

Airport Planning and NEPA Essentials

Planning Essentials

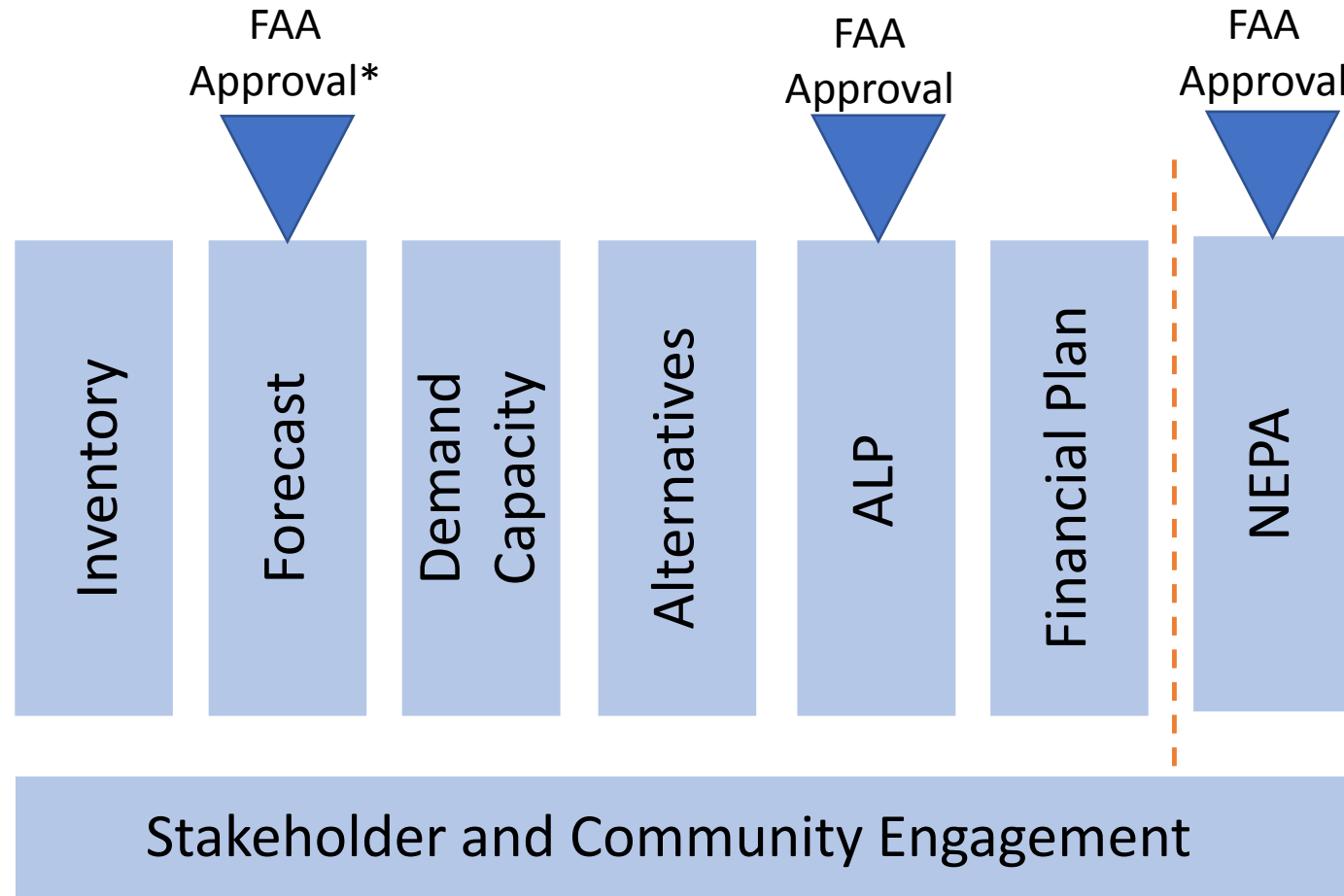


HNTB



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Jeff Breeden – FAA WADO
Shawn Ames- MAA

Planning Process Overview



- Inventory
- Forecast
- Critical Aircraft
- Alternatives

* Includes forecast and critical aircraft



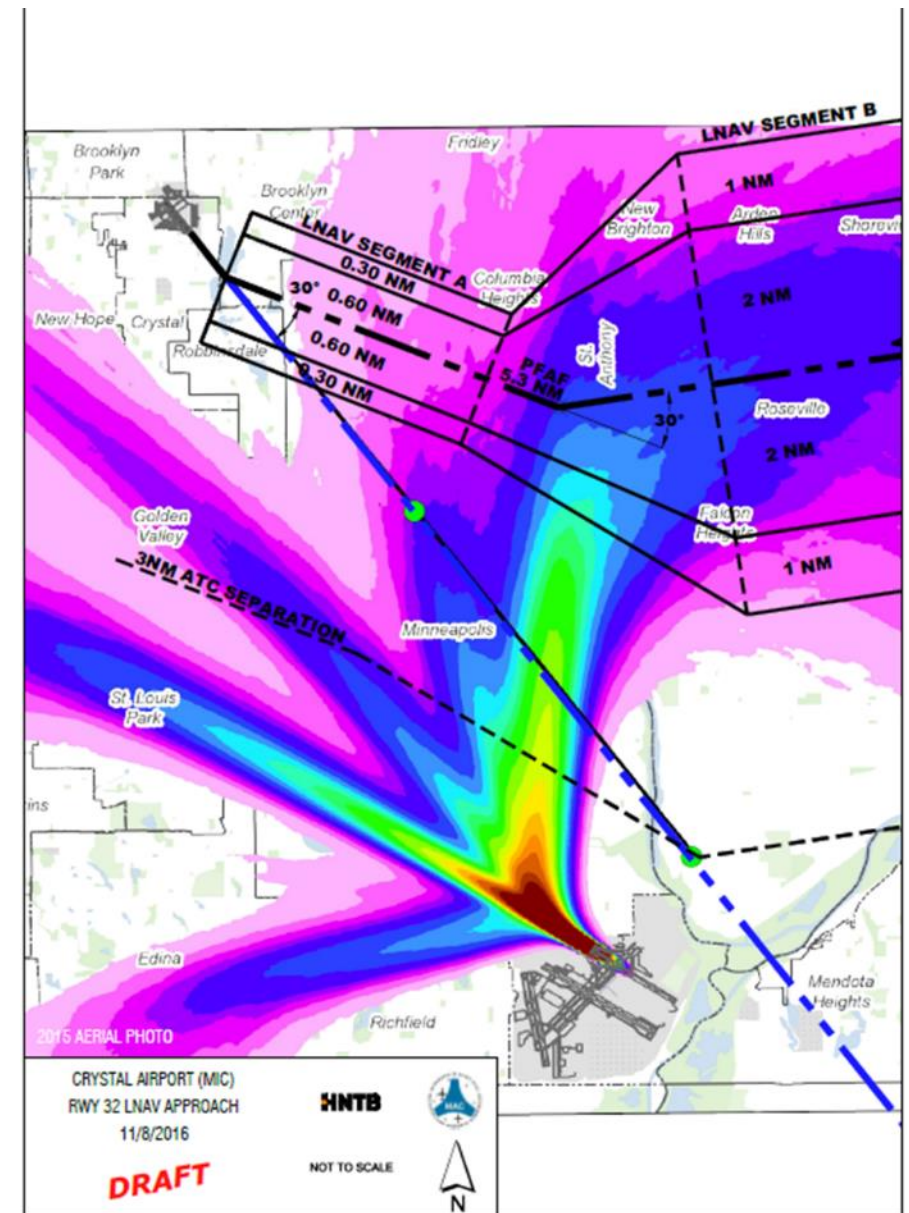
Inventory-Forecast Element

- Airport activity statistics (passengers, aircraft operations, based aircraft etc.)
- Schedule of airline operations (OAG)
- USDOT data (T100 for enplanements, operations, fleet mix; OD1A for origin/destination passengers, average fares)
- Tower counts (OPSNET, ATADS) for aircraft operations
- Radar data (NOMS etc.) for non-commercial fleet mix, operations by time-of-day)
- Bureau of Economic Analysis (BEA) and local economic development agencies (historical socioeconomic data)
- Economic Vendors (Woods& Poole, Global Insight) for economic forecasts
- Airline financials and press announcements for future fleet plans



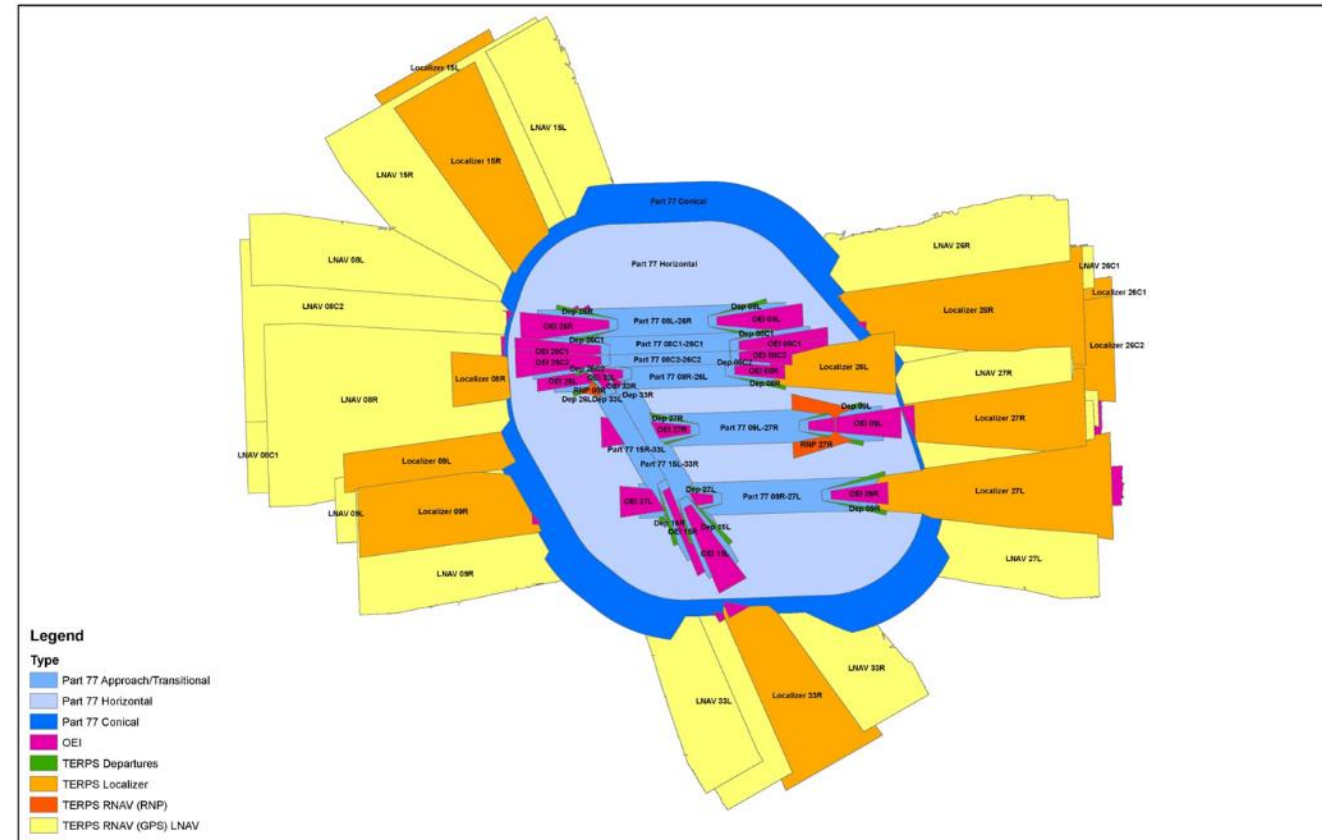
Inventory-Airspace

- ✈ ATC Airspace Structure
 - Number of departure headings
 - Independent versus dependent IFR arrival streams
 - Adjacent airport airspace



Inventory Airspace

- ✈ “Obstacle” Airspace Issues
 - FAA Digital Obstruction Files
 - AGIS Obstacle Files
 - Terrain
 - Proposed Construction
- ✈ Obstacles have a significant impact on runway viability



Typical Inventory Elements

- ✈ Inventory of existing conditions
 - Airfield & airspace
 - Commercial terminals
 - General aviation facilities
 - Cargo
 - Support
 - Access & parking
 - Utilities
 - Other



Typical Inventory Elements

- ✈ Airport Background / History / Ownership / Structure
- ✈ Regional Setting / Land Use
- ✈ Environmental Overview
- ✈ Socio Economic Data
- ✈ Historic Aviation Activity
- ✈ Financial Data



Inventory Chapter Development Strategies

- ✈ Think ahead about what type of data will be used in subsequent chapters of the airport master plan update.
- ✈ When developing the scope of services, try and reuse as much of the existing inventory out of the current master plan and just update those sections that have changed versus starting from scratch.
- ✈ This information can also be used in subsequent environmental documents.



Inventory:

✈ Master Planning

- Comprehensive (Airside, Terminal, Landside & Support)
- Should focus heavily on deficient conditions
- Includes environmental

✈ Project Planning

- Builds on the master plan, but more in-depth survey
- Specific to the project focus (i.e. new runway or cargo facilities)
- Includes environmental



Inventory Data Overview

Data Type	Data Sources
Existing Airport Facilities	Existing ALP
	FAA Chart Supplemental
	FAA Terminal Procedures
	Airport Manager
	FAA 5010
Existing Aviation Activity	National Based Aircraft Inventory
	Terminal Area Forecast
	FAA 5010
	Traffic Flow Management System Count
	FBO/Flight School Data
	Official Airline Guide
Airport Environs	Tenant surveys
	County Zoning and Land Use
	State DOT road mapping
	Census / Bureau of Economic Analysis



