ICAO MID Regional Seminar on Airport Master Planning

Session 1.4 – Airport Capacity Management

13 September 2022

Mike Branum, Program Manager
FAA Airports Division

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Overview

- Common Terms
- Organizational Capacity Coordination
- FAA Airports Division Policy
- Capacity Modeling Tools and Examples
- Planning for Future Technologies

Common Terms

- Capacity: Measures the maximum number of aircraft operations that can be accommodated on an airport, or on an airport component, in an hour under specific conditions with continuous demand
- Delay: The difference between the time it would take an aircraft to travel unconstrained over a specific portion of the system and the actual time it takes under specific conditions of airspace constraints (weather, traffic volume, etc.)
- Annual Service Volume (ASV): An estimate of an airport's annual capacity.
    - ASV accounts for differences in runway use, aircraft mix, weather, etc., that would take place in a year's time; and it assumes an acceptable level of delay.
- Aircraft Mix: The relative percentage of operations conducted by each of the four weight classes of aircraft; i.e., A, B, C and D

Common Terms

- PBN (Performance Based Navigation): Aircraft's capability to navigate using performance standards
- RNAV (Area Navigation): Uses multiple navigation sensors, including GPS and/or DME, to enable an aircraft to fly any desired flight path within the coverage of ground- or spaced-based navigation aids
- RNP (Required Navigation Performance): RNAV with the addition of an onboard performance monitoring and alerting capability

Capacity and Analysis Framework

Field Relationships

Trend Tracking

NAS Review

Airport Construction

Modeling Support

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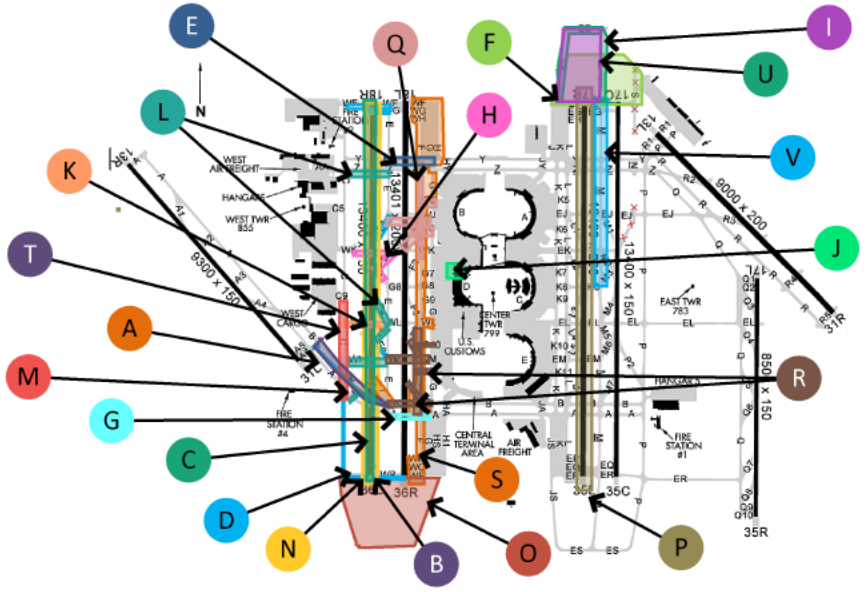
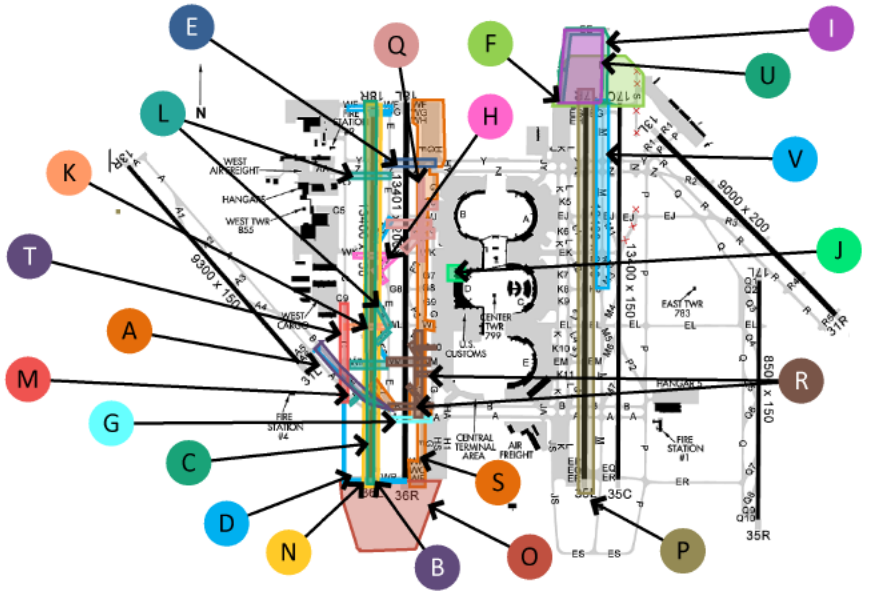


