

AN AIRPORT PLANNING PERSPECTIVE:

GENERAL AVIATION AIRPORT RUNWAY EXTENSIONS

**Prepared for: 2017
NEC/AAAE Airports
Conference
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**Presented by:
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PRESENTATION TOPICS

- **Purpose and Need: Planning vs. Funding**
- **Runway Length Requirements**
- **Application of Design Standards**
- **Project Formulation**
- **Funding Considerations**



PURPOSE AND NEED

PLANNING

- **Supported by 20-Year Forecasts – 500 Annual Itinerant Operations by the Design Aircraft (of Family of Similar Airplanes)**
- **Ultimate with Eligibility Disclaimer**

FUNDING

- **Regular Use = 500 Annual Operations by the Design Aircraft (of Family of Similar Airplanes) Currently Documented (does not include touch and go operations)**
- **Includes Operations occurring at the Subject Airport or Alternate with Adequate Runway**



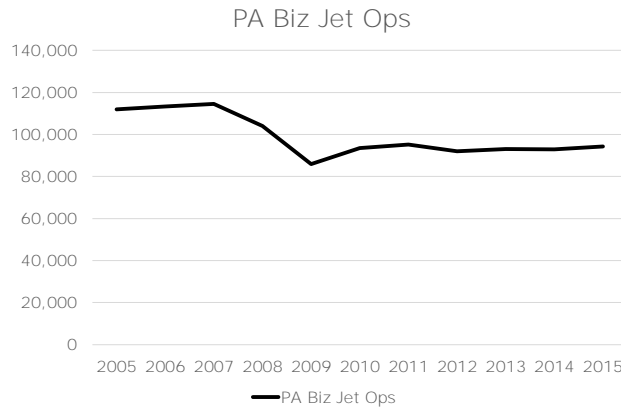
PURPOSE AND NEED: Example Operations Template

| Airport: Thomas M. Tomczyk Regional (TMT) | | CRITICAL AIRCRAFT OPERATIONS TEMPLATE (w/TFMISC CY 2015) FOR PROGRAMMING OF RUNWAY EXTENSIONS IN THE BOA 4 YEAR PLAN | | | | | | Alternate Airport | | Total |
|---|--------------|---|-----------------------|-----------|-------------------|--------------------------|---------------|-------------------|--------|-------|
| Aircraft Owner Name | Contact* | Registration Number (optional) | Aircraft Make & Model | Home Base | Final Destination | TMT Annual Departures.** | Aircraft Name | Annual Dep.** | Demand | |
| TFMISC 2015 Jet IFR Counts | BQA | NA | NA | NA | TMT | 100 | | 0 | 100 | |
| Est. VFR Jet Flights | BQA | NA | Various | Various | TMT | 8 | | 0 | 8 | |
| Flynn's Air Charter | Janet Flynn | NA | Various | Various | TMT | 0 | Various | 50 | 50 | |
| Teeka's Pet Products | Matt Johnson | N8675309 | Falcon 20 | TMT | Various | | RDG | 32 | 32 | |
| Total Departures | | | | | | 108 | | 82 | 190 | |
| Total Itinerant Ops. | | | | | | 216 | | 164 | 380 | |

* Include current phone number or e-mail
 ** Include a takeoffs for flights over 25 NM only.
 Please attach documentation (letters, FBO flight log summaries, etc.) verifying the departures shown above are as accurate as possible.
 If number of departures not specified, assume one per month



PURPOSE AND NEED: PA Business Jet Operations



Source: FAA Traffic Flow Management System Counts



PURPOSE AND NEED: Business Jet Ops Change

| | % CHANGE 2005 TO 2015 | RW Extension |
|----------------------------|-----------------------|--------------|
| Allegheny Co. | -23% | No |
| Pittsburgh-Butler Regional | +137% | Yes |
| Lancaster | -22% | Yes |
| Clarion Co. | +7% | Yes |
| Penn Valley | -18% | Yes |
| Arnold Palmer Regional | -12% | No |
| Pocono Mountains Municipal | +480% | Yes |