2011 BWI Master Plan Inventory (Traditional Insights)

TYPICAL DAY AT BWI MARSHALL

Baltimore/
Washington
International
Thurgood
Marshall Airport



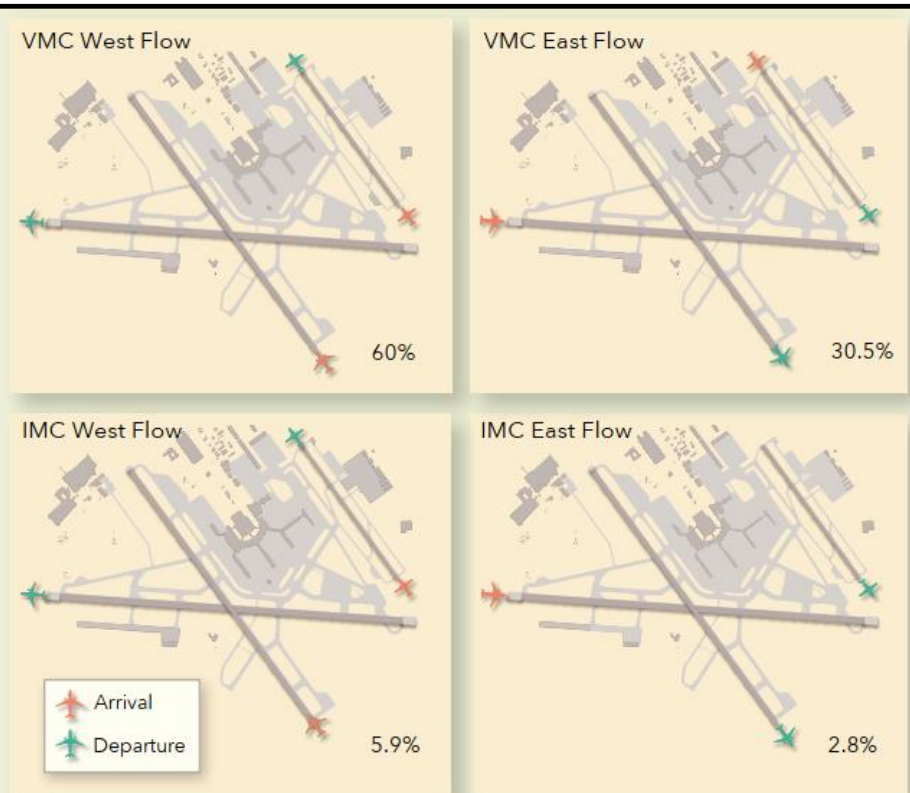
65,000
Passengers



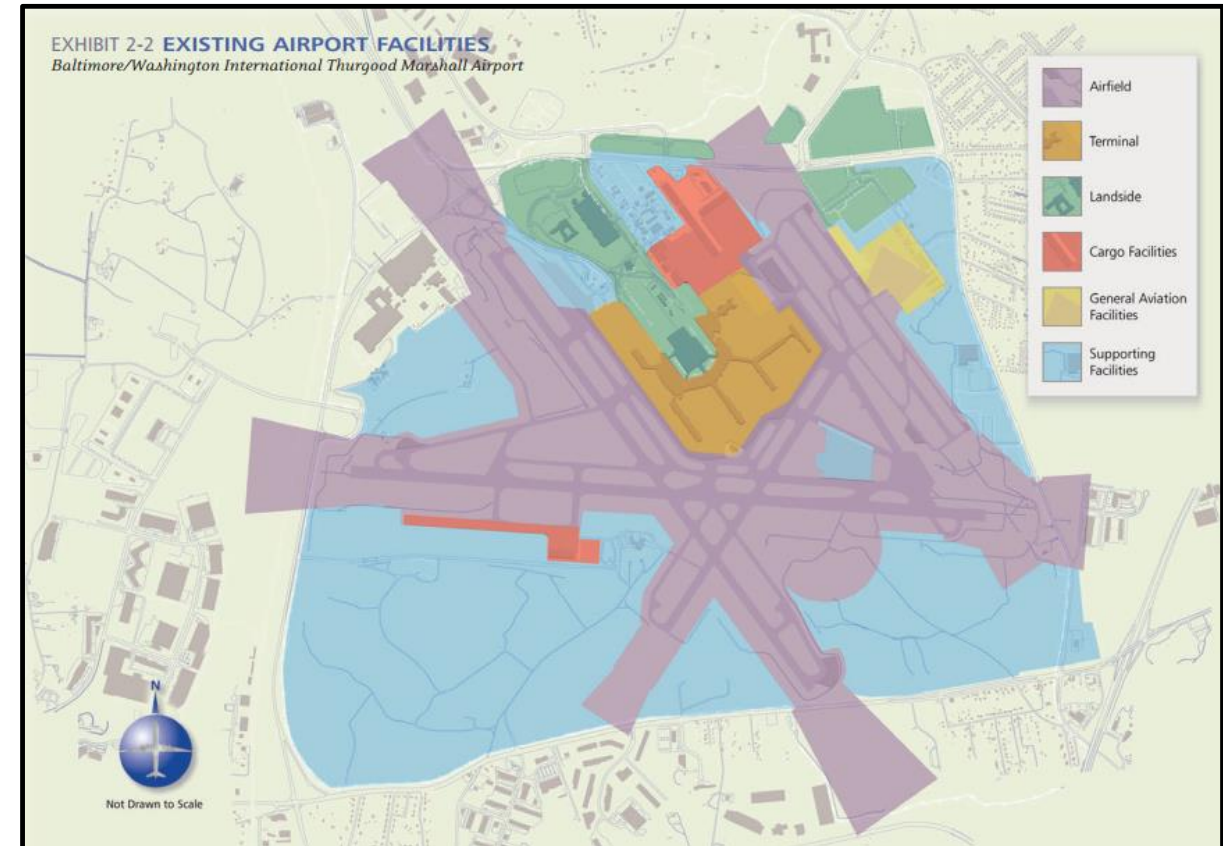
350
Tons of Cargo



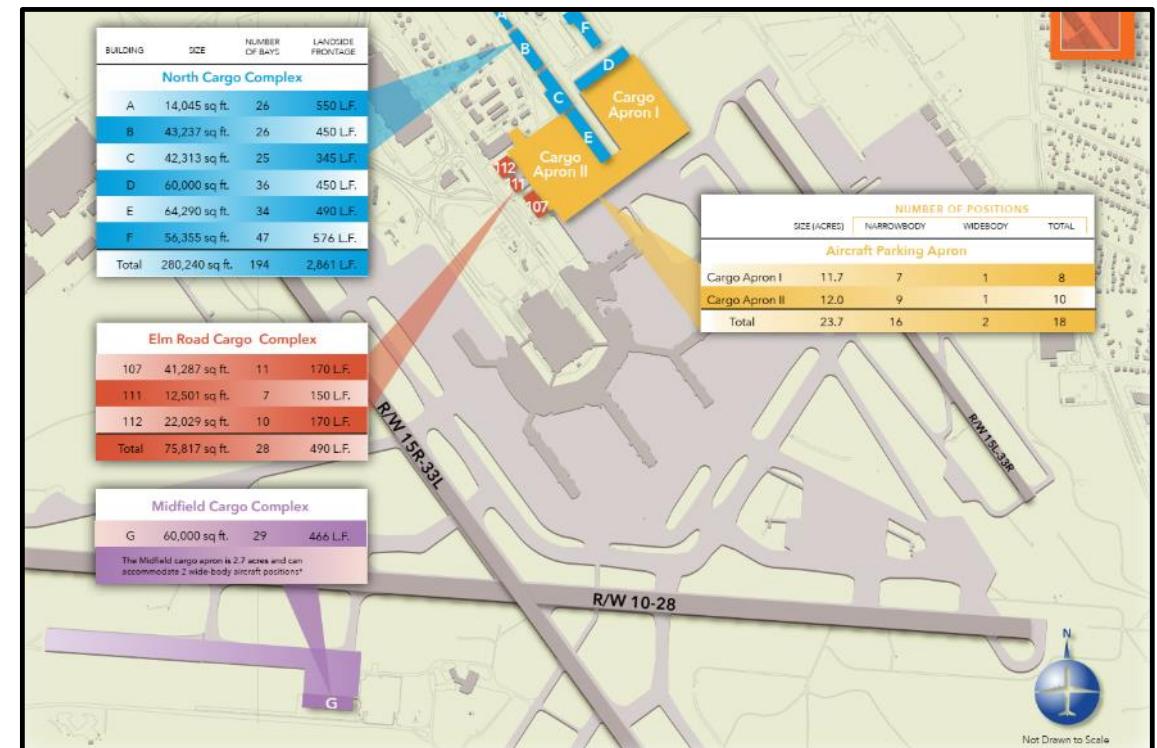
700
Arriving & Departing
Airplanes¹



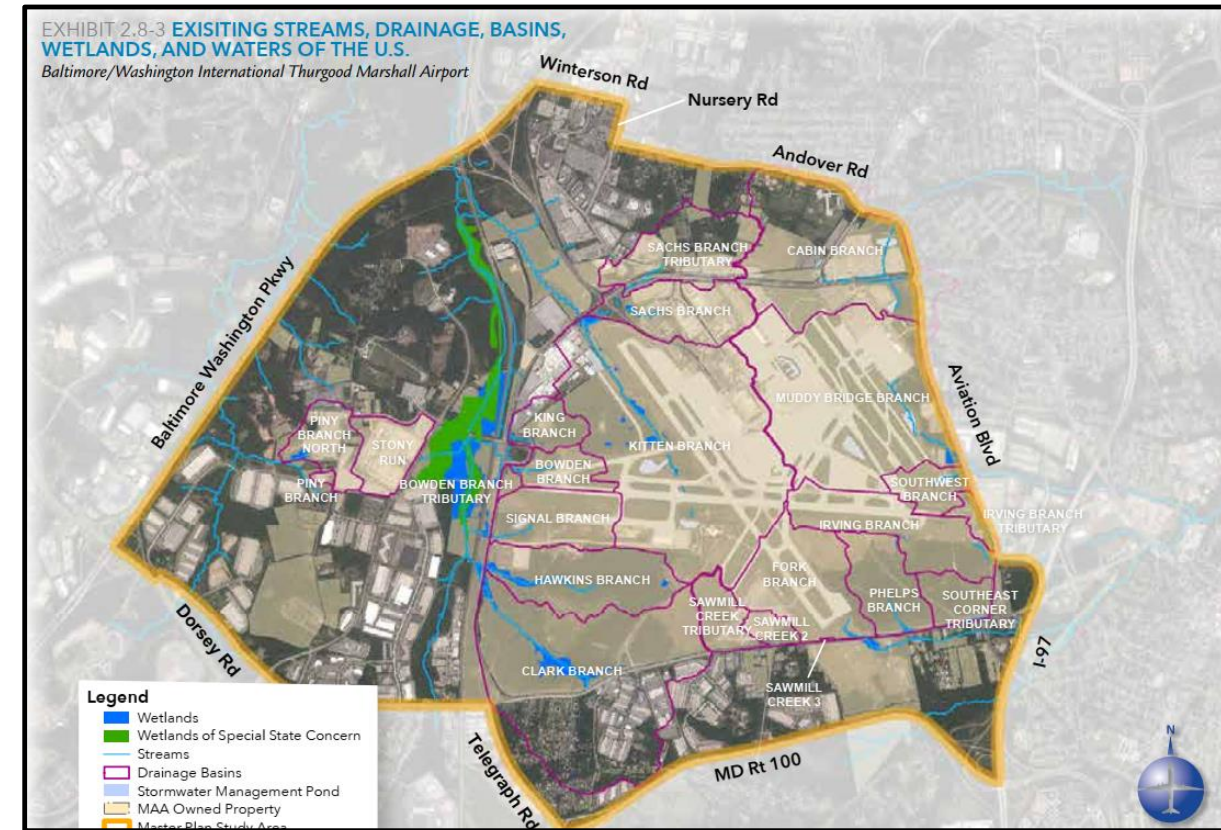
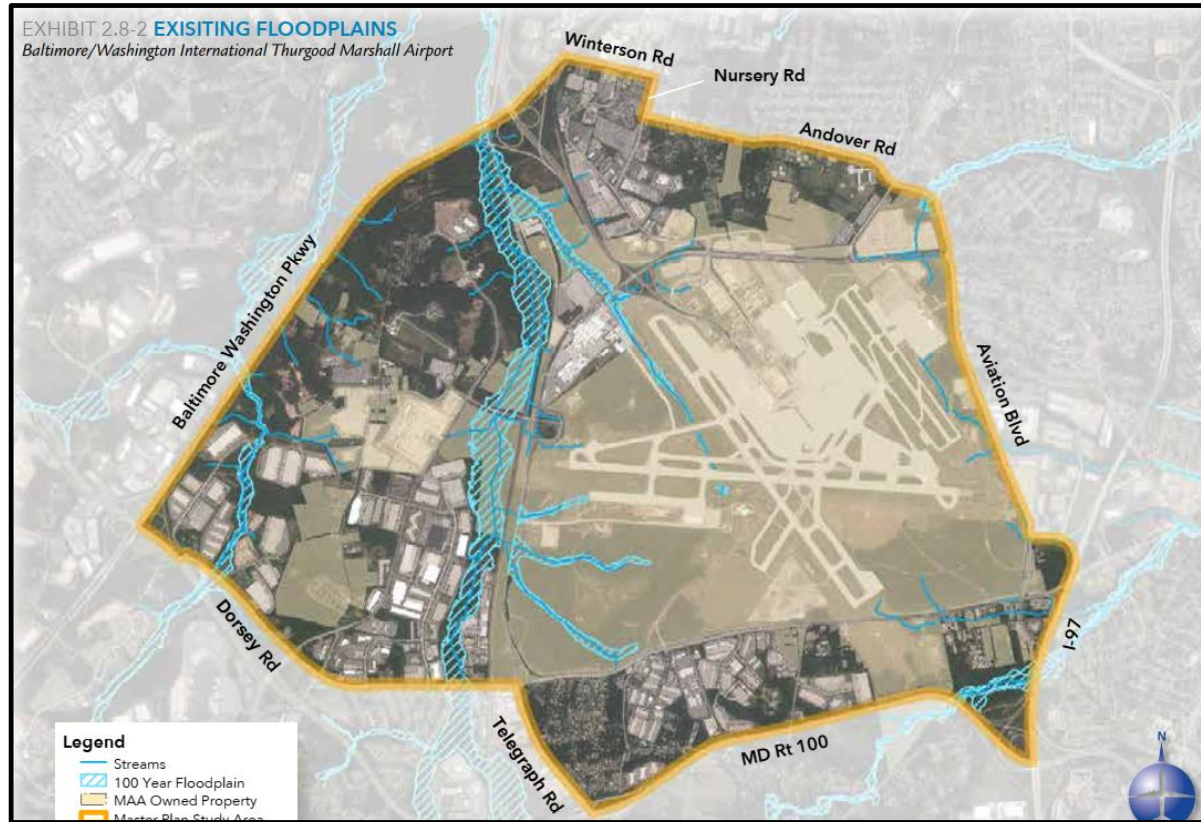
*Note: In addition to the four depicted primary operating configurations, single direction runway configurations occur 0.8 percent of the time.
Source: NOAA weather data; ATCT input.*



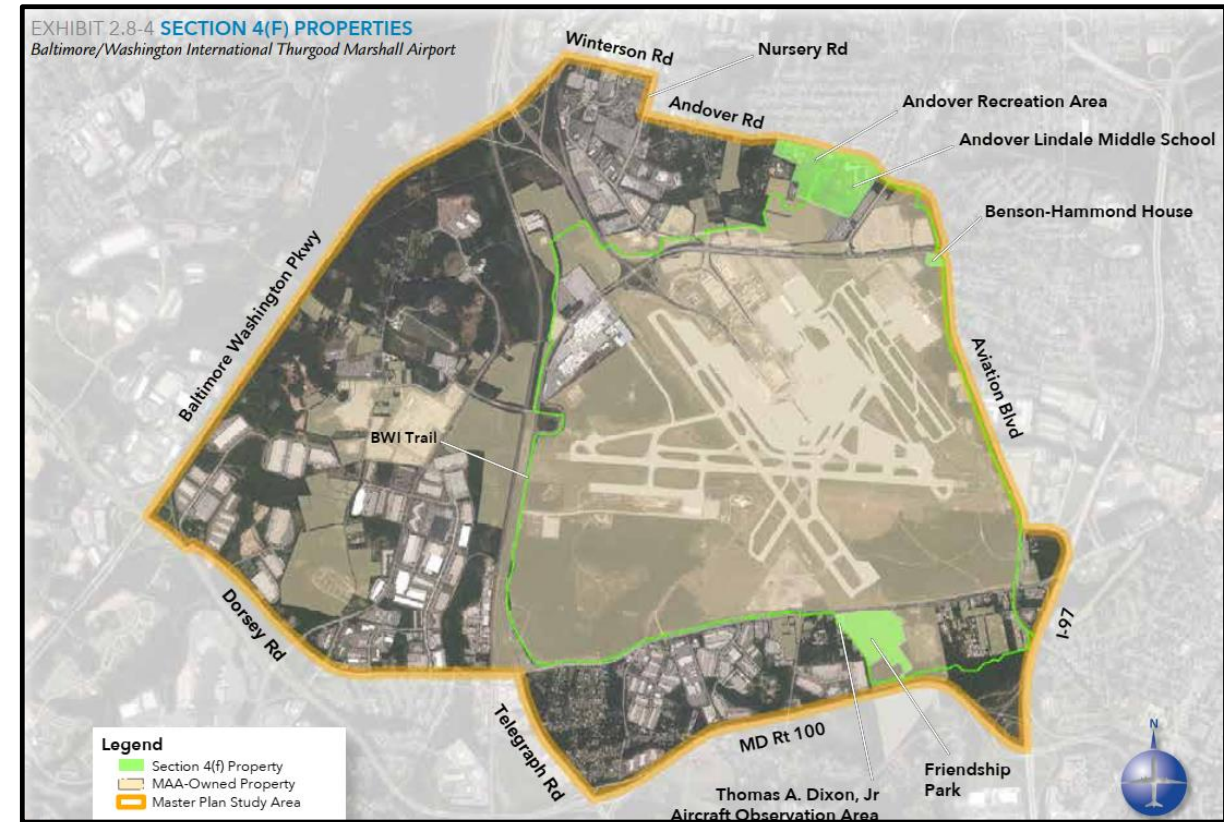
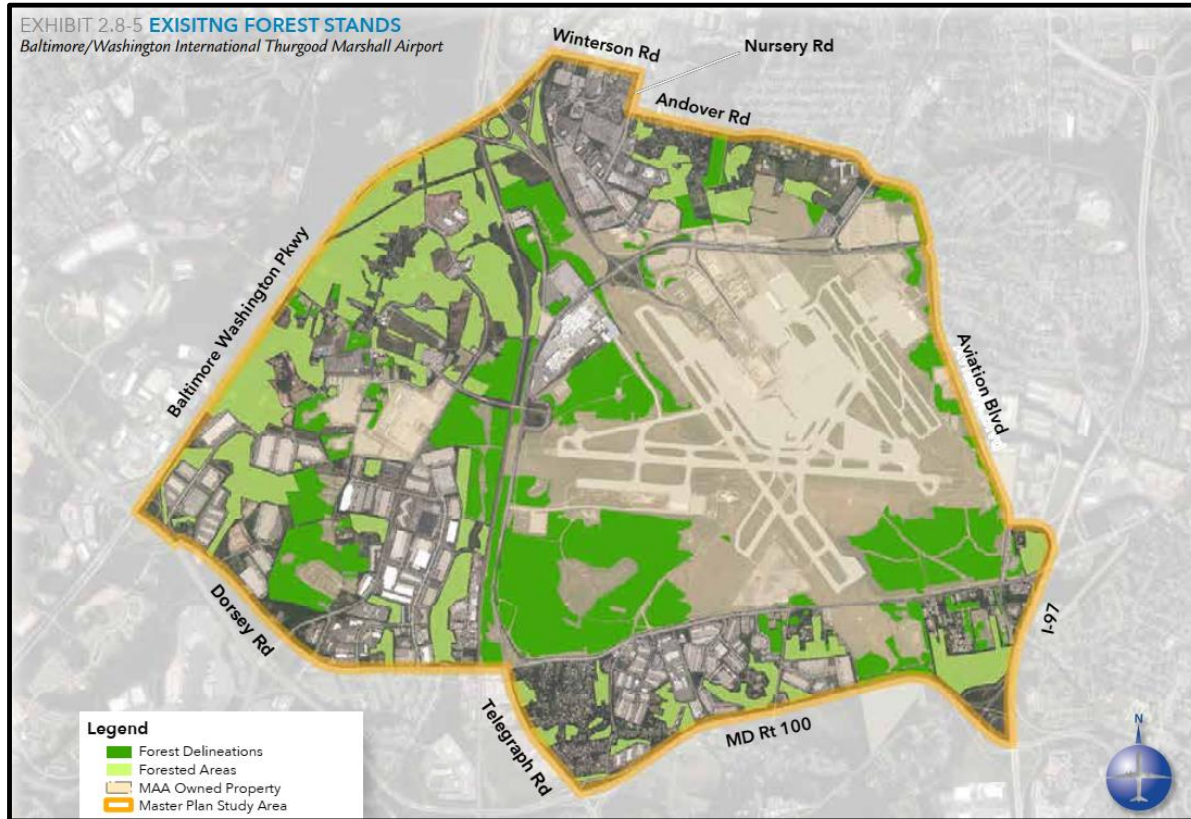
2011 BWI Master Plan Inventory (Traditional Insights)