		2021												2022												2023											
	Project	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
A	TWY E7	T	T	T	T																															
B	RWY 18R/36L Rehab	R	R	R	R																															
C	RWY 36L ALSF-2			G	G	G	G	G	G																											

	Project	Description of Work	Estimated Dates	Status	Impact	Notes
A	TWY E7	TWY E7 closed.	05/11/2020 to 04/15/2021	In Progress	T	
B	RWY 18R/36L Rehab	RWY 18R/36L closed for rehabilitation. Full closure until 4/11/21, followed by flight checks.	06/01/2020 to 04/11/2021	In Progress	R	Lowered AAR for the duration of construction will require greater use of TMIs, GDP, and MIT. Expecting TWYs A and B to reopen before runway completion date.
C	RWY 36L ALSF-2	Remove and replace Runway 36L MALSR with ALSF-2	03/01/2021 to 08/31/2021	In Progress	G	



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N	RWY 18R/36L Rehab Completion					Y	Y	Y	Y																											
O	Southwest End-Around Taxiway																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P	RWY 17R Rehabilitation																									T	T	T	T	T	T	T	T	T	T	T

	Project	Description of Work	Estimated Dates	Status	Impact	Notes
N	RWY 18R/36L Rehab Completion	RWY 18R/36L closed for completion of rehabilitation. Closed nightly between 2300 to 0600 (as needed).	05/01/2021 to 08/30/2021	Upcoming	Y	Nightly work estimated for 122 Calendar Days.
O	Southwest End-Around Taxiway	RWYs 36L and 36R Southwest End-Around Taxiway (EAT). Package I, 3/1/2021 to 3/1/2023.	2023 TBD	Upcoming	Y	Project deferred UTA. Not planned until 2023 start.
		Runway 36L & 36R South Section. Package II.	07/01/2023 to 09/30/2025	Upcoming	G	
P	RWY 17R Rehabilitation	RWY 17R will be a full rehabilitation. Dates are tentative.	01/01/2023 to 01/01/2024	Upcoming	T	Start dates are unknown, however is planned to be a 2023 or 2024 major project.

G No capacity effect Y Reduced Capacity and Delay impact R Reduced Capacity and Greater Delay Impact T To be determined

Table 4-4 Activity Levels That May Trigger Capacity Planning and Development

Development Item	Activity Levels to Begin Planning and Development	Remarks
New runway or extended runway to increase hourly capacity (based on a specific airfield use configuration)	Planning: 60% ASV Development: 80% of ASV and within 5 years of activity reaching ASV under currently approved forecast.	• Parallel runway usually preferred for efficiency. • Runway length determined by critical aircraft intended to use the new or extended runway.
Runway extension to accommodate more demanding aircraft	Planning and Development: Regular use of new critical aircraft, existing or forecast within 5 years, that needs increased runway length or payload capability.	• If the critical aircraft changes, an extension may be necessary. • New critical aircraft must be expected to remain in the fleet for the foreseeable future with regular use at the airport.
Additional exit taxiways	Planning: 50% of ASV Development: 70% of ASV, or within 3-5 years of activity reaching ASV under currently approved forecast.	To be considered as a capacity project, additional exit taxiways will typically allow for reductions in Runway Occupancy Time.
Holding aprons/ by-pass taxiway	75,000 total operations, 20,000 itinerant operations, or 30 peak hour operations per runway.	Consider effect on navigational aids (NAVAIDs). Coordinate with ATC and Ramp Operations to determine the aircraft positions needed in holding aprons.
Terminal aprons, aircraft loading aprons, parking aprons	Planning: 60%+ of available apron space is used routinely (at least 30 days per year). Development: 80%+ of available apron space is used routinely (at least 30 days per year).	Planning should begin 3-5 years before aprons are expected to be congested during peak periods.
Replacement/ supplemental airports	Planning: 60% ASV Development: 120% of ASV or within 5-10 years of activity reaching ASV under currently approved forecast.	Timing depends on forecasts, type of airport, location (metropolitan area), cost, and other factors. At the start of planning, the state or airport sponsor should request a new planning placeholder in the NPIAS from APP-400.