Source: FAA Traffic Flow Management System Counts



RUNWAY LENGTH FACTORS

- **Design Aircraft – Regular Use**
- **Jet & Non-Jet Runway Length Requirements**
 - **FAA AC 150/5325-4B**
 - **Aircraft Flight Planning Manuals**
- **Corporate Jet Owner/ Operator Differences**
- **Aircraft Insurance Requirement?**
- **Site Constraints**



DESIGN AIRCRAFT

| DESIGN AIRCRAFT SELECTION | | | | | | |
|---------------------------|----------------------------------|-----------------------------|--------------------|----------------------------|-----------------------|--------------------|
| Type | Aircraft Model | Annual Itinerant Operations | Max TO weight lbs. | Aircraft Approach Category | Aircraft Design Group | Runway Design Code |
| Jet | C560X - Cessna Excel/XLS | 100 | 21,250 | B | II | B-II |
| Jet | L440 - Learjet 40; Gates Learjet | 50 | 20,400 | C | II | C-II |
| Turboprop | PC12 - Pilatus PC-12 | 100 | 10,450 | B | II | B-II |
| Turboprop | BE20 - Beech 200 Super King Air | 300 | 12,500 | B | II | B-II |
| Jet | E55P - Embraer Phenom 300 | 20 | 17,968 | B | II | B-II |
| | Total | 570 | | | | |
| | Total Jet | 170 | | | | |
| | Total Turboprop | 400 | | | | |



FAA ADVISORY CIRCULAR 150/5325-4B

- **Effective Date: 7/1/2005**
- **Chapters 2 and 3 for GA Airports Runway Length Curves: Elevation and Temperature**
- **Chapter 3, GA Fleet between 12,501 lbs. and 60,000 lbs. Apply Gradient and Wet Conditions to Runway Length Curve Results which include the "60% Landing Distance Rule"**
- **Chapter 4, Guidance on airplanes \geq 60,000 lbs. and Regional Jets (typical for Primary Commercial Service Airports)**
- **AC is in the process of being updated.**

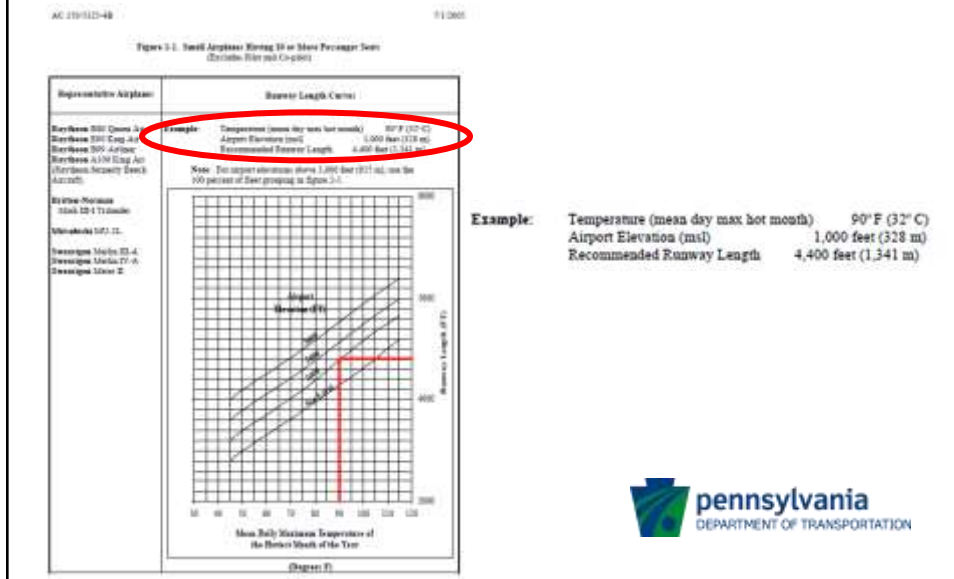


NON-JET AIRCRAFT RUNWAY LENGTH ANALYSIS

- **Chapter 2, FAA Advisory Circular 150/5325-4B**
- **Figure 2-1 Small Airplanes Fewer than 10 Seats:**
 - **95% Fleet, medium and small population centers, typically all piston singles and small twins (up to the Piper Seneca V)**
 - **100% Fleet, larger population centers, medium sized twins and turboprops (Beech Baron to King Air C-90)**
- **Figure 2-2 Small Airplanes More than 10 seats, (Beech King Air 200, Pilatus PC-12), larger population centers and use template for purpose and need**