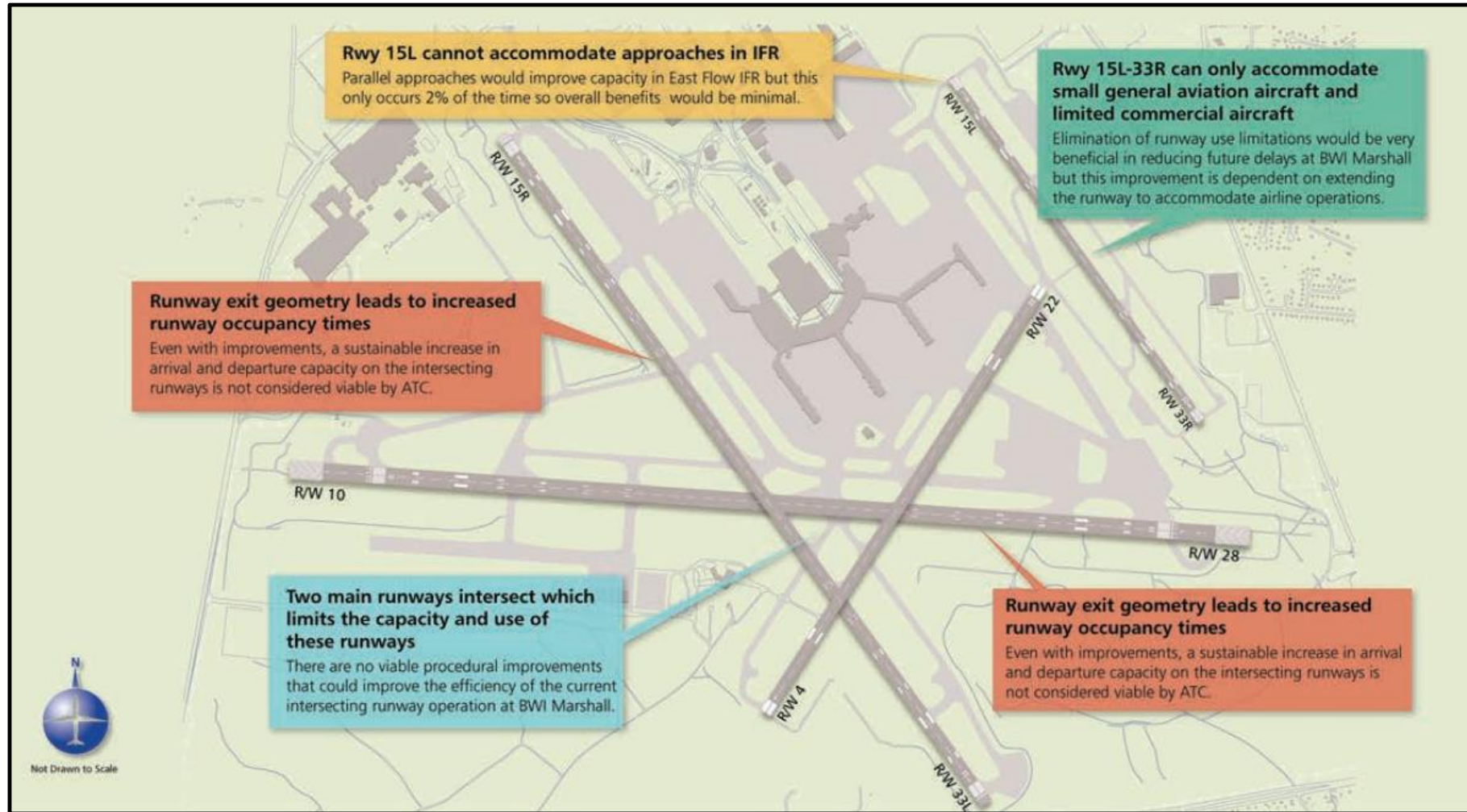
2011 BWI Master Plan Inventory (Traditional Insights)



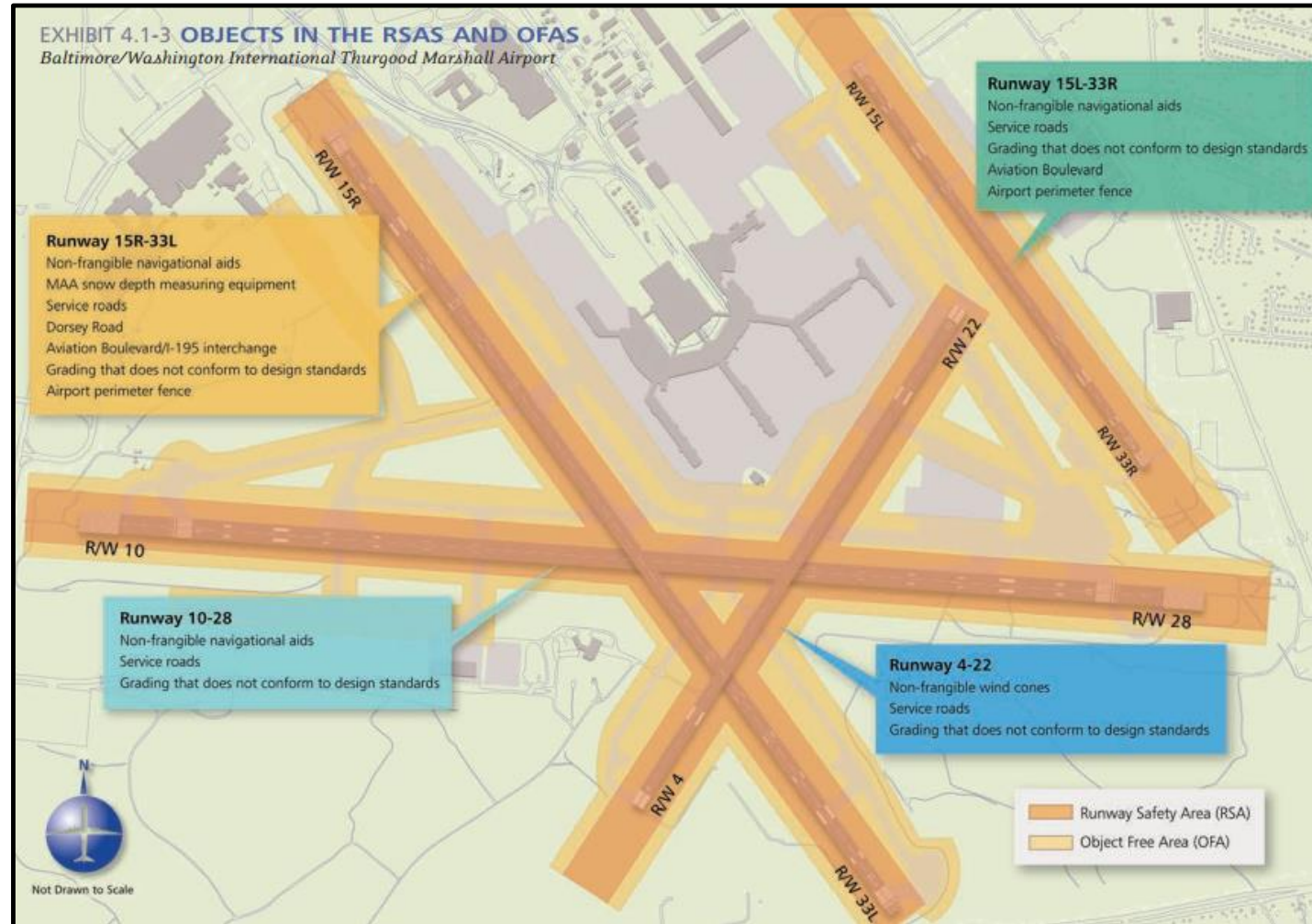
2011 BWI Master Plan Inventory (Traditional Insights)



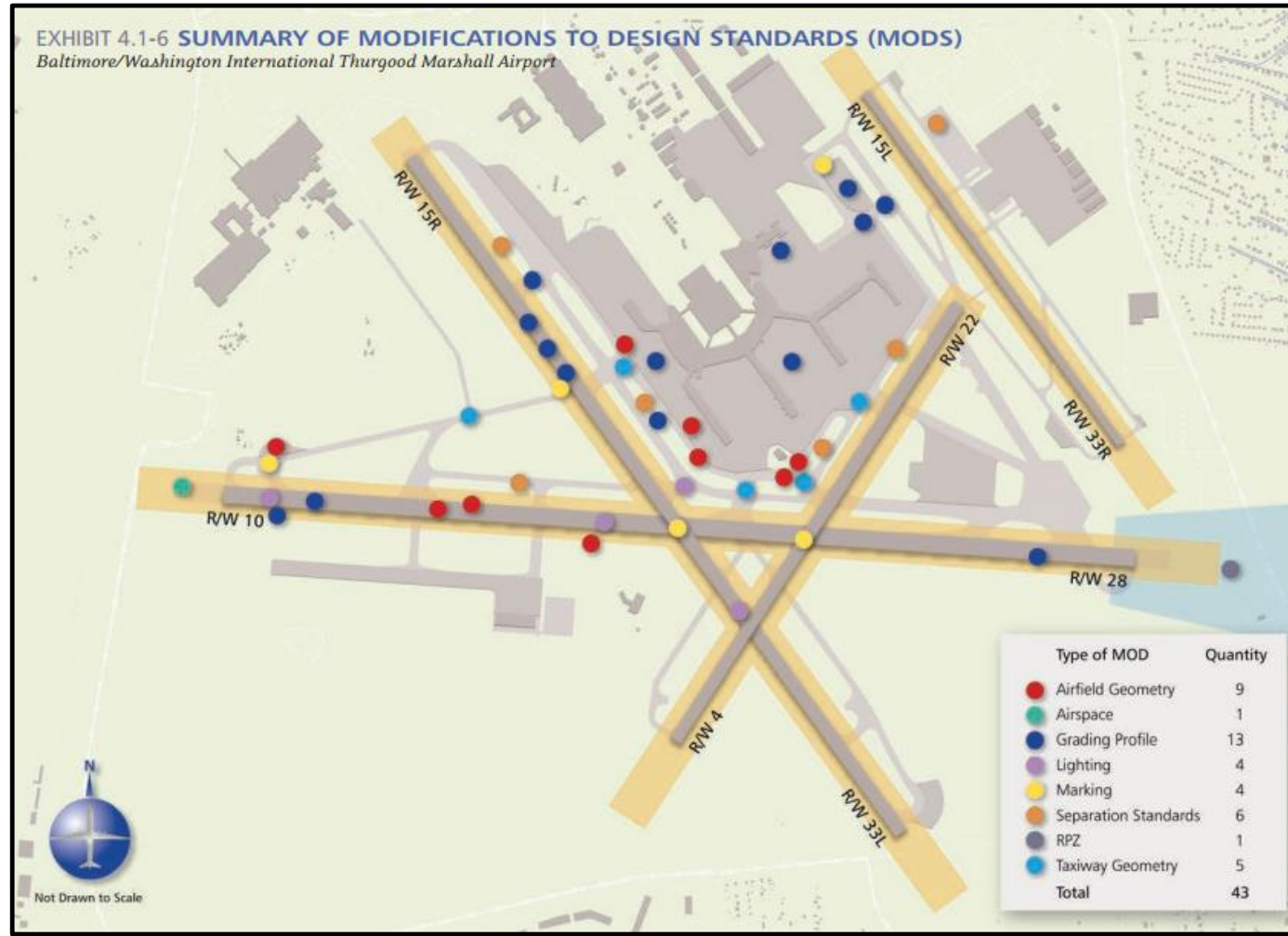
2011 BWI Master Plan Inventory (Dig Deeper - Deficiencies)



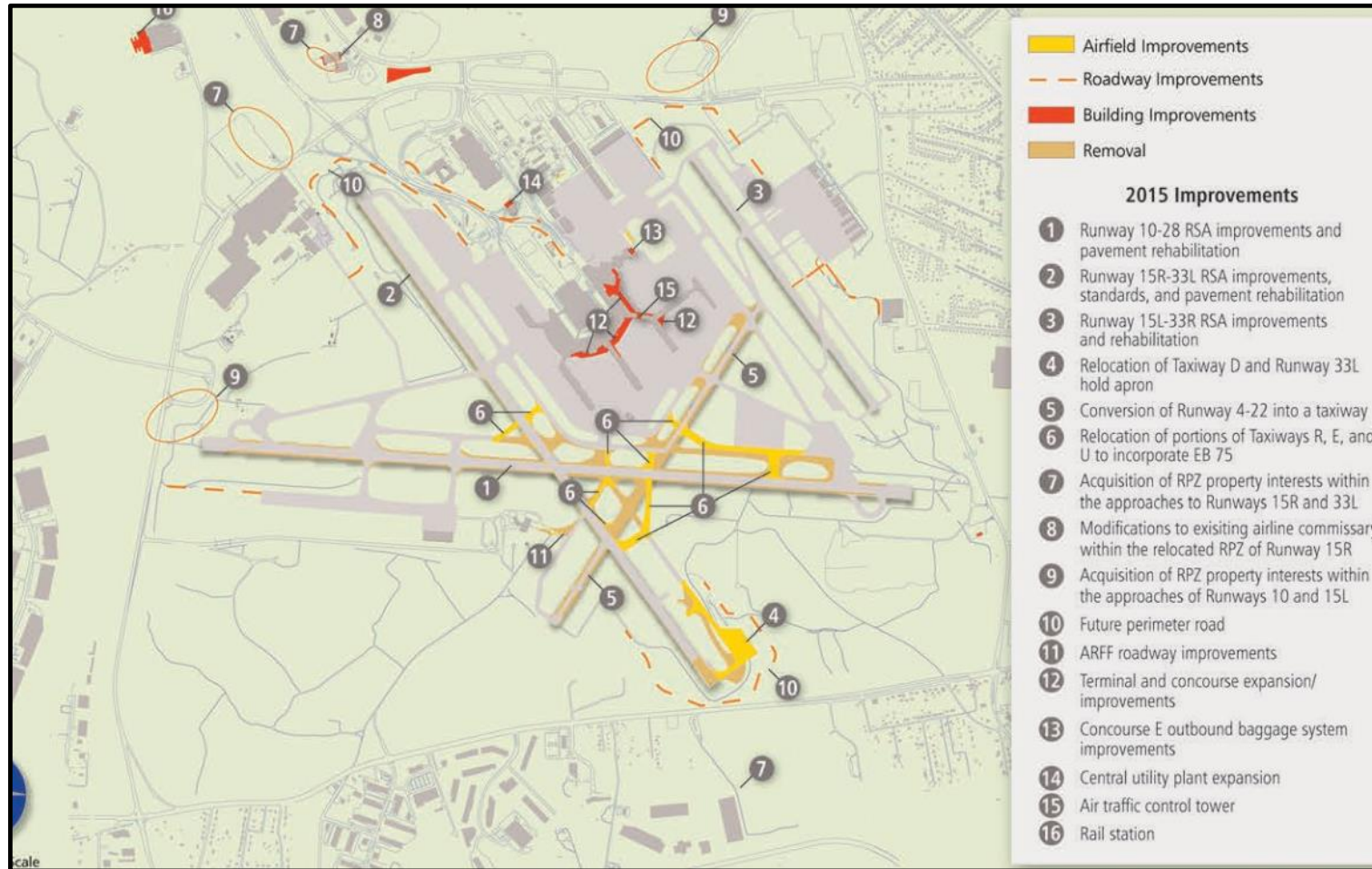
2011 BWI Master Plan Inventory (Dig Deeper - Deficiencies)



