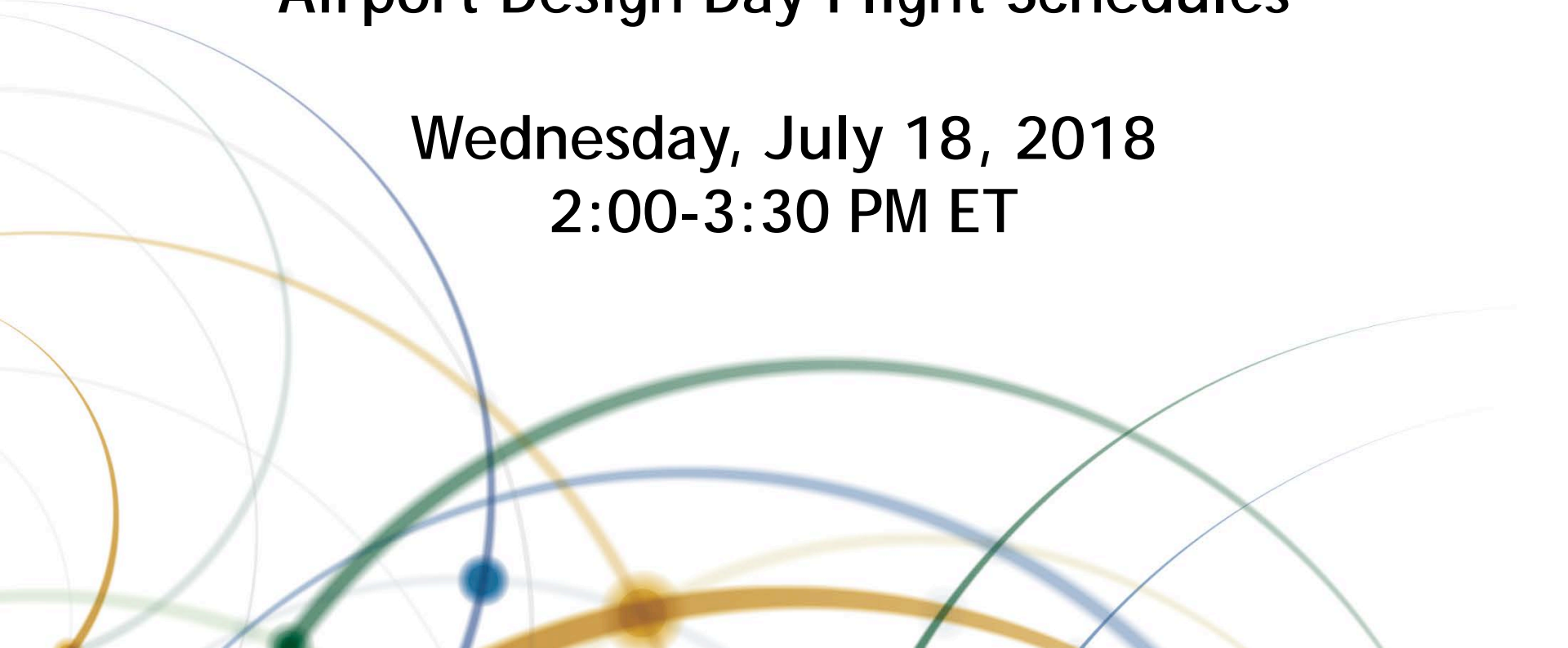


TRANSPORTATION RESEARCH BOARD

**Preparing and Using
Airport Design Day Flight Schedules**

**Wednesday, July 18, 2018
2:00-3:30 PM ET**



Purpose

Discuss research from the [Airport Cooperative Research Program](#) (ACRP)'s [Research Report 163](#): Guidebook for Preparing and Using Airport Design Day Flight Schedules.