NON-JET AIRCRAFT RUNWAY LENGTH ANALYSIS



CORPORATE JET RUNWAY LENGTH REQUIREMENTS

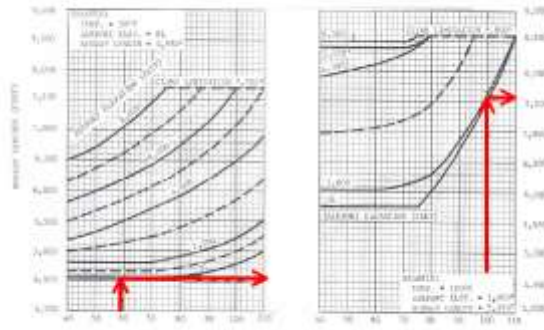
- **Chapter 3, FAA Advisory Circular 150/5325-4B**
 - **Figure 3-1: 75% Fleet Runway Length Curve, Require less than 5,000' runways at mean sea level and at the standard day temperature.**
 - **Figure 3-2 100% Fleet, Require 5,000' or longer runways at mean sea level and at the standard day temperature.**
 - **Useful Loads: 60% and 90%. Typically need regular use for aircraft haul lengths of 1,000 NM or more to apply 90% useful load. (in 2015, 700 of AGC's 11,400 jet ops met this, 6%).**
 - **Curves are not developed for operations at 100% useful load because many of the airplanes used to develop the curves are operationally limited in the second segment of climb.**

CORPORATE JET RUNWAY LENGTH REQUIREMENTS

AC 150/5225-4B

7/3/2005

Figure 3-1. 75 Percent of Flap at 40 or 50 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degree Fahrenheit:
 75 percent of flap at 40 percent useful load 75 percent of flap at 50 percent useful load



AIRCRAFT FLIGHT PLANNING MANUALS: Example Data

| | 0°C / 32°F | 10°C / 50°F | 15°C / 59°F | 20°C / 68°F | 25°C / 77°F | 30°C / 86°F | 35°C / 95°F | 40°C / 104°F |
|---|------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Max Takeoff Field Length - 15° Flaps | | | | | | | | |
| Citation Bravo | | | | | | | | |
| Sea Level | 3410 | 3540 | 3600 | 3740 | 3920 | 4160 | 4450 | 4810 |
| 1,000 ft | 3530 | 3670 | 3760 | 3950 | 4170 | 4450 | 4770 | 5160 |
| 2,000 ft | 3660 | 3800 | 3960 | 4200 | 4470 | 4770 | 5120 | 5540 |
| 3,000 ft | 3810 | 4010 | 4240 | 4490 | 4780 | 5120 | 5510 | N/A |

* Max takeoff weight: 14,800

Source: Citation Bravo Flight Planning Guide, July 2000



CORPORATE JET OWNER/OPERATOR DIFFERENCES

Example: Cessna Citation Sovereign 680, Airport Field Elevation 1,250', Mean Max Temp 86°, Grade Change 20', Wet Runway

RUNWAY LENGTH CALCULATIONS:

Part 91 Corporate Owned and Used

- Takeoff @ MTOW: 4,250'
- Landing @ MLW: 3,250'

Part 91k Fractional and Part 135 On-Demand

- Takeoff @ MTOW: 4,250'
- Landing @ MLW: 4,100' (DAAP), 5,425' (Non-DAAP)

DAAP: Destination Airport Analysis Program, FAR § 91.1037(c) or § 135.385, Land within 80% of Runway instead of 60% Non-DAAP.