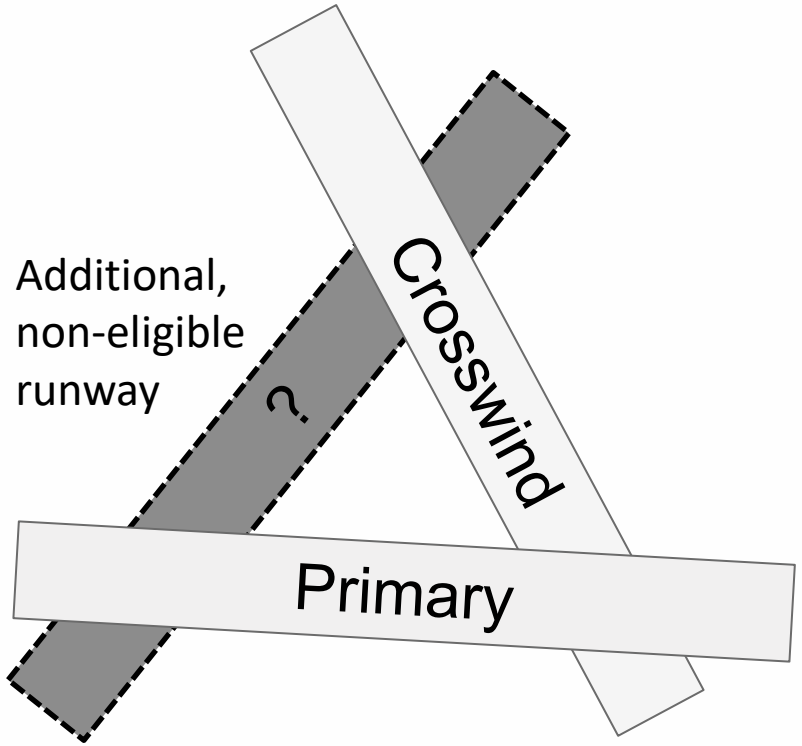
Source: FAA Order 5090.5 Formulation of the NPIAS and ACIP

Table G-1 Runway Types and Eligibility

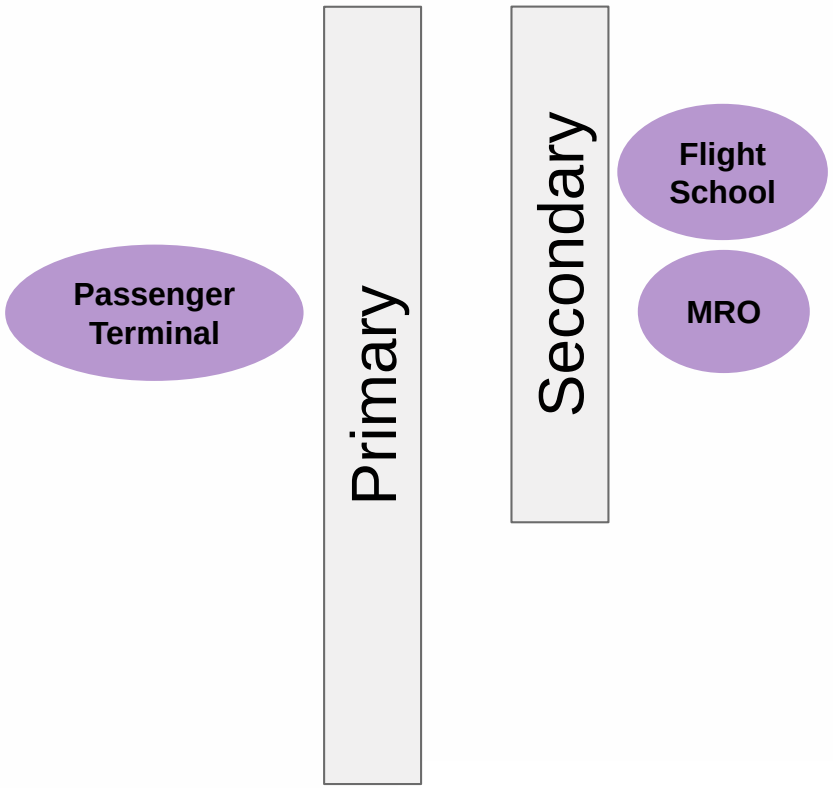
For the following runway type…	Must meet all of the following criteria…	And is…
a. Primary Runway	**(1)** A single runway at an airport is eligible for development consistent with FAA design and engineering standards.	Eligible
b. Crosswind Runway	**(1)** One of the following two criteria are met: **(a)** For the first crosswind, the wind coverage on the primary runway less than 95% **(b)** For more than one crosswind runway, the wind coverage on the primary runway less than 95% and the existing crosswind runway(s) are operating at 60% or more of their annual capacity, which is based on guidance developed by APP-400 as the threshold for considering when to plan a new runway.	Eligible if justified
c. Secondary Runway	**(1)** There is more than one runway at the airport. **(2)** This is not a crosswind runway. **(3)** Either of the following: **(a)** The primary runway (or primary runway AND all secondary runways) is operating at 60% or more of its annual capacity, which is based on guidance developed by APP-400 as the threshold for considering when to plan a new runway. **(b)** APP-400 has made a specific determination that the runway is required for operation of the airfield.	Eligible if justified.
d. Additional Runway	**(1)** There is more than one runway on the airport. **(2)** The ADO has determined that this runway does not meet the requirements to be designated a crosswind runway. **(3)** The ADO has determined that this runway does not meet the requirements to be designated a secondary runway.	Ineligible.