Learning Objectives

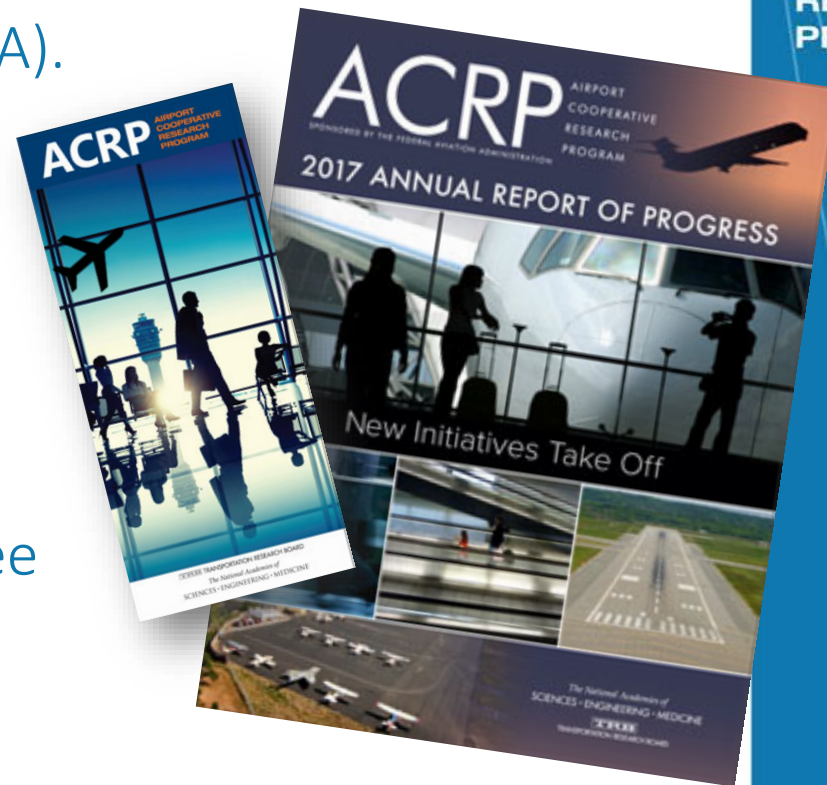
At the end of this webinar, you will be able to:

- Describe how to determine when to use a design day flight schedule (DDFS)
- Understand the practical uses of DDFSs
- Understand how to develop a DDFS



ACRP is an Industry-Driven Program

- ✈ Managed by TRB and sponsored by the Federal Aviation Administration (FAA).
- ✈ Seeks out the latest issues facing the airport industry.
- ✈ Conducts research to find solutions.
- ✈ Publishes and disseminates research results through free publications and webinars.



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Upcoming ACRP Webinars

September 13

Applying the Value of Time in Benefit-Cost Analyses
When Airport Capital Improvement Projects Impact
Passenger Trip Segments

September 26

Establishing a Coordinated Local Family
Assistance Program for Airports

October 11

Understanding the Challenges of Airport
Drinking Water Quality Events

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Additional ACRP Publications Available on Today's Topic

Report 25: [Airport Passenger Terminal Planning and Design, Volumes 1 and 2](#)

Report 40: [Airport Curbside and Terminal Area Roadway Operations](#)

Report 76: [Addressing Uncertainty about Future Airport Activity Levels in Airport Decision Making](#)

Report 79: [Evaluating Airfield Capacity](#)

Report 82: [Preparing Peak Period and Operational Profiles](#)

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Today's Speakers

Patrick Kennon, HNTB Corporation
and
Rick Busch, Aviation, Inc.

Presenting Report 163
Guidebook for Preparing
and Using Airport
Design Day Flight Schedules (DDFS)

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ACRP Report 163: Guidebook for Preparing and Using Airport Design Day Flight Schedules

Patrick Kennon
Rick Busch



ACRP Report 163

Oversight Panel

Angela Schaefer, Southwest Florida International Airport, Panel
Chair

Steven Baun, AvAirPros, Inc.

Joel Hirsch, Hirsch Associates

Benjamin Leischner, Seattle-Tacoma International Airport

Wayne G. Sieloff, Wayne County Airport Authority

Susan J. H. Zellers, Hanson Professional Services, Inc.

Danielle J. Rinsler, AICP, FAA Liason

Richard Marchi, RFMarchi Aviation Consulting, Inc.

Christine Gerencher, TRB Liaison

Marci A. Greenberger, ACRP Senior Program Officer

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ACRP Report 163

Research Team

Patrick Kennon, HNTB Corporation, Principal Investigator

Rick Busch, Aviation Inc.

Bob Hazel, Oliver Wyman, Inc.

Omar El-Sayed, Oliver Wyman, Inc.