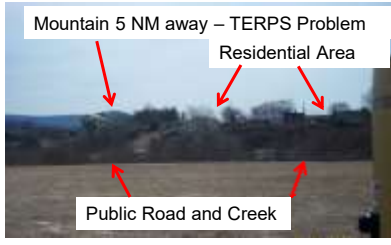


CORPORATE JET AIRCRAFT INSURANCE REQUIREMENT?

- **Although used as justification for runway extensions in planning studies, there appears to be no 5,000' runway length requirement that is mandated by corporate jet insurers.**
- **However, operating larger corporate jets at shorter fields would become a concern that may impact a policy.**
- **The 5,000' requirement came about as a National Business Aircraft Association (NBAA) "Best Practices" for operational safety.**



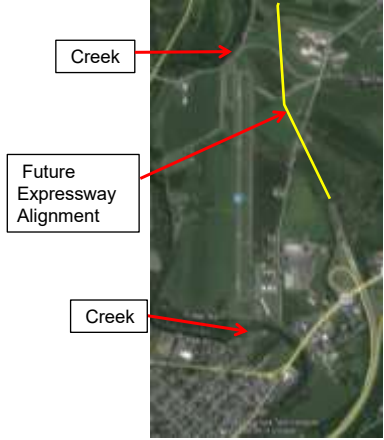
SITE CONSTRAINTS: Example Airport



South Approach



North Approach



APPLICATION OF DESIGN STANDARDS

- **FAA AC 150/5300-13A, Change 1, Para 105 b:** *"The first consideration of the airport planner should be the safe operation of aircraft likely to use the airport. Any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin..."*
- **FAA AC 150/5325-4B, Chapter 2 Runway Length Curves, 95% Fleet: B-I (small), 100% Fleet: B-II (small)**
- **FAA AC 150/5325-4B, Chapter 3 Runway Length Curves, 75% GA Fleet, Current U.S. Registration Data:**
 - Approach Category B: 63%
 - Approach Category C: 37%
- **100% Fleet: Use Approach Category C or D**



B-II Jet 75% GA Fleet



C-II Jet 75% GA Fleet



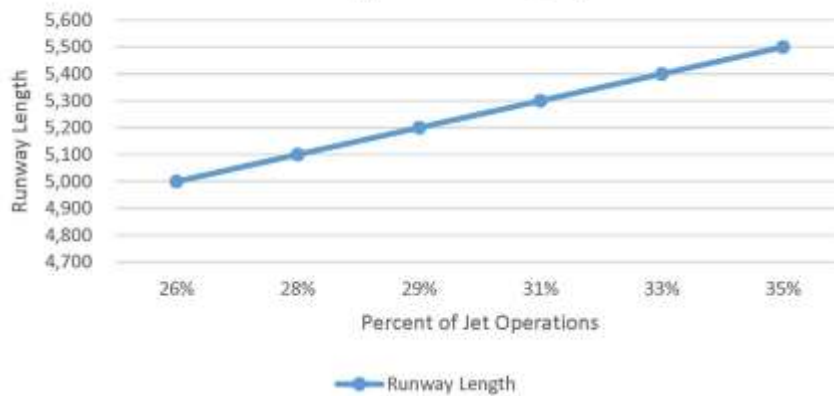
APPROACH CATEGORY B vs. C

| Design Items | B-II Runway | C-II Runway |
|--|--|---|
| Runway Width | 75 feet | 100 feet |
| Runway Safety Area Beyond Runway End | 300 feet | 1000 feet |
| Runway/Taxiway Separation | 240 feet | 300 feet |
| Runway Protection Zone (1 mile visibility) | 1000 feet x 500 feet x 700 feet (14 acres) | 1700 feet x 500 feet x 1010 feet (29 acres) |