2011 BWI Master Plan Inventory (Dig Deeper - Deficiencies)



2011 BWI Master Plan (Deficiencies Reconciled)



\$350M Program

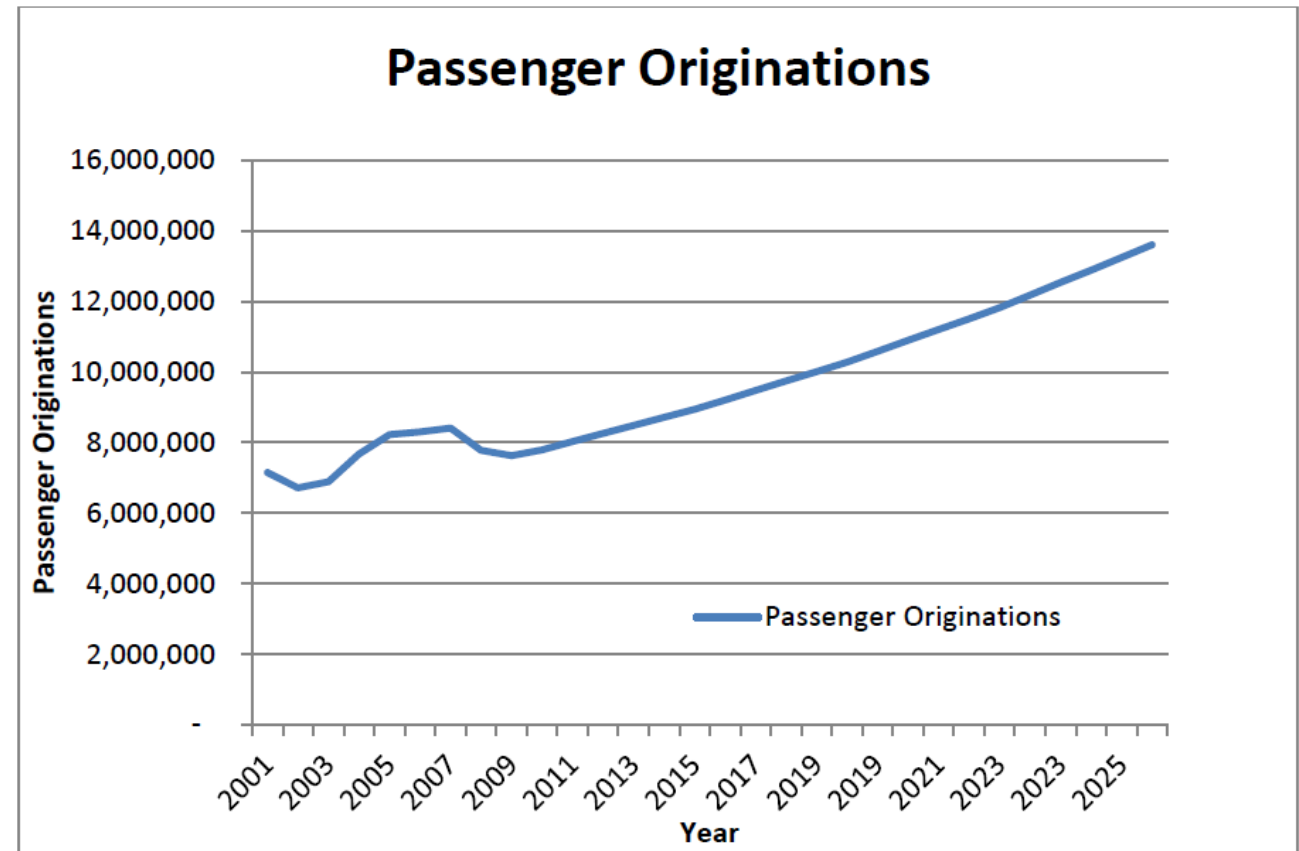
- ➔ Runway Safety Area Compliance
- ➔ Airfield Pavement Rehabilitation
- ➔ Retirement of MODS
 - Key to securing AIP and PFC for the program



Why do forecasts?*

- Any planning effort involves a forecast, either explicit or implicit. *(If you plan for current conditions, you are forecasting that the future will be the same as the present)*
- Therefore, you should make a conscientious effort to make the forecast as accurate as possible and incorporate all available relevant information.
- Also, FAA-approved forecasts are required for airport master plans and NEPA studies.

* Pat Kennon-Manager, Aviation Economics, HNTB Corporation



Main types of forecasts

- ✈ Master Plan
- ✈ NEPA
- ✈ Specialized



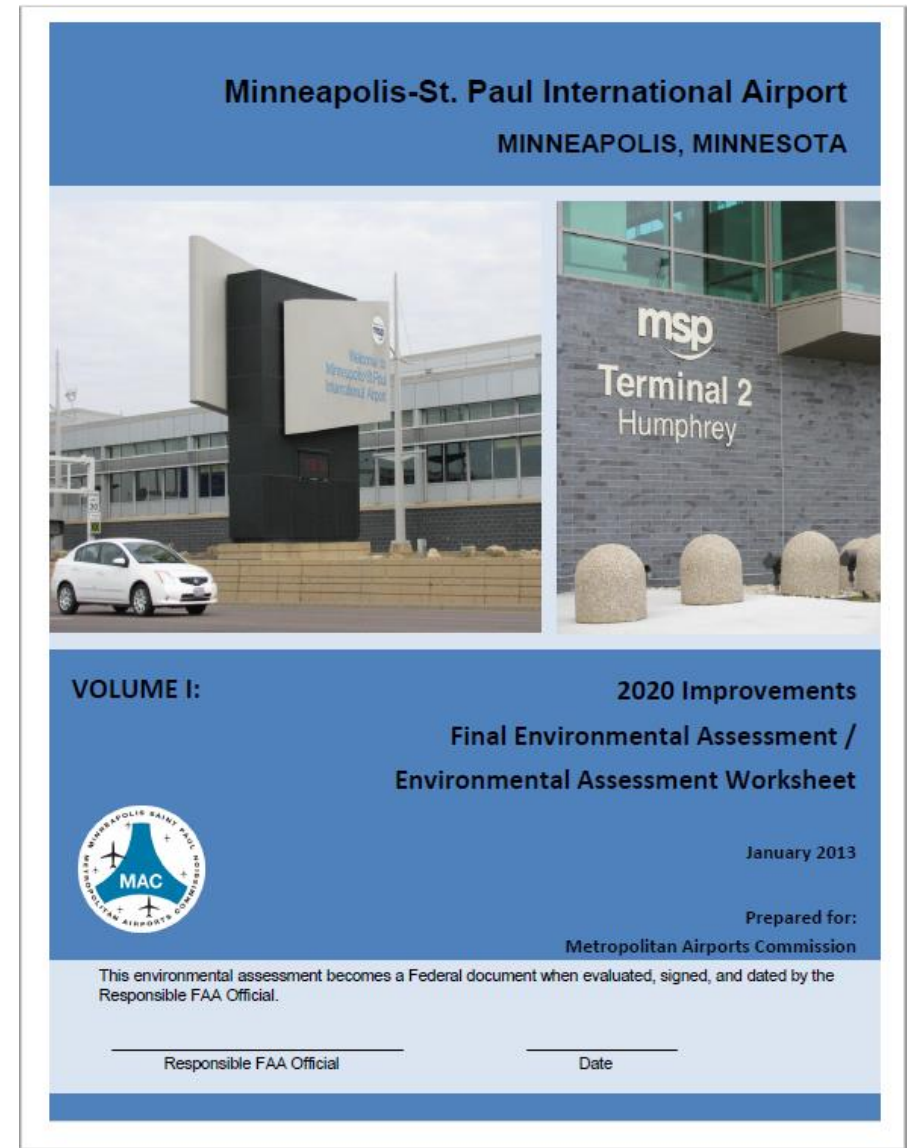
Elements of Master Plan Forecast

- Annual and peak period
- 20-year horizon typical
- Includes passengers and all aircraft operations
- Future Critical Aircraft(s)
- For comprehensive assessment of future airport facility requirements (airfield, terminal, landside, other)



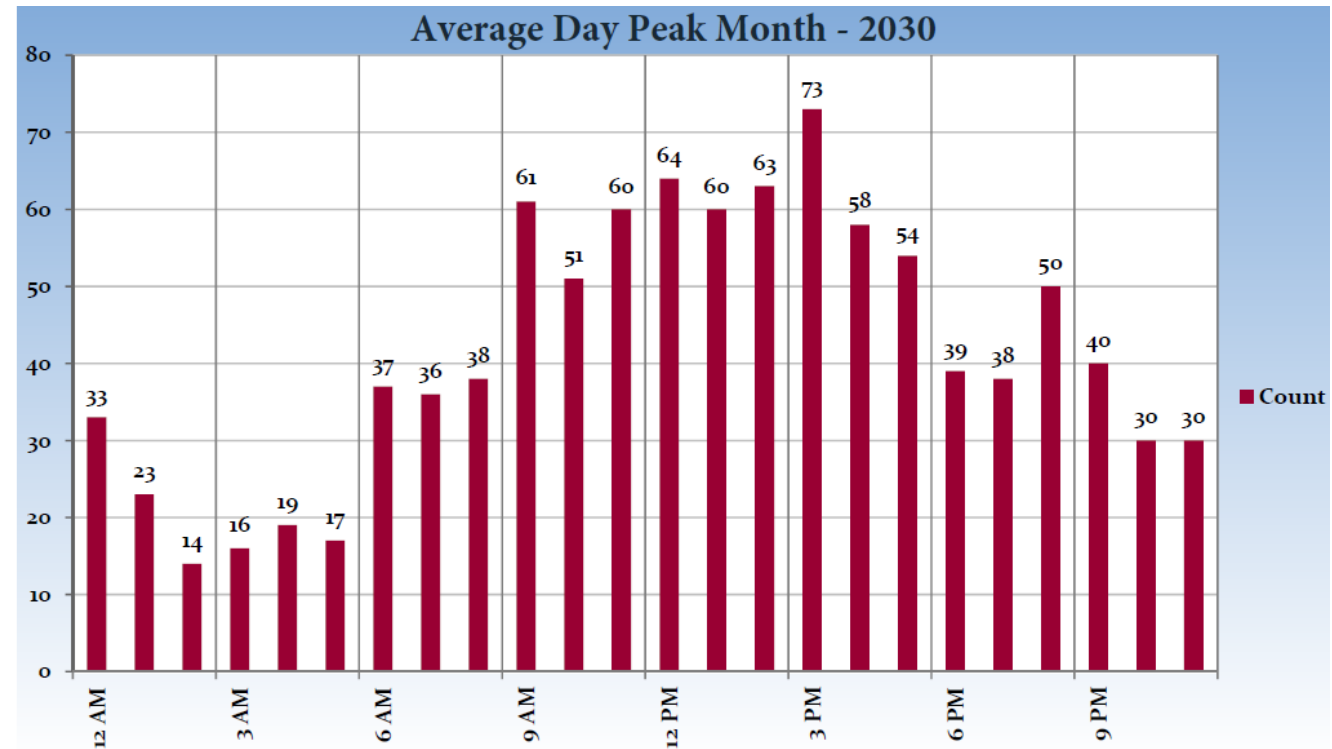
Elements of NEPA Forecast

- Average annual day
- 1- and 5-year horizons typical
- Includes aircraft operations and fleet mix
- For environmental assessment (noise and air quality)



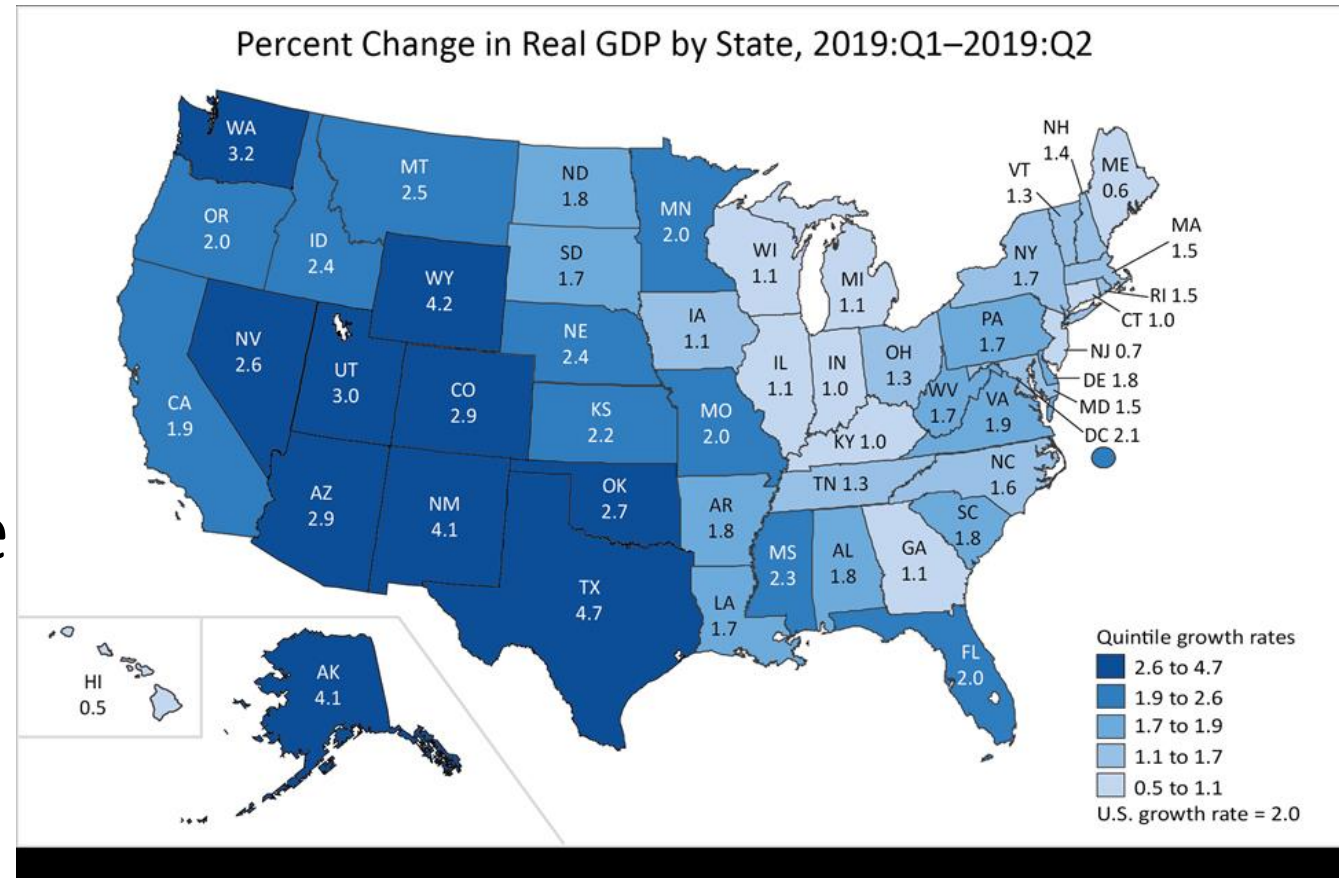
Specialized Forecasts

- ➔ Facility forecasts
(airfield/terminal, landside, etc.)
- ➔ Design Day Flight Schedules (simulations and detailed planning)



General Forecast Factors

- Economic (income/employment, population)
- Cost (air fares/fuel)
- Competition (Other airports/trains/automobiles)
- Constraints (Airport facilities/airline capacity/Policy)



General Forecast Approaches

- ➔ Statistical (regression or trend)
- ➔ Share analysis (constant or changing share of national forecast)
- ➔ Use Terminal Area Forecast (TAF)



Critical Aircraft

- Most demanding aircraft or aircraft group
- Determined on the basis of “Regular Use”
 - Regular use is at least 500 annual Operations
- Future Critical Aircraft determined in FAA approved forecast
 - AC “highly likely” or “expected” on regular basis



Can Have Multiple Critical Aircraft

- Aircraft Approach Category (AAC)
- Airplane Design Group (ADG)
- Runway Length
- Taxiway Design Group (TDG)
- Engineering Material Arresting System (EMAS)



Typical Aviation Forecast Elements

- ✈ Operations
- ✈ Enplanements
- ✈ Based aircraft
- ✈ Fleet mix
- ✈ Peak hour activity
- ✈ Critical aircraft



What Types of Data Needs To Be Collected

- ✈ Socioeconomic
- ✈ Demographic
- ✈ Geographic
- ✈ Aviation-related
- ✈ Operations, enplanements, based aircraft
- ✈ Previous forecasts



Types of Forecasting Methods

- ➔ Regression
 - Correlation between two variables
 - The Airport Sponsor needs to be able to adequately forecast the independent variable
- ➔ Trend
 - Projects historic trends into future
 - Need at least 5 years of historic data
- ➔ Share
 - Examines airport's share vs. larger aggregate
 - Need at least 5 years of historic data



FAA Role in Forecast Development

- ✈️ FAA Reviews the Entire Master Plan for Sound Planning techniques but only approves 2/3 elements. These elements include:
 - Forecast of Aviation Demand Including Critical Aircraft
 - Airport Layout Plan

Master Plan Advisory Circular
150/5070-6B

205. MASTER PLAN REVIEWS BY THE FAA

- a. The recommendations contained in an airport master plan represent the views, policies and development plans of the airport sponsor and do not necessarily represent the views of the FAA. Acceptance of the master plan by the FAA does not constitute a commitment on the part of the United States to participate in any development depicted in the plan, nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public law. The FAA reviews all elements of the master plan to ensure that sound planning techniques have been applied. However, the FAA only approves the following elements of airport master plans:
 - 1) *Forecasts of Demand* – The master plan forecast should be reviewed to ensure that the underlying assumptions and forecast methodologies are appropriate. Paragraph 704.h of this guidance should be used to determine consistency of the master plan forecast levels and the Terminal Area Forecast (TAF). Inconsistencies between the master plan forecast and TAF must be resolved, and the forecast approved, before proceeding with subsequent planning work.
 - 2) *Airport Layout Plan* – All airport development at Federally-obligated airports must be done in accordance with an FAA- and sponsor-approved ALP. Furthermore, proposed development must be shown on an approved ALP to be eligible for Airport Improvement Program (AIP) funding. FAA approval of the ALP indicates that the existing facilities and proposed development depicted on the ALP conforms to the FAA airport design standards in effect at the time of the approval or that an approved modification to standard has been issued. Such approval also indicates that the FAA finds the proposed development to be safe and efficient.