Rose Agnew, Aviation Innovation, LLC

Cristina Coverdall, Aviation Innovation, LLC

Debra Lubin

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ACRP Report 163: *Guidebook for Preparing and Using Airport Design Day Flight Schedules*

- Identifies when a DDFS should be used
- Describes key elements of DDFS
- Provides guidance on scoping DDFS
- Describes how to prepare DDFS
- Describes how to apply DDFS results
- Describes how to Address Risk and Uncertainty
- Describes how to communicate DDFS results
- Published 2016

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What is a DDFS?

A Design Day Flight Schedule (DDFS) is a detailed snapshot of existing or forecast activity at an airport during a defined busy day (design day) or critical demand period.

The DDFS shows individual aircraft arrivals and departures by time of day and, if needed, can also show airline, origin/destination, and the number of passengers associated with each flight.

Purpose of Guidebook (Research Problem)

1. Provide Airport leaders an understanding of DDFS
2. Provide Airport staff and consultants with detailed information on how to prepare a DDFS
3. Provide Airport staff and consultants guidance on how to use and communicate results.

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Research Process

1. Literature Review
2. Surveys and Interviews
 1. Airports (10)
 2. Consultants (10)
 3. Airlines (7)
 4. Technology Providers (3)
3. Independent Research
 1. Stability of Airline Schedules
 2. Impact of Uncertainty
4. Field Tests (Validation)
 1. Airports (4)
 2. Consultants (3)

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When to Use DDFS

Key General Decision Factors

- **Type and Complexity of Project**
- **Resources Available**
- **Capital Project Costs – Will Benefit-Cost Analysis be Needed?**
- **Degree of Stakeholder Scrutiny**
- **Expected Amount of Controversy**

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When Should DDFSs be Used – General Guidance

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	DDFS More Likely to be Needed or Useful	DDFS Less Likely to be Needed or Useful
Airport Size	Large or Medium Hub	Small or Non-Hub
Airport Role	High percentage of scheduled operations	Low percentage of scheduled operations
Pattern of aircraft activity	Complex/ Changing	Simple/ Stable
Constraints on aircraft activity	Constraints	No constraints
Type of Project	Capacity	Non-Capacity
Project Category	Terminal/Airfield	General Aviation/ Landside
Project Complexity	Complex	Simple
Detailed Follow-on Work	Yes	No
Competing Airport Activity Demands	High	Low
Planning Tool (s)	Complex	Simple
Project Cost	High	Low
Degree of Stakeholder Scrutiny	High	Low
Expected Amount of Controversy	High	Low
Available Analytical Resources	High	Low

When Should DDFS be Used -- Specific Guidance

- **Tables in Report:**
 - Airside
 - Terminal Area
 - Landside Analysis
 - Environmental Analysis
 - Operations and Management
- **For Each Table:**
 - Planning Issue
 - Approach Used
 - DDFS Role
 - Is DDFS Required, Useful and/or Not Required?
 - Alternatives to DDFS

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When Should a DDFS Be Used: Airside

Planning Issue	Approach	DDFS Role	Alternatives to DDFS
Capacity/Delay	Simulation Model	Required	None
	Spreadsheet Models	Not Required	Peak Period/Fleet Mix Forecasts
Operations and Efficiency	Simulation Model	Required	None
	Airfield Layout Analysis	Not Required	Peak Period/Fleet Mix Forecasts
Runway Length	Spreadsheet Models	Not Required	Fleet Mix Forecasts
Deicing	Simulation Model	Required	None
	Spreadsheet Models	Not Required	Peak Period/Fleet Mix Forecasts
At Gate	Gate Allocation Model	Required	None
	Spreadsheet Models	Not Required	Operations/Passenger Forecasts
	Airline Input	Not Required	Not applicable
Remain Overnight	Gate Allocation Model	Required	None
	Spreadsheet Models	Not Required	Operations/Passenger Forecasts
	Airline Input	Not Required	Not applicable
Aircraft Rescue and Firefighting	Airfield Layout Analysis	Not Required	Operations/Fleet Mix Forecasts