Source: FAA Order 5100.38D AIP Handbook

A Typical Former Military Airfield…

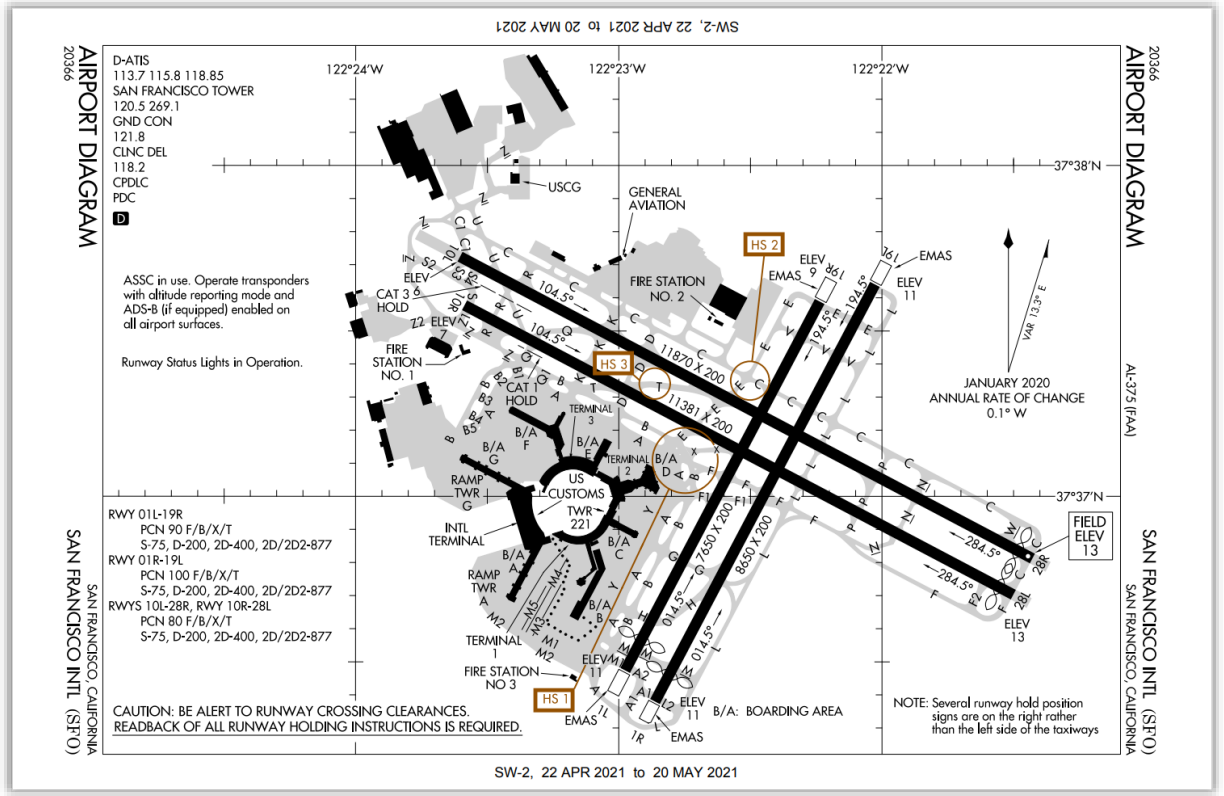


Example of Support for a Secondary Runway Designation



Runway Configuration

- Runway configuration and use is a primary factor affecting airport capacity
- Weather is a primary factor affecting runway use
- Parallel runways can provide the greatest capacity



