Master Plan Update

Public Information Meeting
George Bush Intercontinental Airport

February 17, 2015
Agenda

- Introduction
- Requirements
- Recommendations
  - Airfield
  - Passenger Terminal
  - Roadways
- Environmental considerations
- Next steps
Introduction

Background
What is a master plan
Master plan process
Master plan goals and objectives
About Houston

- Largest City in Texas
- Fourth largest city in the U.S.
- 2 million people in city limits
- 6 million people in Houston-Galveston region
- Strong energy-based economy
The Houston Airport System owns/operates three airports

- George Bush Intercontinental Airport (IAH) – the city’s largest airport and global gateway, serving over 40 million passengers annually
- William P. Hobby Airport (HOU) – serving over 11 million passengers annually, with international flights to begin in the fall of this year
- Ellington Airport (EFD) – a commerce/aviation center; potential spaceport site

We exist to connect the people, the businesses, the cultures and the economies of the world to Houston.
Houston has nonstop service to 5 continents

- **Asia**: 4 destinations
- **Canada**: 5 destinations
- **U.S.**: 120 destinations
- **Mexico**: 27 destinations
- **Central America**: 10 destinations
- **Caribbean**: 6 destinations
- **South America**: 8 destinations
- **Europe**: 8 destinations
- **Middle East**: 2 destinations
- **Africa**: 1 destination
International traffic is rapidly growing at IAH

- **2007**: Dubai (Emirates)
- **2008**: Singapore via Moscow (Singapore)
- **2009**: Rio de Janeiro (United); Doha (Qatar)
- **2010**: Monterrey (VivaAerobus)
- **2011**: Lagos (United)
- **2012**: A380 to Frankfurt (Lufthansa)
- **2013**: Third daily London (United); Istanbul (Turkish); Beijing (Air China)
- **2014**: Second daily Tokyo, Munich, and Punta Cana (United); Seoul (Korean); Stavanger (SAS); Guadalajara and Cancun (VivaAerobus); Santiago de Chile (United); Monterrey (Aeromexico and Interjet); A380 to Dubai (Emirates)
- **2015**: Guadalajara (Volaris), Taipei (EVA Air), Tokyo (ANA), Calgary (Westjet)
The economic impact of IAH on the City of Houston is substantial

<table>
<thead>
<tr>
<th>TOTAL ANNUAL ECONOMIC IMPACT</th>
<th>JOBS CREATED</th>
<th>ANNUAL EARNINGS GENERATED</th>
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<tbody>
<tr>
<td>$22 Billion</td>
<td>172,000 full time equivalent employees</td>
<td>$6.8 Billion</td>
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What is an airport master plan?

- A long-range guide for the orderly development of the airport, typically looking out about 25 years into the future
- A plan that FAA requires airports to update periodically
- Primary plan components include:
  - An FAA approved Airport Layout Plan enabling the airport to receive federal funding for eligible improvements
  - A narrative report documenting the analyses and recommendations

No two are the same
Each airport master plan addresses issues unique to the airport, its community and its environment
Overview of the IAH Master Plan process

Project kickoff

Existing conditions assessment

Aviation demand forecast

Facility requirements

Alternatives

Implementation plan

Airport Layout Plan and documentation

FAA review and approval

Public input

FAA review and approval

start

current status

end
IAH Master Plan vision and goals

Master Plan 2035 provides a vision for the airport that is safe and efficient, increasingly cost-competitive, aesthetically pleasing, and highly effective in serving the greater Houston community.

- **Airfield**: plan for a safe and operationally efficient airfield

- **Passenger Terminal**: provide needed gate capacity and improve customer experience throughout the terminal complex

- **Landside/Access**: provide efficient airport access

- **Environment and City**: provide environmentally and socially conscious airport improvements

- **Financial**: provide an affordable plan
Requirements

Forecast
Summary of requirements
The Houston metro area is expected to grow by 3.4 million people (55%) by 2035.