APPROACH CATEGORY B vs. C

Percent Approach Category C

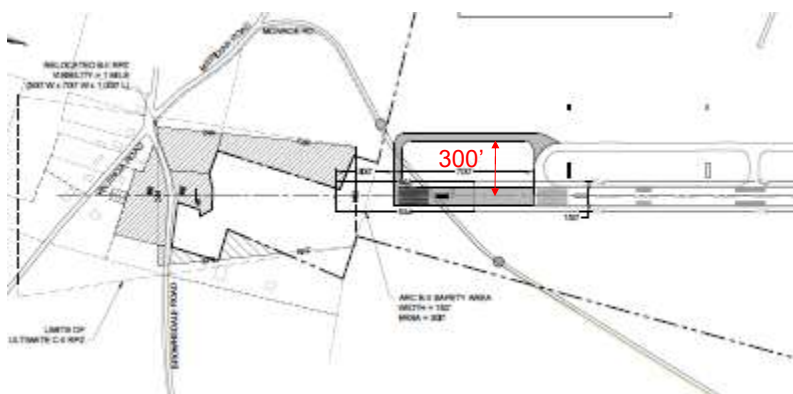


RUNWAY EXTENSION DESIGN: BOA Perspective

- **Extensions for Corporate Jets Based on FAA Recommended Runway Length Requirements (typically 5,500')** but regular use, current to year 5, is B-II aircraft:
 - **New pavement geometry C-II (RW TW CL Separation)**
 - **Remaining standards must meet applicable B-II in the interim.**
 - **Meet all C-II Standards in the Future/Ulimate configuration shown on the ALP.**
- **Extensions for Corporate Jets Based on B-II Design Family Flight Planning Manuals: Must meet all applicable B-II Standards:**
 - **A 5,000' maximum practicable landing length accommodates most B-II aircraft .**
 - **Due to Site Constraints, rationale for most GA runway extensions in PA, constructed and planned for corporate jets.**



BOA PERSPECTIVE: Example Interim Configuration



PROJECT FORMULATION – RUNWAY EXTENSIONS

- **For FAA (State Block Grant Program):**
 - **Depicted on Approved ALP**
 - **Documented Funding Purpose and Need (500 Itinerant Operations Documented)**
 - **When applicable, formal Benefit-Cost Assessment, benefits typically are eliminating intermediate fueling stop and using alternate airports**
 - **Environmental (NEPA) Approval**
 - **Must Meet Design Standards (standard turf RSA's, land-use compliant RPZ's, etc.)**



FUNDING CONSIDERATIONS: FAA (and PA Block Grant)

- **For FAA Funding (State Block Grant Program):**
 - **Any land acquisition funding needs to have real estate appraisal, accepted settlement justification and evidence of good title to the acquired property to be eligible.**
 - **FAA Discretionary funding typically requires a high National Priority Rating (NPR) to be competitive.**
 - **Multiple grant years are likely for high cost projects.**



FUNDING CONSIDERATIONS: Pennsylvania

- **For State/Local Funding:**
 - **Capital Budget: Typical release \$10M, non-FAA eligible projects: 50% state share, FAA-eligible: 75% state share. Need line item in an approved Bill. Must construct to reimburse for design**
 - **Annual State/Local Aviation Development funding is approx. \$2.5 M for the next four years. All 131 Aviation Facilities are eligible. Project must be on approved BOA Four-Year Program**
 - **Multi-modal Aviation Set-Aside, 70% state share currently, shall normally not exceed \$3.0 M for any project, related engineering, design and inspection cost shall not exceed 10% of the grant award**



POTENTIAL PLANNING CHANGES: Runway Extensions

- **New Recommended Runway Length AC:**
 - **Under Development**
 - **Database being developed using new technology**
 - **Will include a new Runway Length Calculation Tool (could differentiate B-II versus C-II aircraft requirements)**
- **Runway Length Guidance:**
 - **Regular use for funding eligibility to continue**
 - **Useful load exceeding 60% needs documented justification**
 - **Use of 100% fleet may be less than regular use if larger aircraft are based or frequent the airport (Use good planning judgement)**
 - **Providing runway length for all-weather conditions may not always be factored for funding eligibility at GA Airports**



INSPIRED BY



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PLANNING PERSPECTIVE – RUNWAY EXTENSIONS



Thank-you !

Questions?