Required DDFS Elements: Airside Planning

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DDFS Element	Type of Planning Analysis					
	Airfield			Aircraft Parking		Safety
	Capacity/ Delay	Operations and Efficiency	Deicing	At Gate	Remain Overnight	Incursion Analysis
Arrival/Departure Designation	Required	Required	Required	Required	Required	Required
Arrival/Departure Pairing	Useful	Useful	Useful	Required	Required	Useful
Activity Category	Useful	Useful	Useful	Useful	Useful	Useful
Flight Time	Required	Required	Required	Required	Required	Required
Day of Week	Useful	Useful	Useful	Useful	Useful	Useful
Airline Designation	Useful	Useful	Useful	Useful	Useful	Useful
Flight Number	Useful	Useful	Useful	Useful	Useful	Useful
Domestic/International Designation	Not Required	Not Needed	Not Required	Useful	Useful	Not Required
Gate Assignment	Useful	Useful	Useful	Useful*	Useful*	Useful
Remain Overnight Status	Useful	Useful	Useful	Required	Required	Useful
Origin/Destination	Useful	Useful	Useful	Useful	Useful	Useful
Equipment Type/Category	Required	Required	Required	Required	Required	Required
Aircraft Seats	Not Required	Not Needed	Not Required	Not Required	Not Required	Not Required
Enplaned/Deplaned Passengers	Not Required	Not Needed	Not Required	Not Required	Not Required	Not Required