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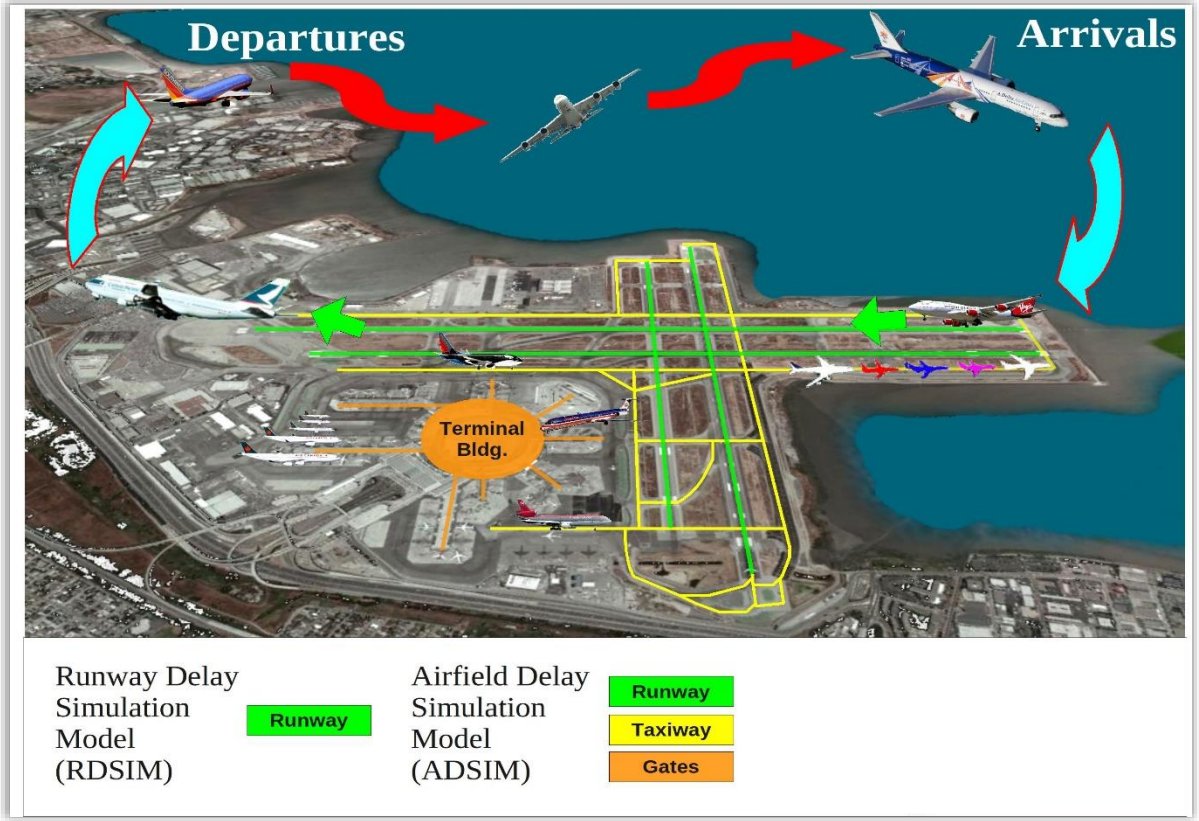
Example Airfield Capacity Enhancements

- New runways
- New commercial service airports
- Regional solutions (regional traffic and development alternatives)
- Congestion management
- High-density corridors and multi-modal planning
- NextGen

FAA Capacity Simulation Modeling

- Help evaluate the operational performance of physical airfield development alternatives.
- Assist in gathering operational data to support EA/EIS noise modeling, air quality modeling, and benefit cost analyses.



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Total Airspace & Airfield Modeler (TAAM)