8



FAA Role in Critical Aircraft Identification

What is the critical aircraft?

- ✈ Most demanding aircraft type that makes regular use
- ✈ Regular use is 500 annual operations



FAA Role in Critical Aircraft Identification

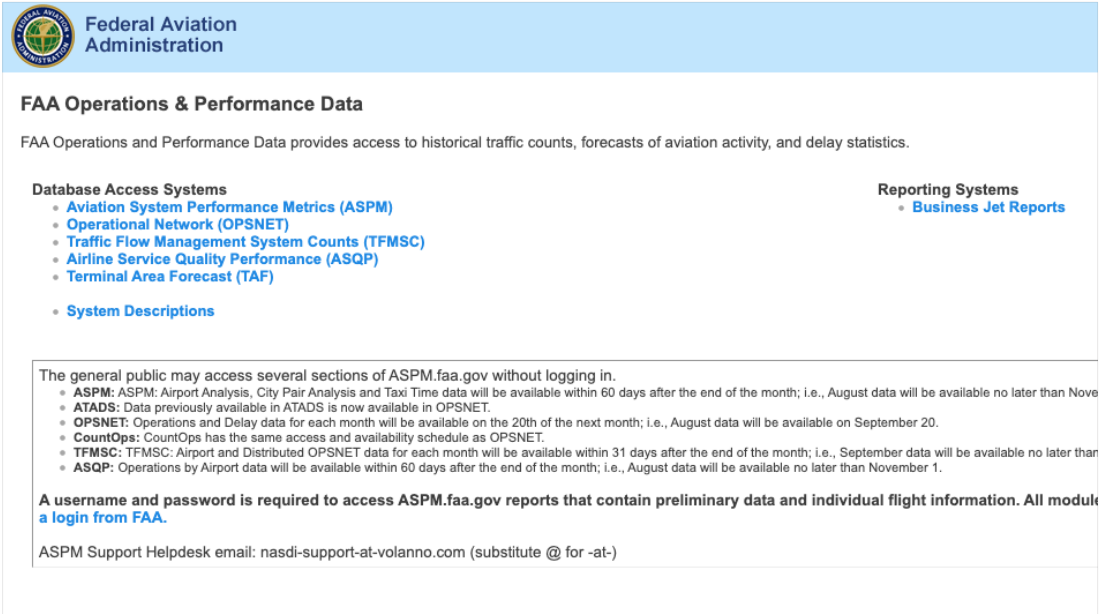
Where do I Go to Verify the Data / Data Sources?

Existing Critical Aircraft

- ➔ [ASPM.faa.gov](https://aspm.faa.gov)
- ➔ [Basedaircraft.com](https://basedaircraft.com)
- ➔ Airport Records

Future Critical Aircraft

- ➔ Operator Letters
- ➔ Linkage to Forecast Data



Federal Aviation Administration

FAA Operations & Performance Data

FAA Operations and Performance Data provides access to historical traffic counts, forecasts of aviation activity, and delay statistics.

Database Access Systems

- [Aviation System Performance Metrics \(ASPM\)](#)
- [Operational Network \(OPSNET\)](#)
- [Traffic Flow Management System Counts \(TFMSC\)](#)
- [Airline Service Quality Performance \(ASQP\)](#)
- [Terminal Area Forecast \(TAF\)](#)
- [System Descriptions](#)

Reporting Systems

- [Business Jet Reports](#)

The general public may access several sections of [ASPM.faa.gov](https://aspm.faa.gov) without logging in.

- **ASPM:** ASPM: Airport Analysis, City Pair Analysis and Taxi Time data will be available within 60 days after the end of the month; i.e., August data will be available no later than November 1.
- **ATADS:** Data previously available in ATADS is now available in OPSNET.
- **OPSNET:** Operations and Delay data for each month will be available on the 20th of the next month; i.e., August data will be available on September 20.
- **CountOps:** CountOps has the same access and availability schedule as OPSNET.
- **TFMSC:** TFMSC: Airport and Distributed OPSNET data for each month will be available within 31 days after the end of the month; i.e., September data will be available no later than October 1.
- **ASQP:** Operations by Airport data will be available within 60 days after the end of the month; i.e., August data will be available no later than November 1.

A username and password is required to access [ASPM.faa.gov](https://aspm.faa.gov) reports that contain preliminary data and individual flight information. All modules require [a login from FAA](#).

ASPM Support Helpdesk email: nasdi-support-at-volanno.com (substitute @ for -at-)



FAA Role in Critical Aircraft Identification

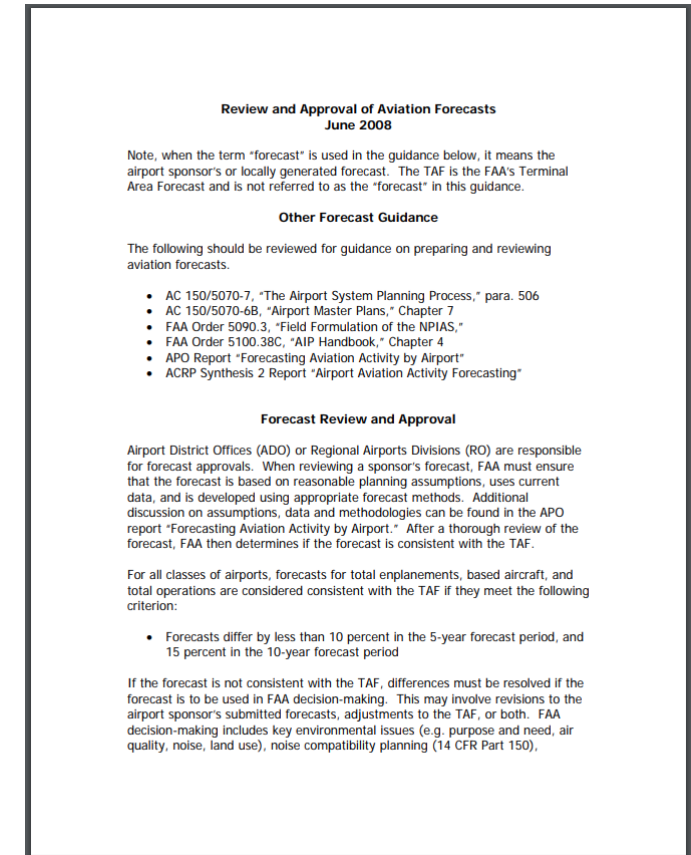
What is the critical aircraft?

- ➔ May be a single aircraft or composite / family
- ➔ For small airports, usually a business aircraft
- ➔ For large airports, usually an air carrier



Consistency With the FAA Terminal Area Forecast

- ✈ Within 10% of the TAF for the 5-year forecast period
- ✈ Within 15% of the TAF for the 10-year forecast period



Forecast Chapter Development Strategies

- ➔ Forecasts Exceed Guidelines of Consistency with FAA Terminal Area Forecasts
- ➔ Projects Contained in Master Plan are expected to require an EIS and/or BCA

The image shows two overlapping FAA forms titled "Request for FAA Headquarters Review of Airport Forecasts". The forms are from the FAA Airports section. They contain fields for reviewer information (FAA Regional/ADO Reviewer, Office, Email, Date, Phone, Date), study details (Title of Forecast Study, Date Study was Prepared), and checkboxes for various forecast verification criteria. The criteria include: Appendix B "Template for Summarizing and Documenting Airport Planning Forecasts" (or equivalent table with all the relevant information found in Appendix B), Appendix C "Template for Comparing Airport Planning and TAF Forecast" (or equivalent table with all the relevant information found in Appendix C), and a section for "Please verify the following" with sub-points A and B. Sub-point A states: "Base year numbers are current for passenger enplanements, airport operations, and based aircraft." Sub-point B states: "Forecasts for these parameters are based on an appropriate forecast methodology: and share analysis. These methodologies include regression analysis, trend analysis, by Airport (see note). Increases in new service also may be justified with letters of support from users. The support letters should address the planned number of operations and be signed by persons in a position to authorize these operations. See also paragraph 3-12 in the APP Handbook and APP guidance 'Planning Information Needed for FAA Headquarters Review of Airport Forecasts' (PDF) for more information on justification of new service." The forms also include checkboxes for "Passenger enplanements", "General aviation operations", and "Based aircraft used to derive general aviation operations". The forms are dated 1/1/2016 and are labeled "Page 1 of 2" and "Page 2 of 2".



Forecast Chapter Development Strategies

✈ Does the Forecast “story” make sense?

- Justification
- Scenarios & Range
- Baseline
- Data
- Risk If We Get it Wrong

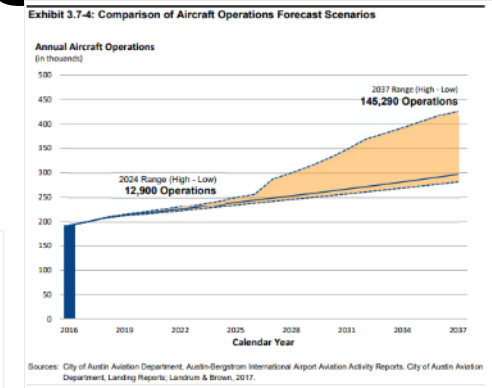
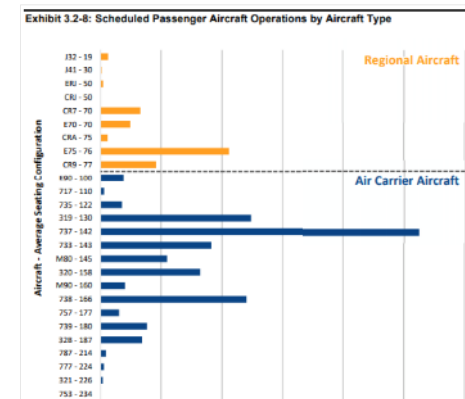


Table 3.5-2: Summary of Enplaned Passenger Forecast Scenarios

YEAR		DOMESTIC			INTERNATIONAL			TOTAL		
		LOW	BASE	HIGH	LOW	BASE	HIGH	LOW	BASE	HIGH
Historical	2016	6,095,112	6,095,112	6,095,112	133,829	133,829	133,829	6,228,941	6,228,941	6,228,941
Estimate	2017	6,798,141	6,798,141	6,798,141	169,400	169,400	169,400	6,967,541	6,967,541	6,967,541
Forecast	2019	7,556,000	7,598,000	7,682,000	234,000	261,100	261,100	7,790,000	7,859,100	7,943,100
	2021	7,977,000	8,086,000	8,308,000	283,800	307,800	307,800	8,260,800	8,393,800	8,615,800
	2024	8,644,000	8,869,000	9,338,000	321,400	342,200	357,200	8,965,400	9,211,200	9,695,200
	2037	11,836,000	12,816,000	15,060,000	466,200	512,600	645,200	12,302,200	13,328,600	15,705,200
RANGE		AVERAGE ANNUAL GROWTH RATE								
2016-2024		4.5%	4.8%	5.5%	11.6%	12.5%	13.1%	4.7%	5.0%	5.7%
2024-2037		2.4%	2.9%	3.7%	2.9%	3.2%	4.7%	2.5%	2.9%	3.8%
2016-2037		3.2%	3.6%	4.4%	6.1%	6.6%	7.8%	3.3%	3.7%	4.5%

Sources: Woods & Poole, The Complete Economic and Demographic Data Source 2017. U.S. Department of Transportation, Air Passenger Origin-Destination Survey, Landrum & Brown, 2017.



Forecast – Lessons Learned

- ➔ Keep it simple
- ➔ TAF
 - Challenge it early, but prepare to embrace it
 - Develop independent forecasts where necessary
 - Aircraft Fleet Mix
 - Passenger Enplanements (Carrier specific, O&D/Connecting)
- ➔ Don't forget to refresh
 - Forecasts age as studies and EAs progress
 - Validation of prior analyses may be required during the EA
 - When unattended, sponsor risks NEPA delays or significant rework
- ➔ Consistent application
 - Apply approved forecasts to other efforts where possible (i.e. EA, Part 150)
 - Summarize any differences (horizons, changes)