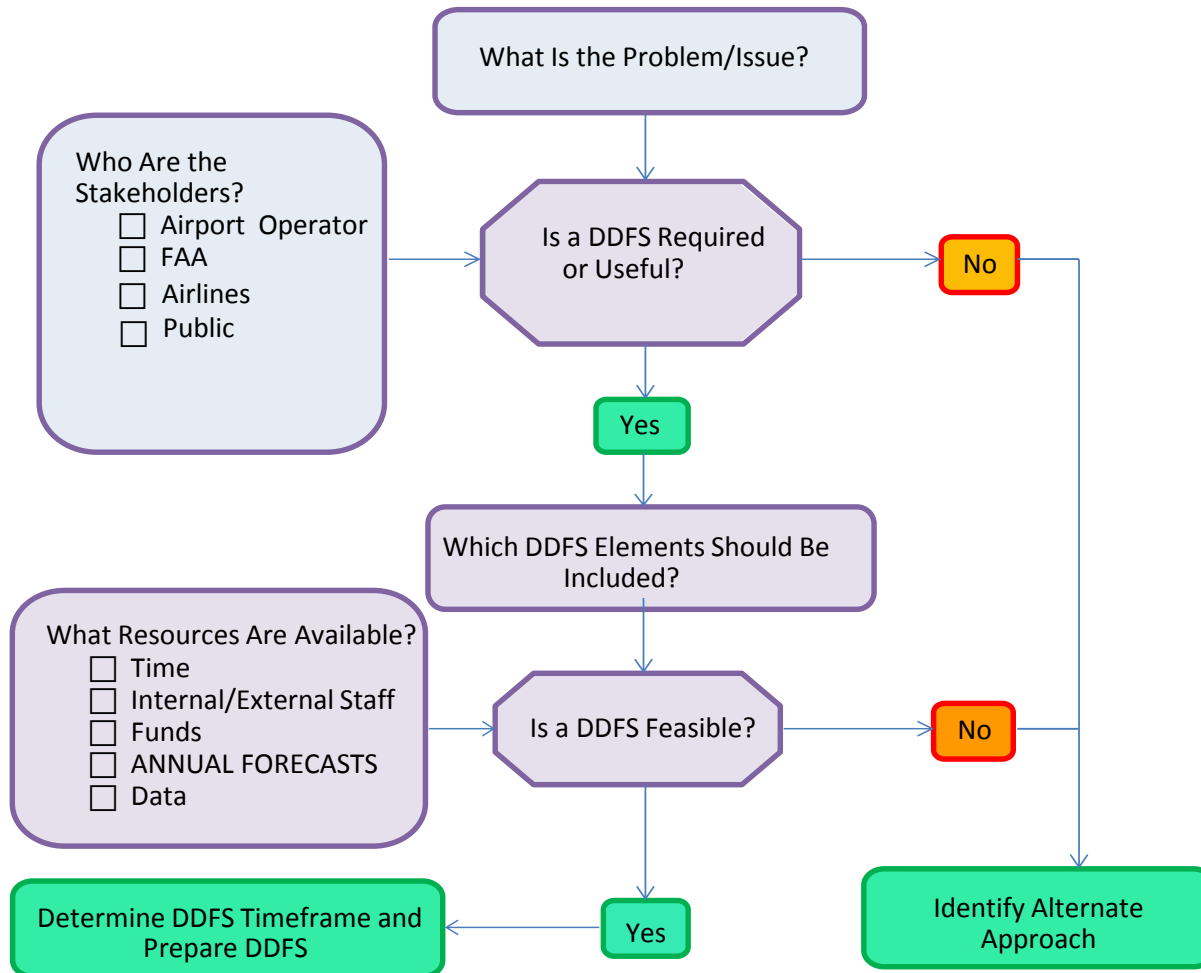
DDFS Time Period

- **Timeframe(s) to be Considered for the DDFS?**
 - Current, "Base Year"
 - Near-Term (12 months or less)
 - Medium-Term (5 years +/-)
 - Long-Term (10, 20 years or more)

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Summary: Scoping a DDFS



How to Prepare DDFS

Stakeholder Input

- Airlines
- Airport staff

Types of Input

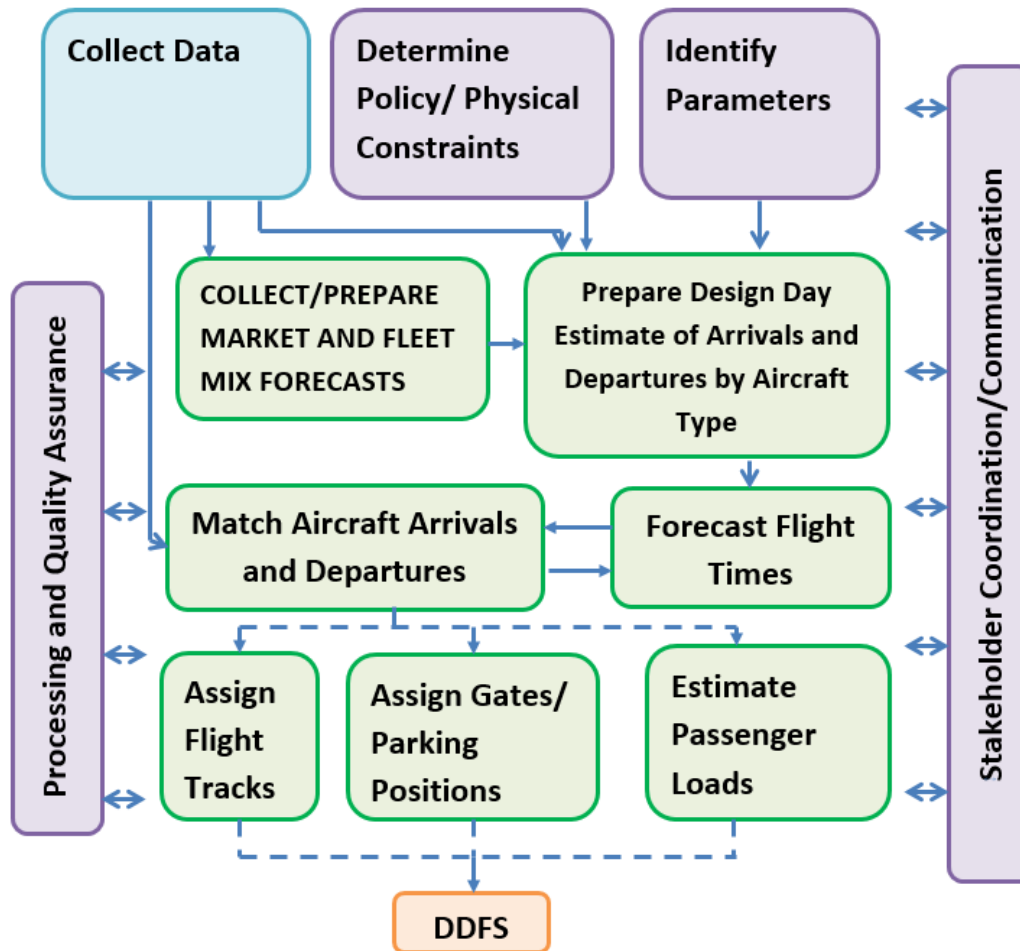
- **Definition of Design Day**
- Fleet mix
- Factors determining flight times
- Turnaround, tow-on and tow-off, and buffer times
- Gate utilization targets
- Gates vs. hardstands
- Spare gates
- Irregular operations