Simulates

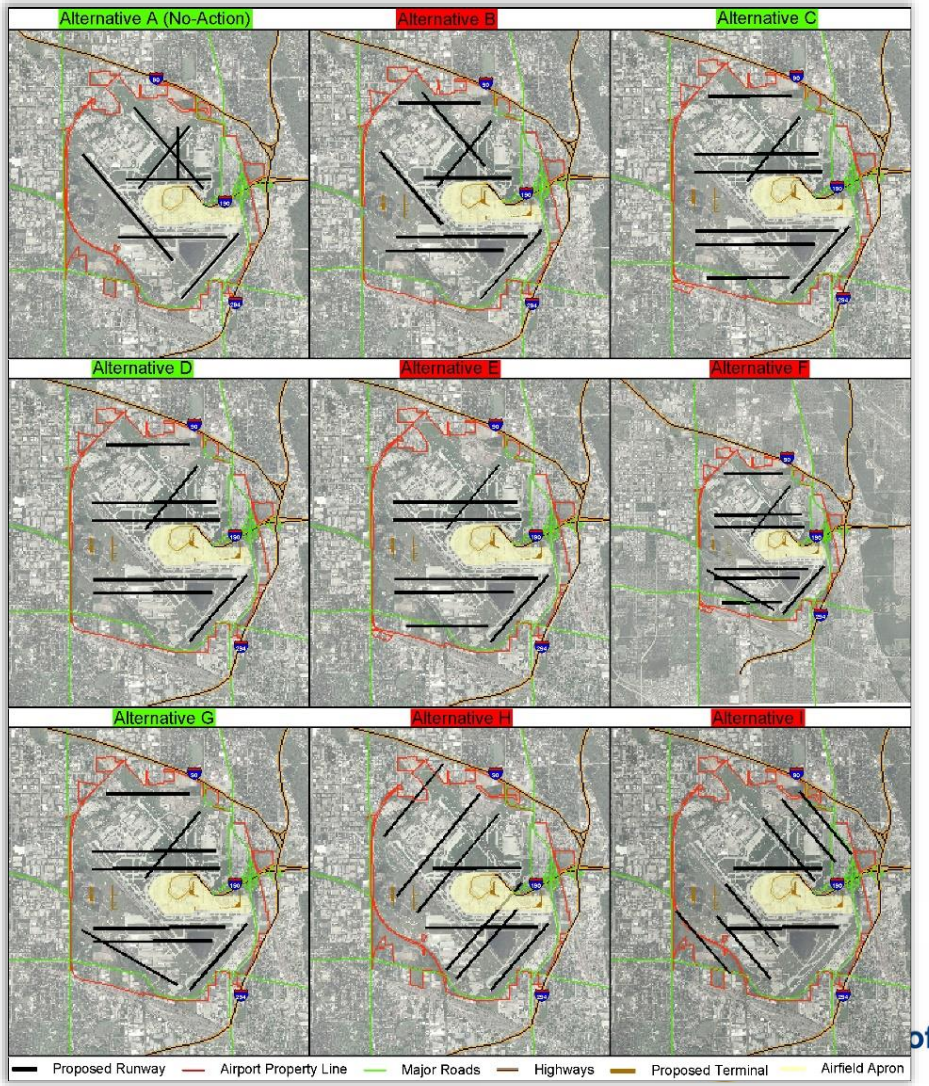
- Movement of arrivals from origin airport to destination gate
- Movement of departures from the gate to destination airport
- Complex airspace & airfield movements

Computes

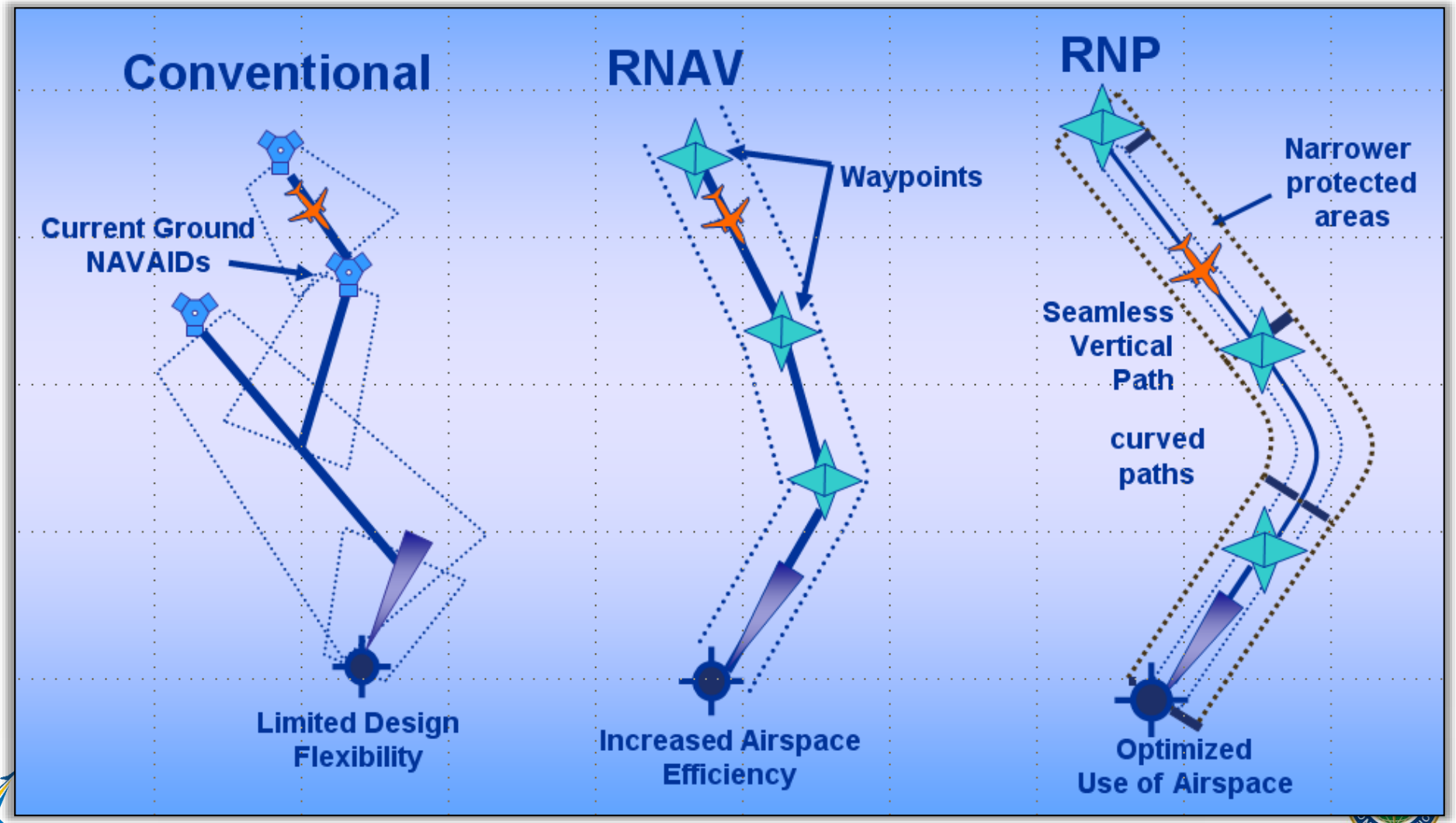
- Delays
- Aircraft flow rates
- Aircraft travel times