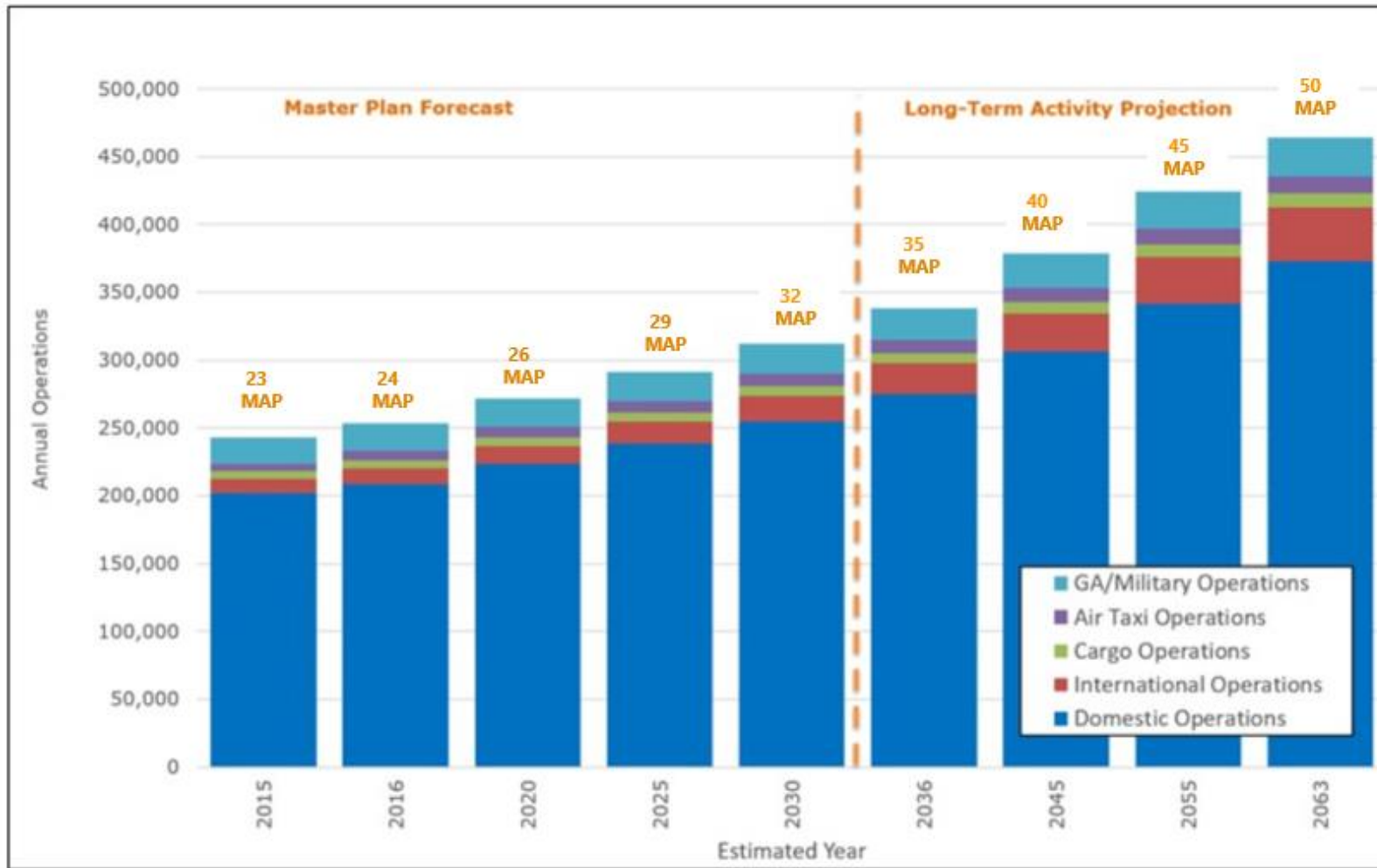


BWI Forecast

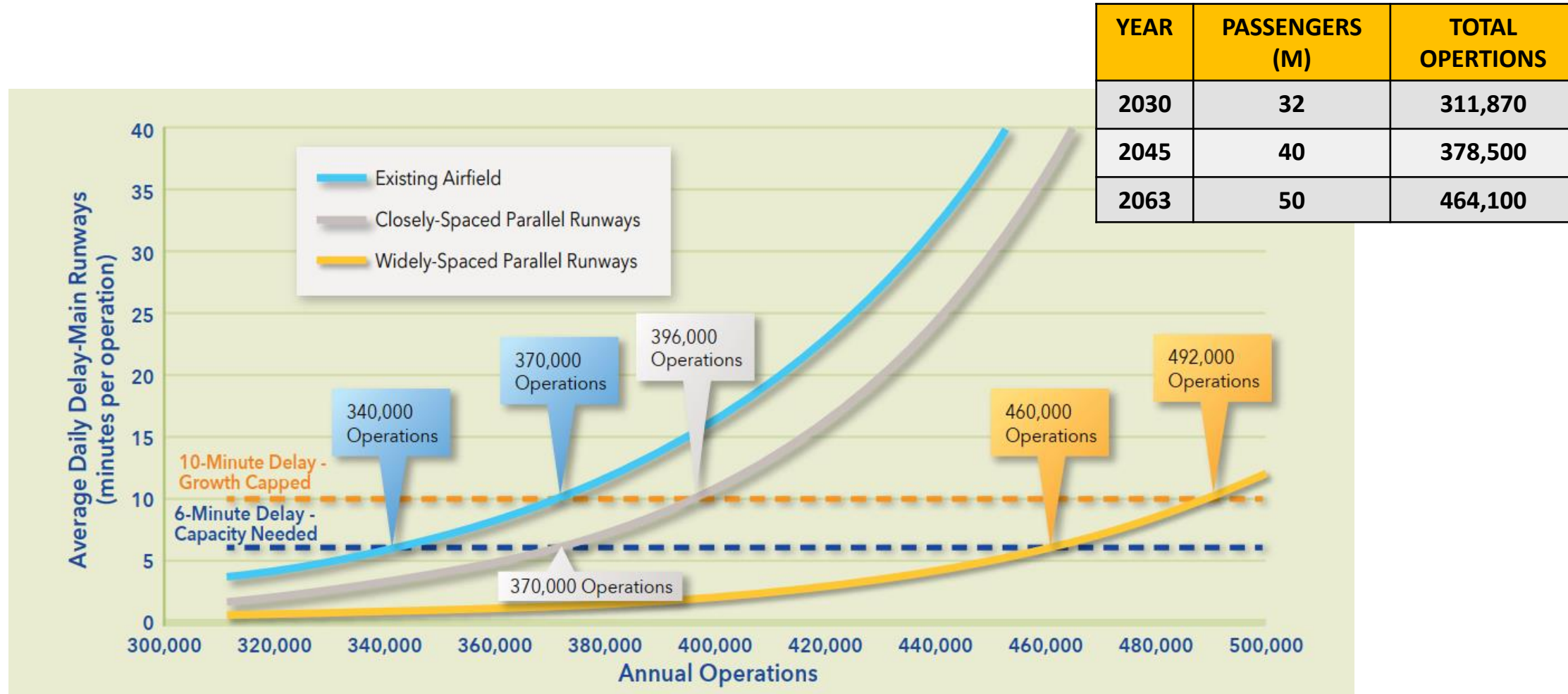
	MAA	FAA 2014 TAF	% Diff.
Enplanements			
Base Yr.	11,546,009	10,885,382	6.1%
Base Yr. + 5 Yrs.	12,903,000	12,511,492	3.1%
Base Yr. + 10 Yrs.	14,268,000	13,883,710	2.8%
Base Yr. + 15 Yrs.	15,726,000	15,302,927	2.8%
Commercial Operations			
Base Yr.	218,214	223,309	-2.3%
Base Yr. + 5 Yrs.	243,060	254,324	-4.4%
Base Yr. + 10 Yrs.	261,250	279,896	-6.7%
Base Yr. + 15 Yrs.	280,720	307,376	-8.7%
Total Operations			
Base Yr.	242,848	242,867	0.0%
Base Yr. + 5 Yrs.	271,430	274,625	-1.2%
Base Yr. + 10 Yrs.	291,090	300,973	-3.3%
Base Yr. + 15 Yrs.	311,870	329,263	-5.3%



BWI Forecast



BWI Forecast & Airfield Requirements



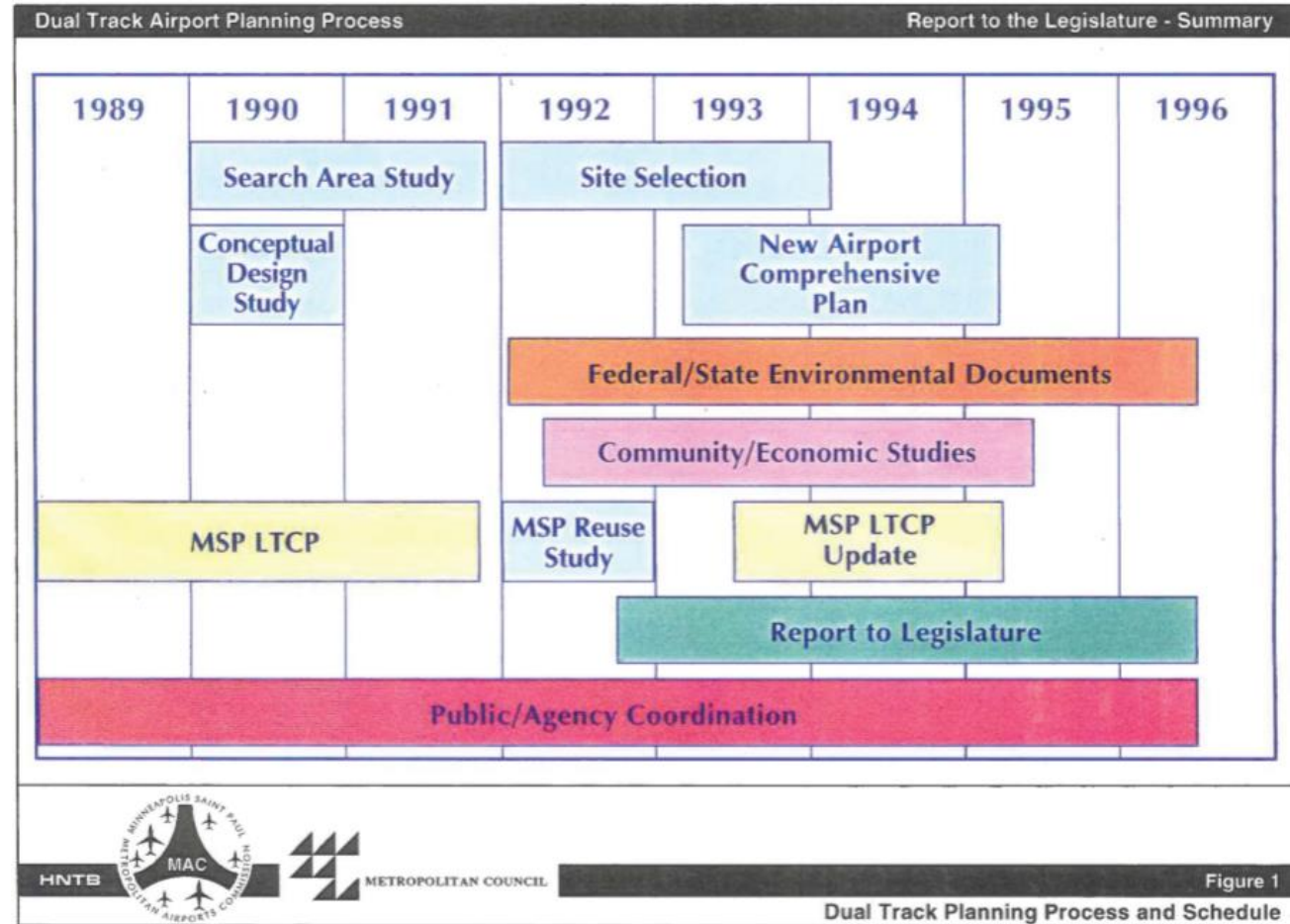
BWI Forecast & Terminal Requirements

PLANNING LEVEL	PASSENGER OPERATIONS	PARKING POSITIONS	OPERATIONS PER GATE
Domestic			
Master Plan 2030	254,600	71	3,586
40 MAP	306,000	85	
50 MAP	372,700	104	
International			
Master Plan 2030	19,200	11	1,745
40 MAP	28,500	16	
50 MAP	40,200	23	
Total Remotes			
Master Plan 2030	273,800	15	18,253
40 MAP	334,500	18	
50 MAP	412,900	23	



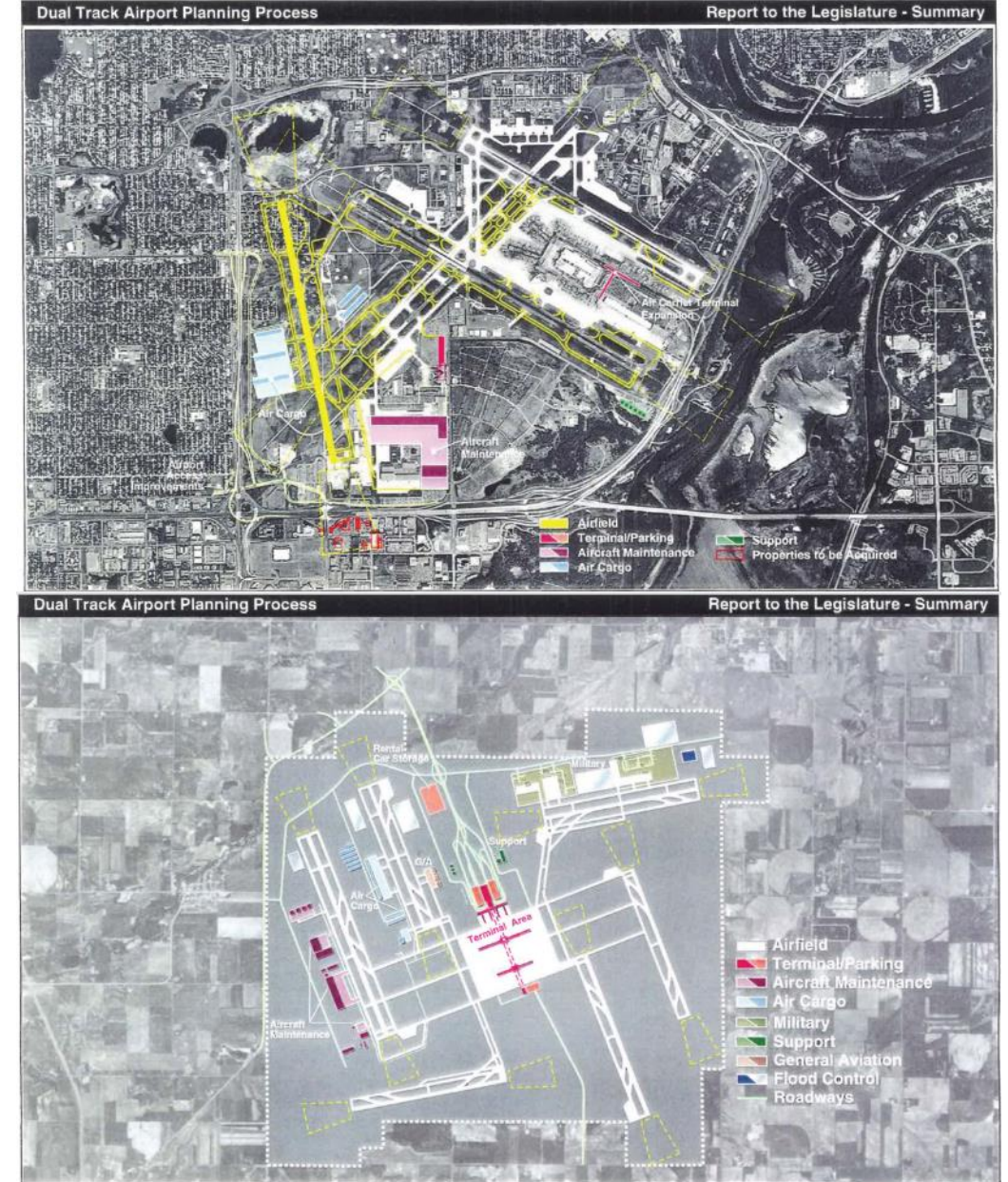
Alternatives

- ➔ Alternatives not chosen can be just as important as the chosen alternative
- ➔ MSP Dual Track Airport Study is an example



Alternatives

✈ My opinion: From a political standpoint, MSP was never going to see significant improvement until the option of a new airport was thoroughly studied



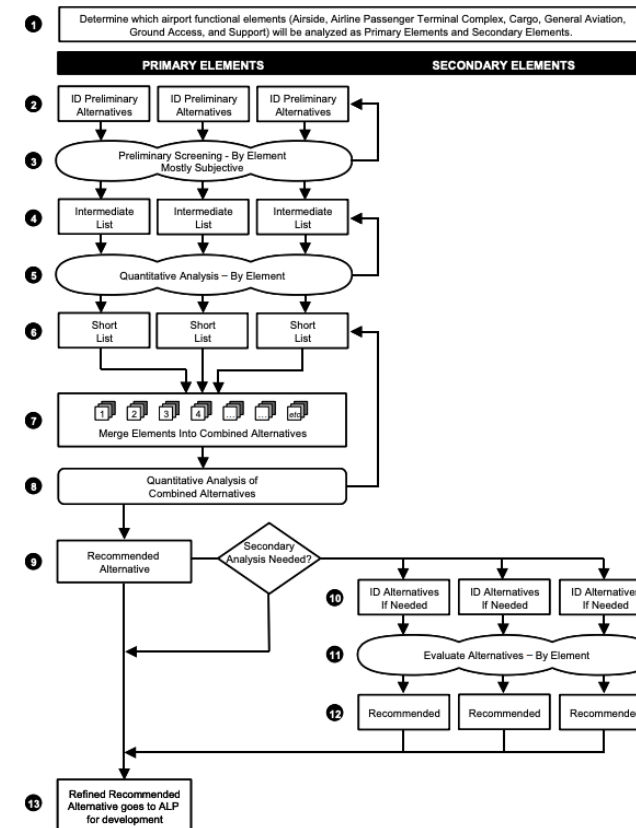
What Is An Alternative Analysis?

- ✈ Presents ways to address facility requirements
- ✈ Evaluates strengths & weakness
- ✈ Selects a recommended alternative



What Is An Alternative Analysis?