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How to Prepare DDFS



How to Prepare DDFS

Summary of Key Steps

1. Project Future Markets
2. Project Future Fleet Mix
3. Forecast Future Flight Times
4. Assigning Gates
5. Forecasting Passengers by Flight
6. Charter, Cargo, GA and Military
7. Application of Constraints, if Applicable
8. Update Process
9. **Quality Assurance and Control**

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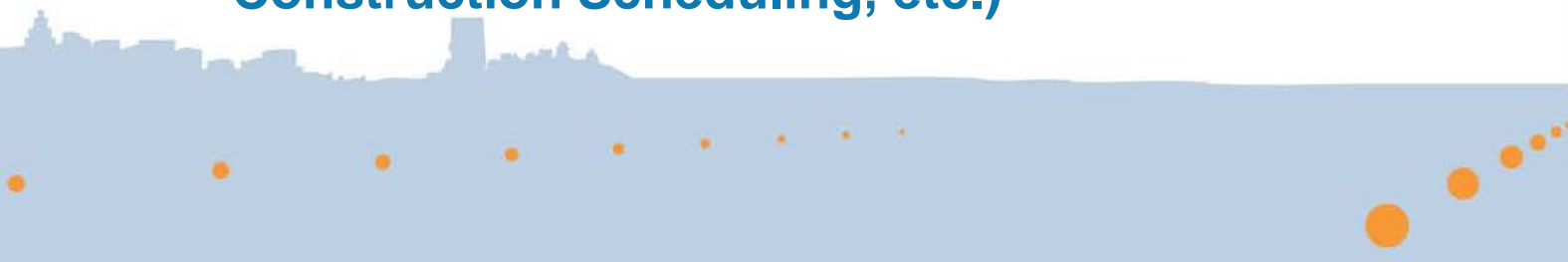


How to Apply DDFS Outputs

- **Inputs to various modeling types: Simulation, Spreadsheet and Other**
- **Airfield/Airspace Planning**
- **Terminal Building Planning**
- **Landside Planning**
- **Environmental Planning (Noise and Air Quality Models and Mitigation)**
- **Airport Operations (Staffing, Maintenance and Construction Scheduling, etc.)**

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How to Address Risk and Uncertainty

- **Sources of Uncertainty**
- **Evaluation of Uncertainty**
- **Management of Uncertainty**

Additional Guidance in ACRP Report 76: Addressing Uncertainty about Future Airport Activity Levels in Airport Decision Making

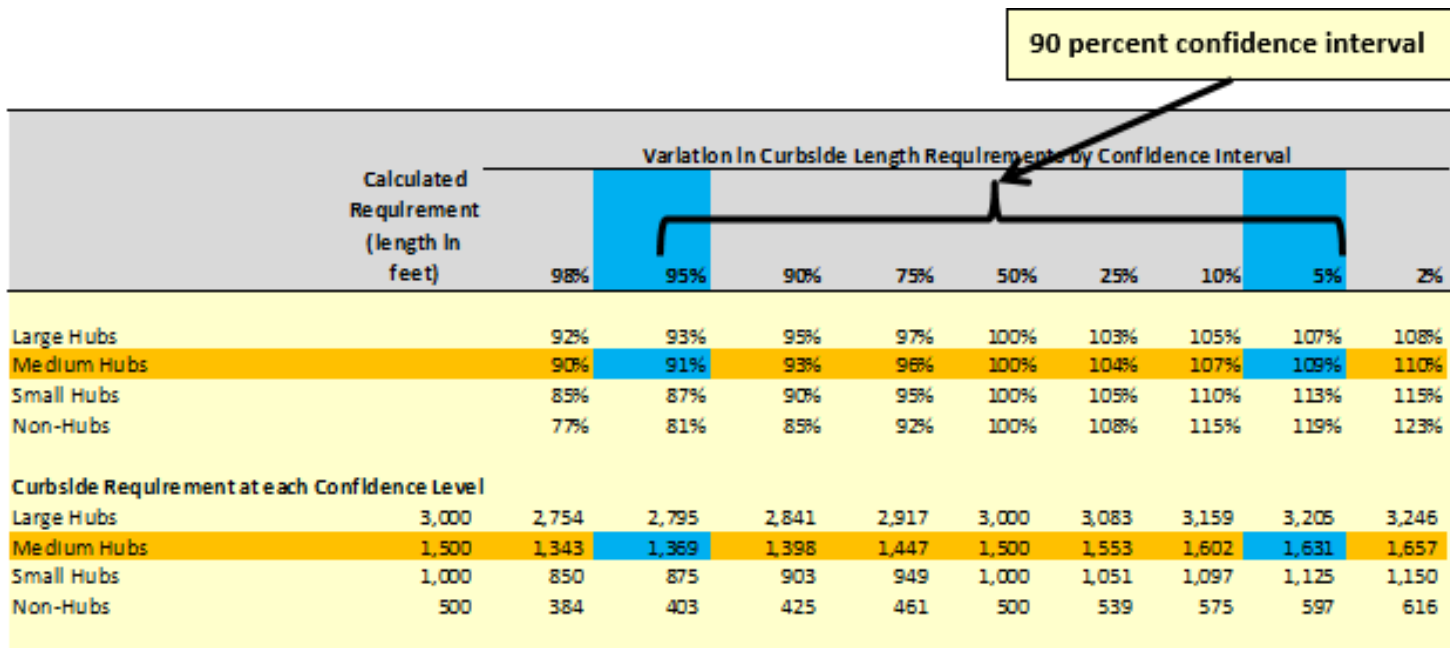
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How to Address Risk and Uncertainty