Applications

- Analysis of complex airfield and airspace alternatives.



Performance Based Navigation



Example Airspace Enhancement

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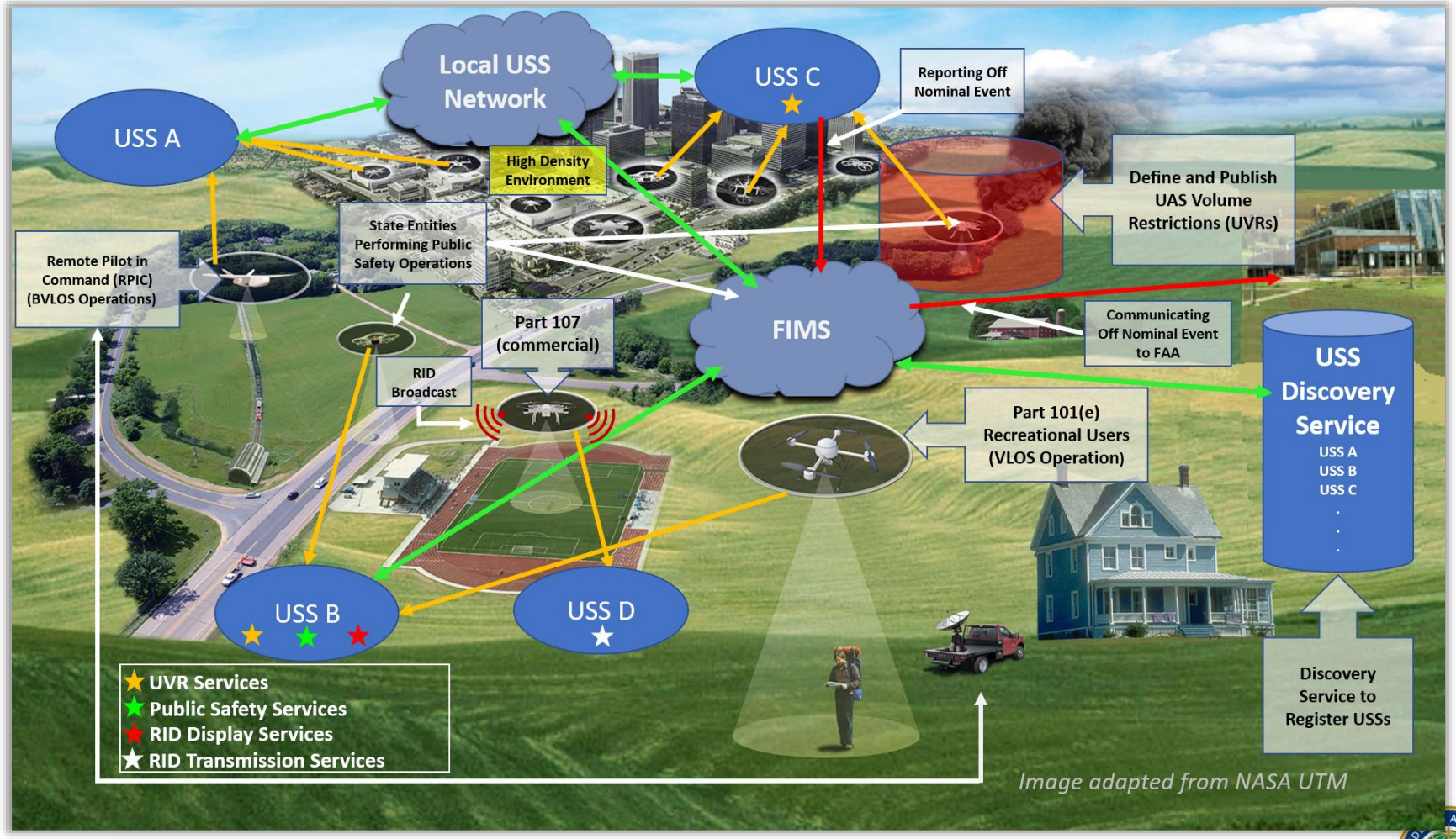
Unmanned Traffic Management (UTM)