- ✈ Identify elements
- ✈ Evaluate & refine
- ✈ Merge
- ✈ Analyze
- ✈ Develop recommended



Alternative Analysis Chapter Development Strategies

- ✈ Meet facility requirements
- ✈ Considers short- and long-term objectives
- ✈ Addresses stakeholders
- ✈ Environmental
- ✈ Fiscal
- ✈ Prioritizes needs



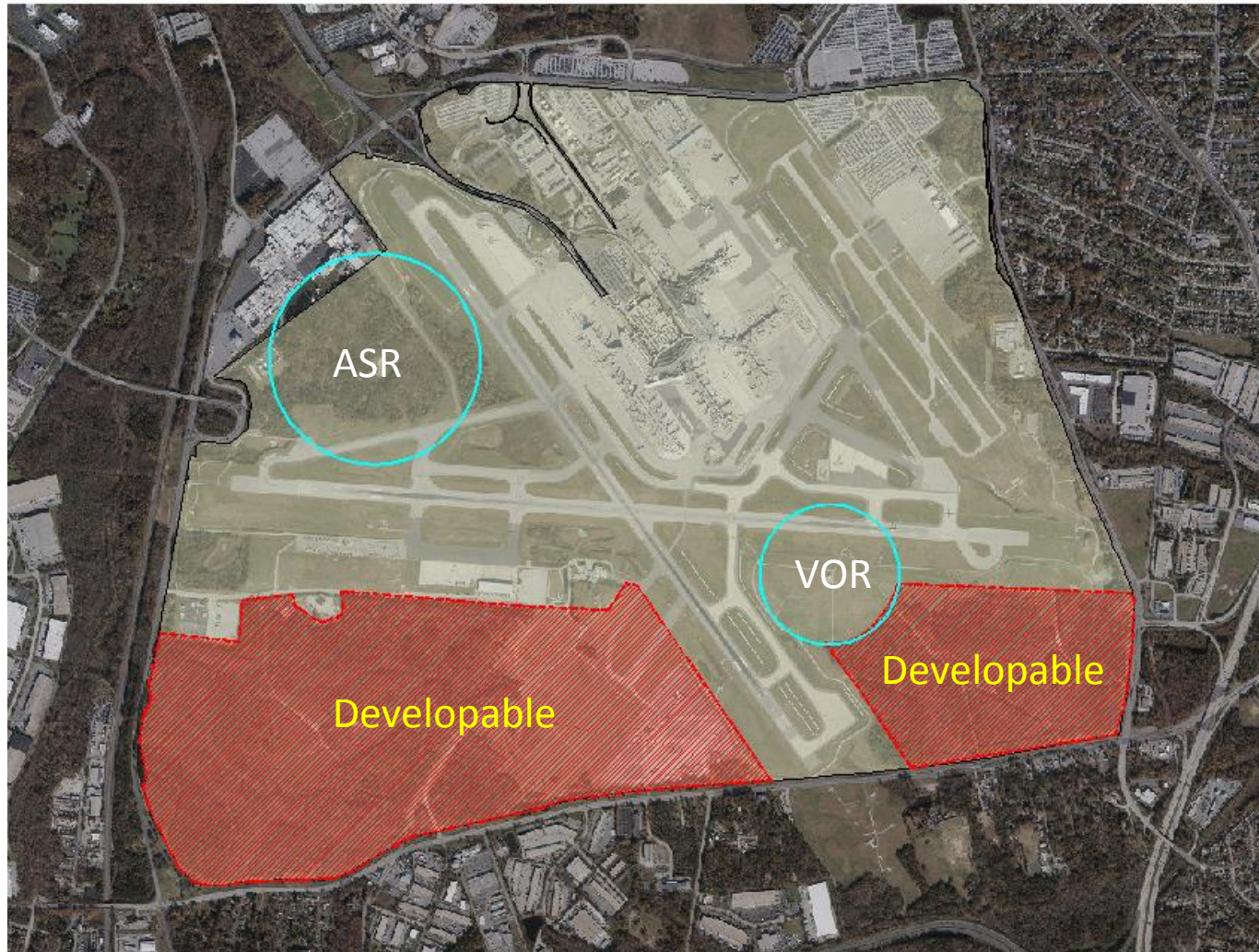
Alternatives Analysis:

- ➔ Master Planning
 - Comprehensive and can be conceptual only
 - Apply and screen environmental resources
 - Integrates the long-term plan
 - Preserves opportunity/flexibility on ALP

- ➔ Project Planning
 - Detailed analysis (including environmental)
 - Each iteration should become more robust and defensible
 - Paves the way for ALP and follow-on NEPA
 - Not design, but...



Alternatives Analysis:



BWI Marshall Airport

- ✈ 3,200+ Acres
- ✈ Limited developability
- ✈ Planned parallel 10-28



BWI ARFF Training Relocation Analysis (2013)

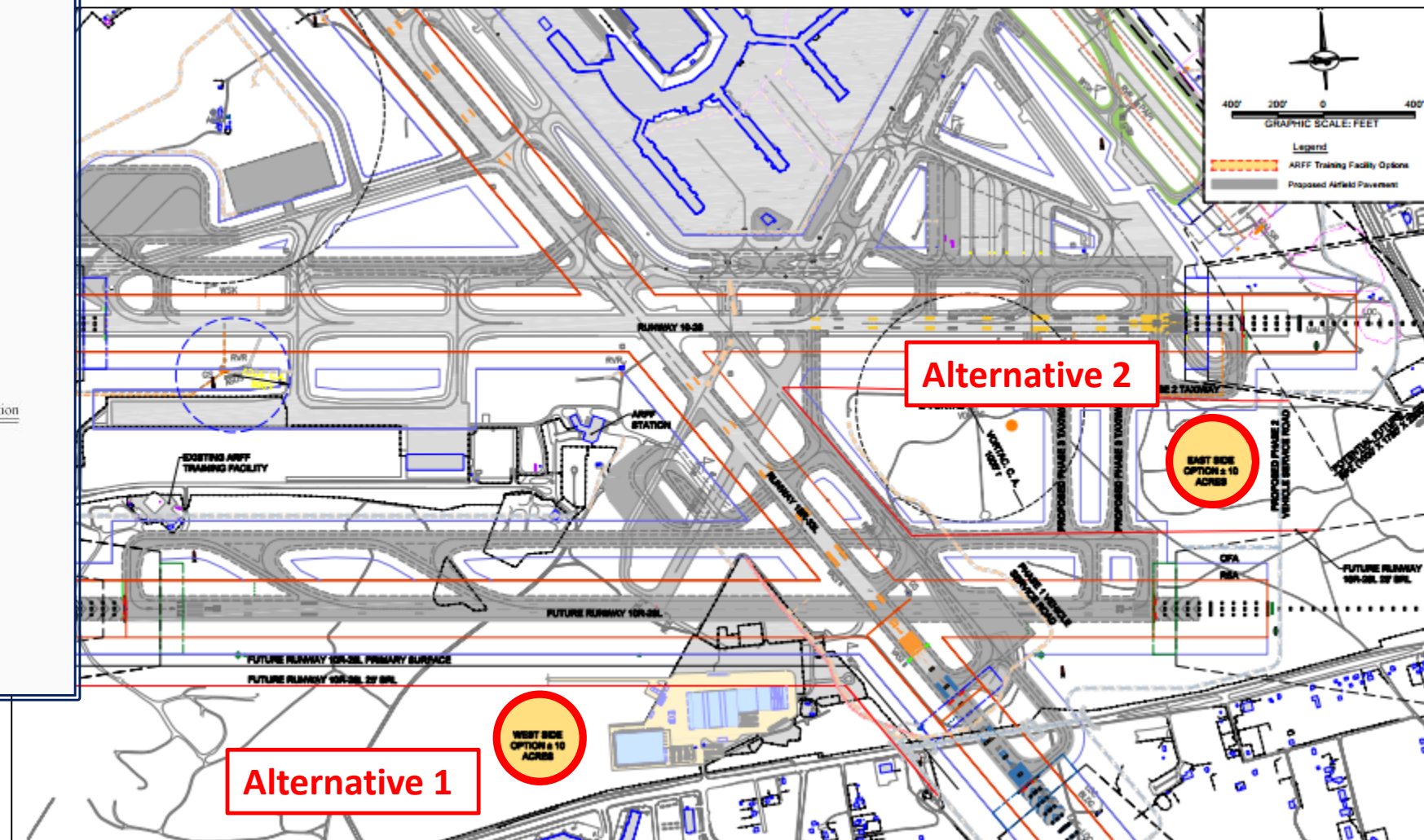
Airport Rescue and Fire Fighting (ARFF) Training Facility Relocation Analysis

MAA-AE-11-005
Task 033

Prepared for:



Maryland Aviation Administration



BWI ARFF Training Relocation Analysis (2013)

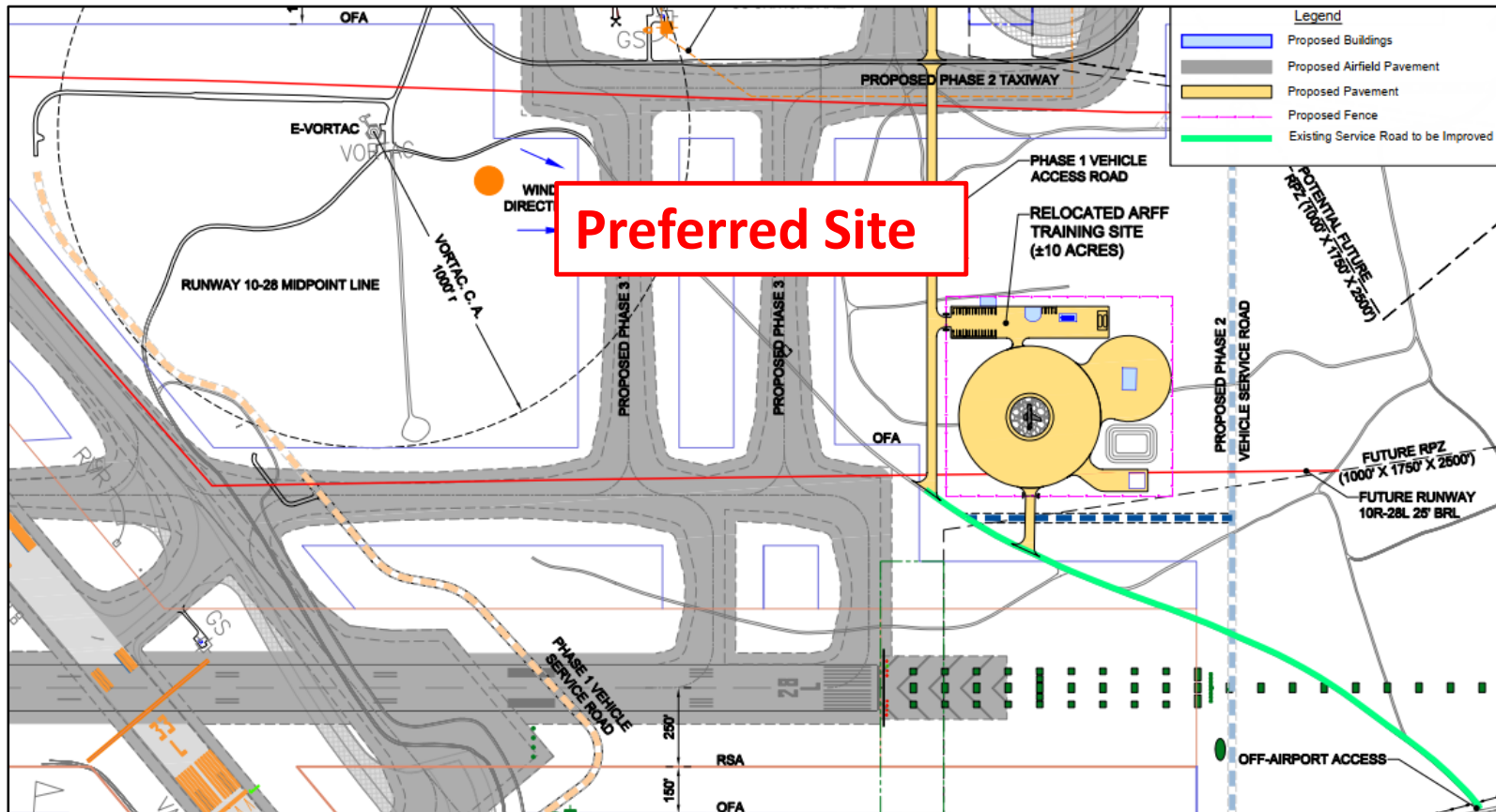
Site Comparison

Negatives

- ✈ Less accessible to landside
- ✈ Greater disturbance
 - 3X's more tree removal
- ✈ Costlier
 - By \$3M

Positives

- ✈ Proximal to airfield
- ✈ Land Use compatibility
- ✈ Highest and best use



BWI ARFF Training Center

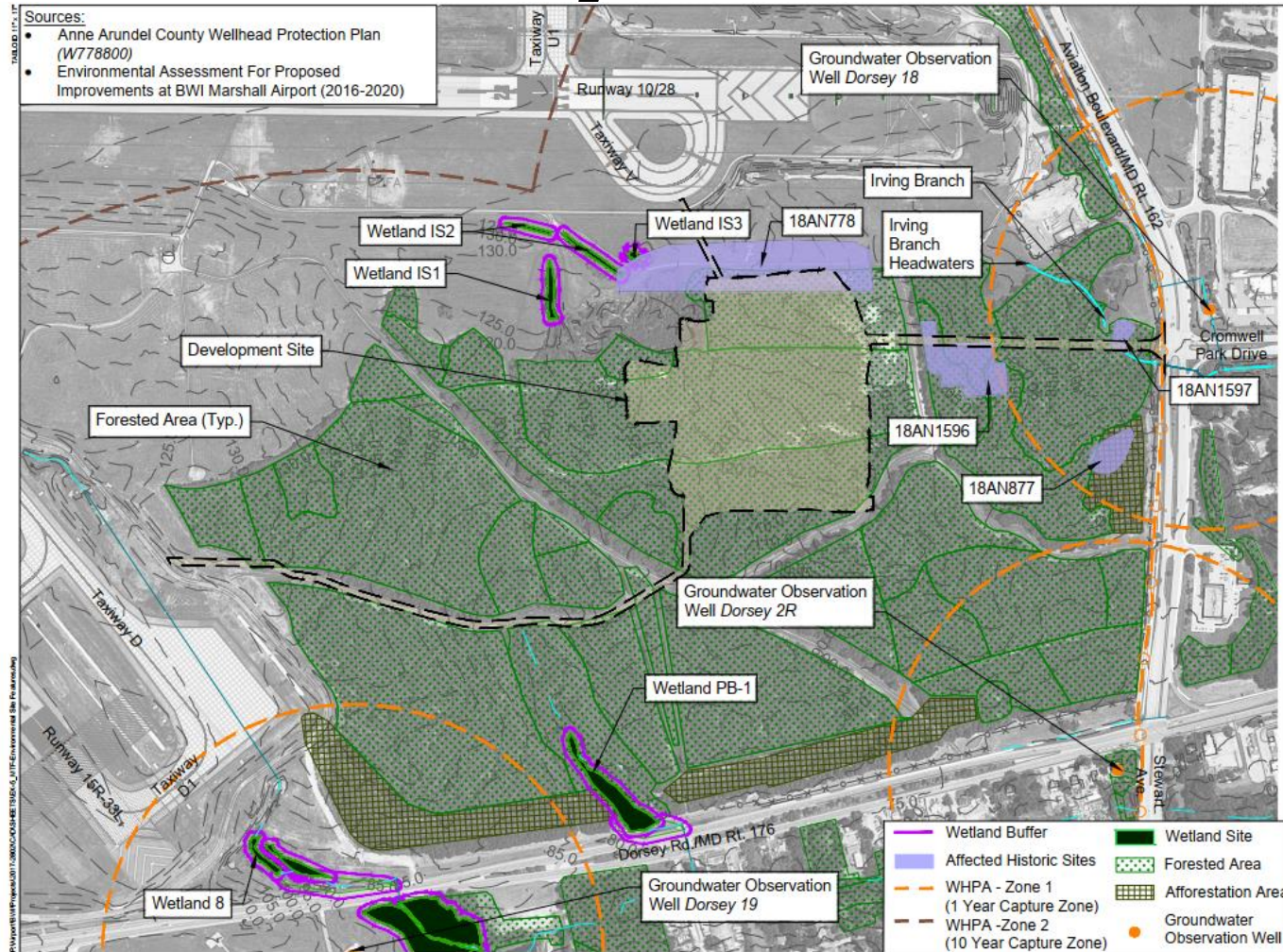
2017 Project Definition Document (PDD)



- ➔ More thorough/reliable analysis
- Site/facility plans (15% - 30%)
 - Environmental
 - Utilities
 - Costs