Evaluation of Uncertainty: Confidence Intervals



Note: Based on peak 60 minute O&D passengers.

Source: Appendix D

How to Address Risk and Uncertainty

Management of Uncertainty

- **Ad hoc Adjustments**
- **Forecast Scenarios**
- **Incorporating Uncertainty into Aggregate DDFS Results**
 - Monte Carlo Analysis
 - Risk Register

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How to Address Risk and Uncertainty

Example of Risk Register

Risk Identification				Risk Evaluation								
Risk ID	Risk Category	Status	Threat or Opportunity	Probability/Likelihood	Description of Impact	Impact on	Magnitude of Impacts					
							Low	Mid	High	Expected Duration	Expected Recovery	
1	Airline Strategy		Increase in number of connecting banks	30%	Increase in number of connecting banks resulting in passengers and operations spread more evenly throughout the day with reduced peaks and increased nighttime operations	Aircraft Operations, Passengers			X		Medium to Long term	Uncertain
2	Airline Strategy		Decrease in aircraft turnaround time	40%	Decrease in gate requirements; reduced ability to recover from disrupted operations	Aircraft Operations, Passengers		X			Long term	None
3	Technology		Supersonic aircraft	5%	Change in international flight times/windows, U.S. CBP requirements	International Aircraft Operations, Passengers		X			Long term	None
4	Airport Facilities		Runway Reconstruction	50%	Reduced capacity; change in throughput, reduced peak activity	Aircraft Operations, Passengers			X		Medium term	Full
5	Irregular Operations		Disruption in Schedule	99%	Delay in Operations	Aircraft Operations, Passengers			X		Short term	Full

CBP = U.S. Customs and Border Protection

How to Communicate Results

Generally Two Target Audiences:

- **Senior Airport Management and Stakeholders**
 - Decision Makers
- **Technical Airport Staff and Consultants**

When to Communicate:

- **Project Manager is Key to Reporting Process**
 - Receives and reviews technical work
 - Assesses strategies to ensure stakeholder involvement
 - Coordinates reporting to senior management

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Future Research: Remaining Issues

- Closing the communications gap between DDFS preparers and airport decision makers?
- Stability of critical factors providing different results if done for a different time period?
- Factors driving changes in the peak hour percentage?
- Variance in the Split between O&D and Connecting Traffic Vary by Time of Day?
- What Determines Changes in Airline Share at an Airport or Within a Market?

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For additional information:



ACRP Report 163 *Guidebook for Preparing and Using Airport Design Day Flight Schedules*

- Patrick Kennon
 - pkennon@hntb.com

<http://www.trb.org/main/blurbs/175210.aspx>

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Today's Participants

- Wayne Sieloff, *Capital Region Airport Authority*,
wsieloff@craa.com
- Patrick Kennon,, *HNTB Corporation*,
pkennon@hntb.com
- Rick Busch, *Jviation, Inc.*,
Rick.Busch@jviation.com

Panelists Presentations

<http://onlinepubs.trb.org/onlinepubs/webinars/180718.pdf>

After the webinar, you will receive a follow-up email containing a link to the recording

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