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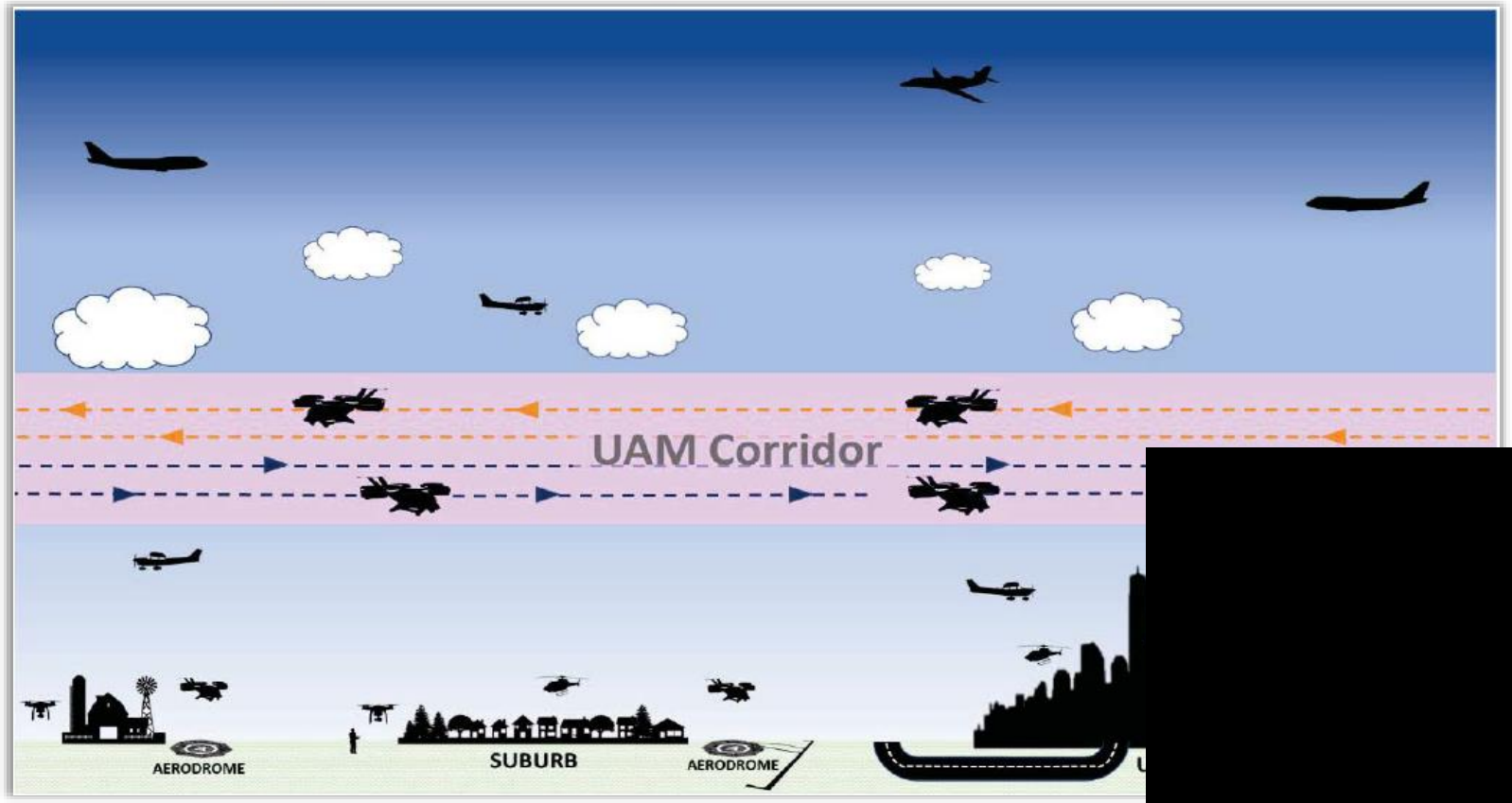
Urban Air Mobility (UAM)



Source: FAA UAM Concept of Operations V1

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Thank you!

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