BWI ARFF Training Center

2017 Project Definition Document (PDD)



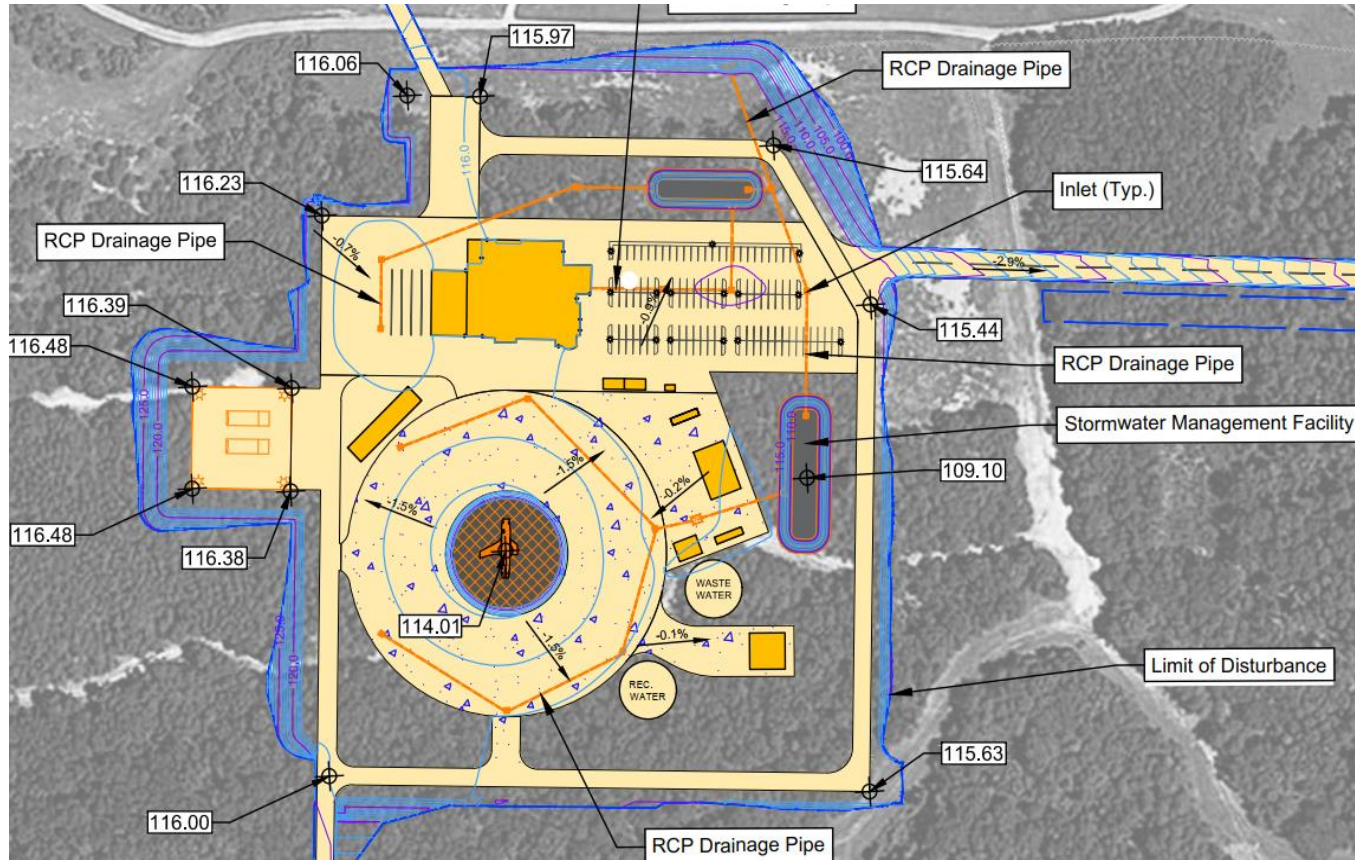
Environmental Analysis

- ➔ Well defined site/facility requirements
 - More reliable environmental
- ➔ Benefits from pre-design
 - Drainage
 - Utilities
 - Traffic Analysis

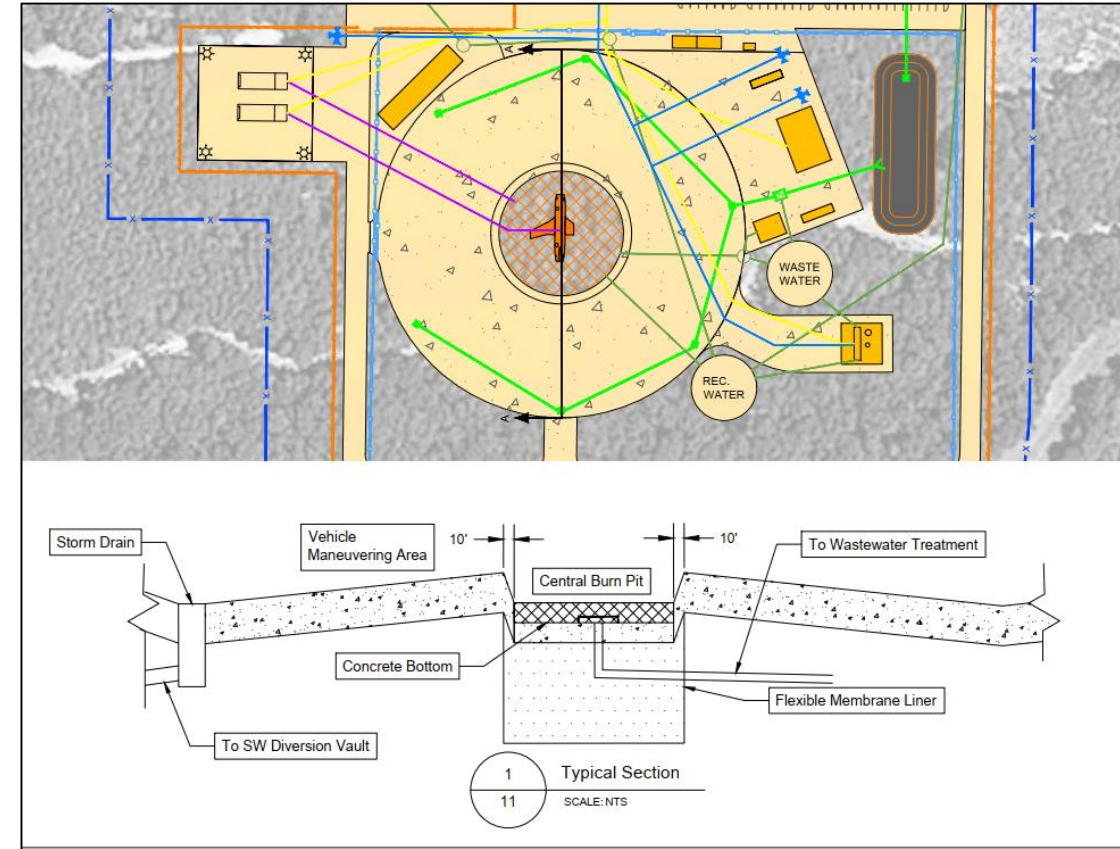
BWI ARFF Training Center

2017 Project Definition Document (PDD)

Drainage Plan



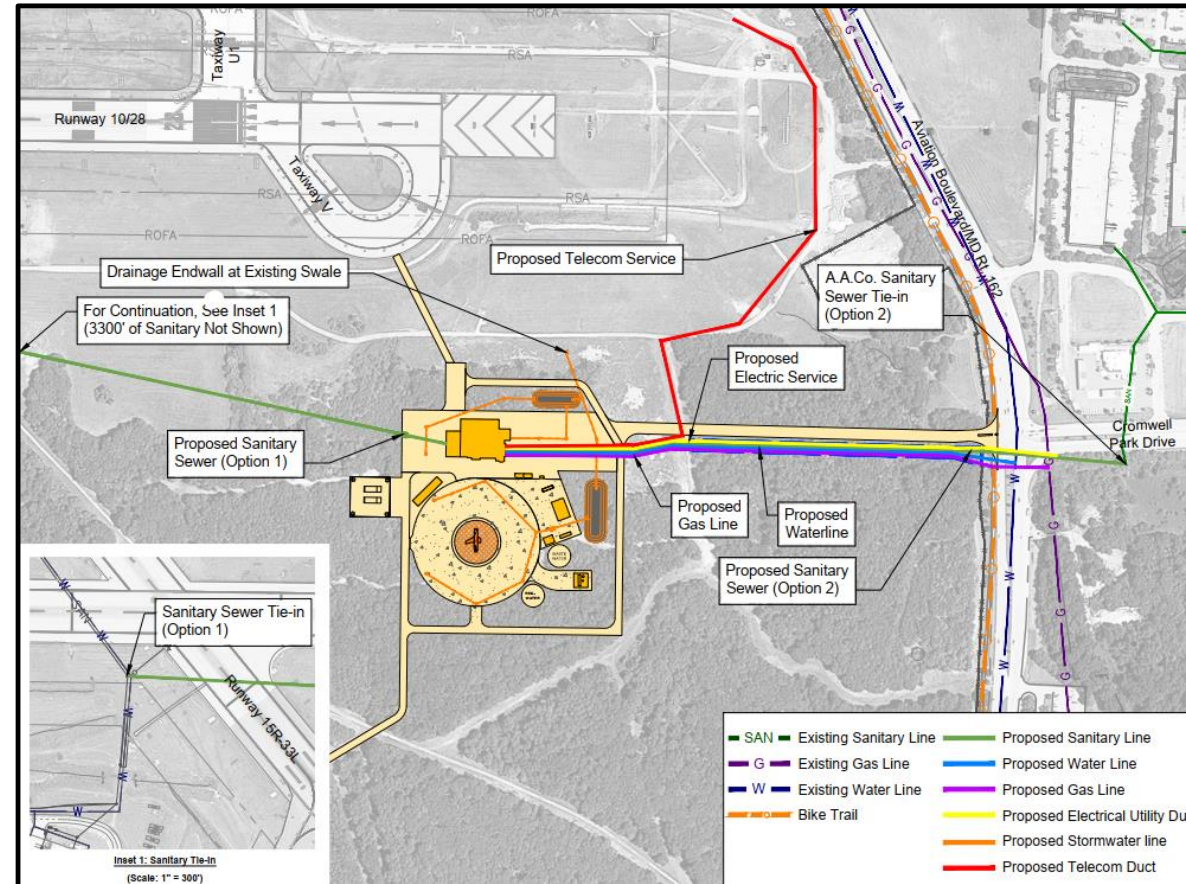
Drainage Section Plan



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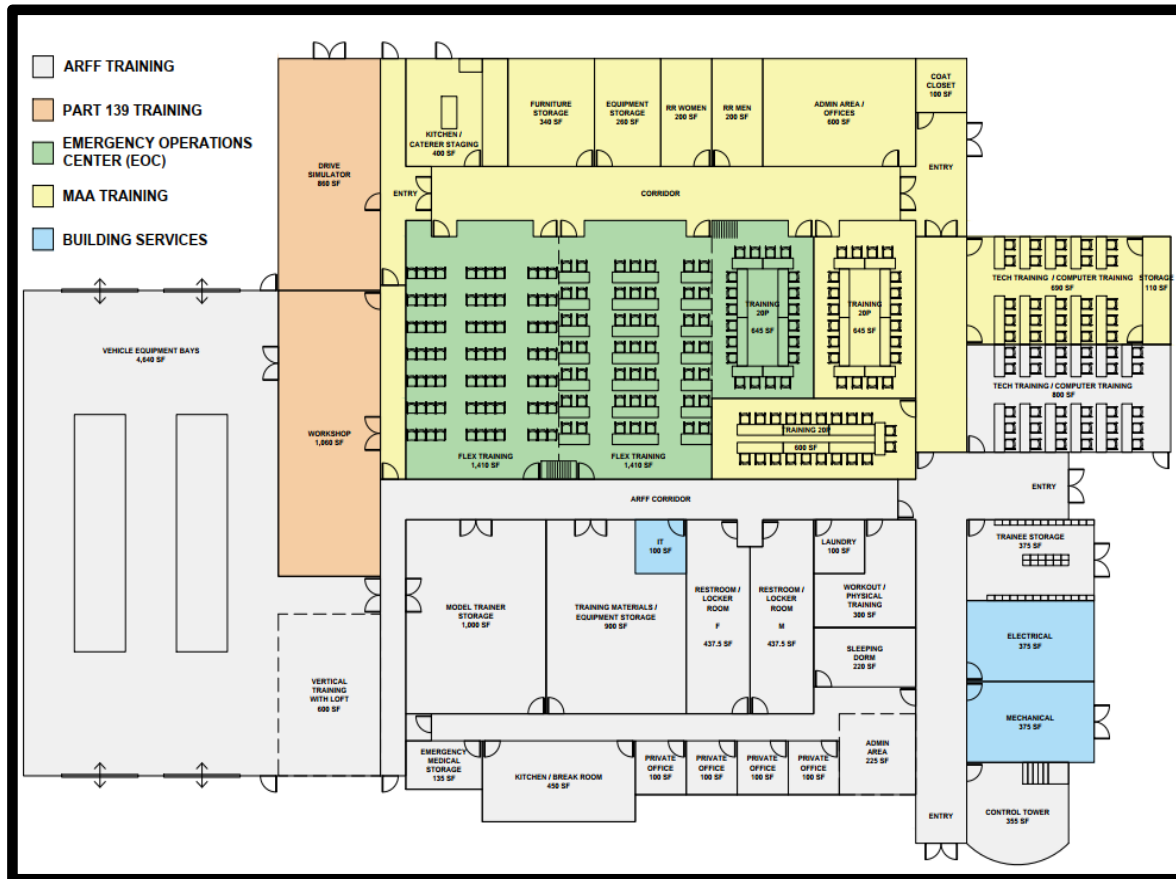
Utilities Plan



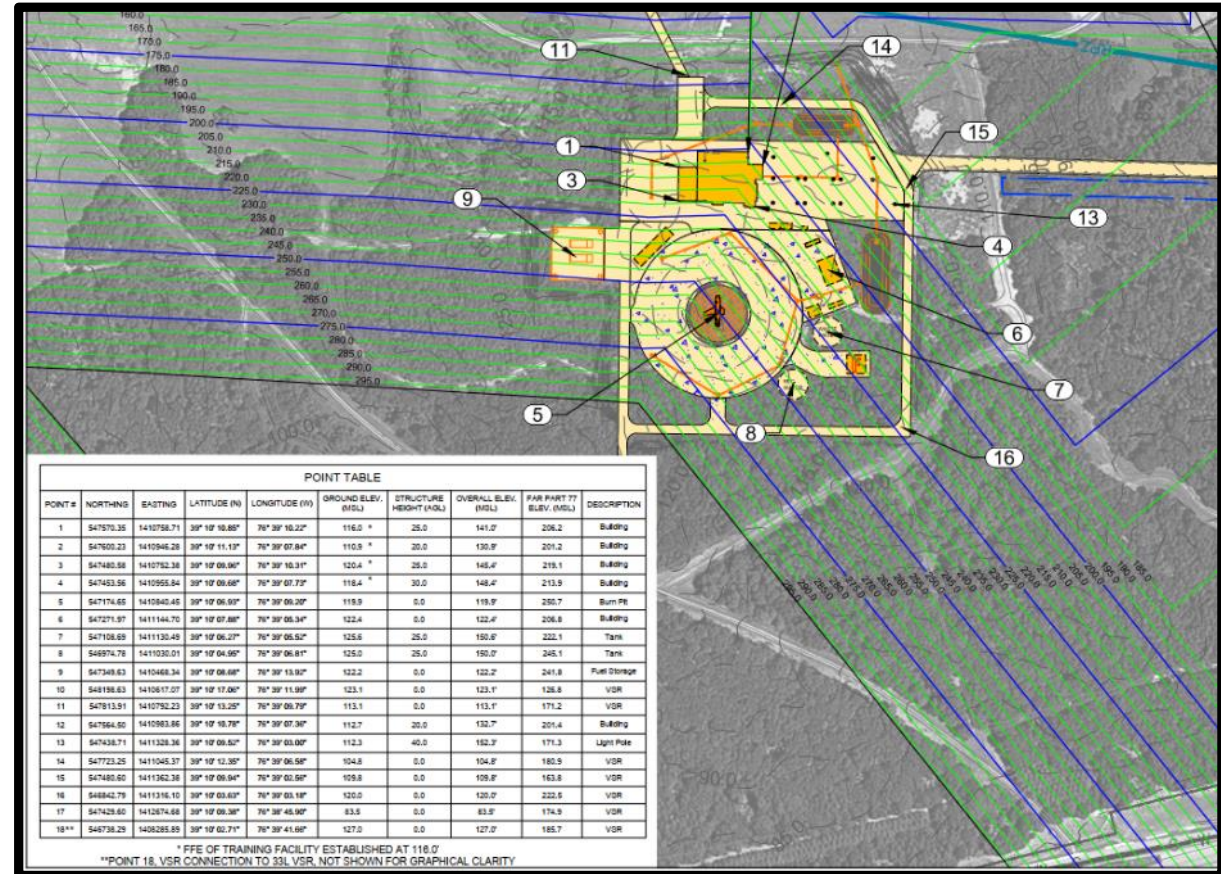
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Detailed Building Plans



Reliable Airspace Analysis



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- ➔ Many benefits
- Strengthens NEPA
 - Minimizes risk
 - Less delay to NEPA
 - Jump starts design
 - Better cost estimates