



# Deicing Apron Development

- After concourse configuration was determined, deicing operations were evaluated
- Plan to use the current area which offers two deicing positions and enough room for aircraft to taxi around
- Could also be shifted south with Fugro lease possibly moving west



ENGINEERING, REIMAGINED



# Fuel Farm Development

- A loop concept was developed in the same area as the current fuel farm
- This offers easy access to the new fueling system
- Adds another dispenser on the east side of Airport Rd. so operations and maintenance do not have to drive large SRE to the landside to refuel



ENGINEERING, REIMAGINED



Kent Penney A.A.E., AICP  
605.857.5005  
kent.penney@kljeng.com



ENGINEERING, REIMAGINED

# Thank You!

Google Earth

1000 ft