### POPULATION GROWTH RATES

<table>
<thead>
<tr>
<th>Year Period</th>
<th>Growth Rate</th>
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<tbody>
<tr>
<td>1990-2011</td>
<td>1.5%</td>
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<tr>
<td>2011-2016</td>
<td>2.0%</td>
</tr>
<tr>
<td>2016-2021</td>
<td>2.0%</td>
</tr>
<tr>
<td>2021-2026</td>
<td>1.5%</td>
</tr>
<tr>
<td>2026-2035</td>
<td>1.0%</td>
</tr>
<tr>
<td>2011-2035</td>
<td>2.0%</td>
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**Historical**

**Forecast**

**Sources:** Houston MSA: Houston-Galveston Area Council; U.S.: Woods & Poole, Economic and Demographic Projections, 2011.
Annual enplaned passengers could grow to over 30 million by 2035

**HISTORICAL**
CAGR 1990 - 2014

- Domestic 3.1%
- International 6.7%
- Total 3.7%

**FORECAST**
CAGR 2015 - 2035

- Domestic 1.5%
- International 3.4%
- Total 2.0%

Source: Master Plan Forecasts, slow-growth scenario.
Annual aircraft takeoffs and landings could grow to over 600,000 by 2035

### HISTORICAL

<table>
<thead>
<tr>
<th></th>
<th>Compound Annual Growth Rate 1990 - 2014</th>
<th>Forecast CAGR 2015 - 2035</th>
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<tbody>
<tr>
<td>Air carrier</td>
<td>1.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Air taxi</td>
<td>6.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Total</td>
<td>2.1%</td>
<td>0.9%</td>
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#### Race Years

<table>
<thead>
<tr>
<th>Year</th>
<th>General aviation and military</th>
<th>Commerical aircraft &lt;60 seats</th>
<th>Commercial aircraft &gt;60 seats</th>
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<tbody>
<tr>
<td>1990</td>
<td>150,000</td>
<td>70,000</td>
<td>10,000</td>
</tr>
<tr>
<td>1995</td>
<td>150,000</td>
<td>130,000</td>
<td>100,000</td>
</tr>
<tr>
<td>2000</td>
<td>220,000</td>
<td>170,000</td>
<td>120,000</td>
</tr>
<tr>
<td>2005</td>
<td>270,000</td>
<td>220,000</td>
<td>130,000</td>
</tr>
<tr>
<td>2010</td>
<td>300,000</td>
<td>250,000</td>
<td>150,000</td>
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<tr>
<td>2014</td>
<td>330,000</td>
<td>280,000</td>
<td>170,000</td>
</tr>
<tr>
<td>2020</td>
<td>360,000</td>
<td>310,000</td>
<td>190,000</td>
</tr>
<tr>
<td>2025</td>
<td>390,000</td>
<td>340,000</td>
<td>210,000</td>
</tr>
<tr>
<td>2030</td>
<td>430,000</td>
<td>370,000</td>
<td>230,000</td>
</tr>
<tr>
<td>2035</td>
<td>470,000</td>
<td>400,000</td>
<td>250,000</td>
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Source: Master Plan Forecasts, slow-growth scenario.
Aircraft operations have been flat the last several years after peaking in 2007.

The runway capacity is sufficient for the next 20 years

**IAH Master Plan 2035**

**Public Information Meeting**

**AIRFIELD** (runway capacity)
- **Long-term** (beyond 2035)
  - 40 million enplanements
- **Mid-term** (2025-2035)
  - 33 million enplanements
- **Near-term** (2015-2025)
  - 25 million enplanements

**TERMINAL** (aircraft gates)

**TERMINAL ROADWAYS** (curbside)

**Legend** – Level of service during peak periods
- Unacceptable
- Marginal
- Acceptable

*HOUSTON AIRPORT SYSTEM*
Airfield recommendations
Overview of the existing airfield – 5 runways

North Airfield (arrivals)

South Airfield (arrivals)

West Airfield (departures)
Airfield Flow Diagrams

West flow (70% of the time)

East flow (30% of the time)

Source: Leigh Fisher, based on discussions with IAH Airport Traffic Control Tower, December 2012.
In the next 10 years, the airfield requires additional taxiway infrastructure

- Taxiway SL
- Taxiway NR
- Runway 15R-33L extension
Taxiway NR enables shorter taxi distances from the north airfield
Runway 15R-33L extension provides needed redundancy for long haul departures
Taxiway SL provides additional crossfield connectivity

- Taxiway SL
- Taxiway SF
- Aircraft parking apron

Runway 8R - 26L
Runway 9L - 27R
NA
NB
Revisit the overview of the existing airfield

North Airfield (arrivals)
In about 25 years, Runway 8C-26C would add a third departure runway
Taxiway RA and RB require extensions to serve Runway 8C-26C
Now, for the long-term, we have a few improvements to the south airfield
In 2050, the airfield may require an additional runway and associated taxiways.

- Taxiway SM
- Taxiway SD
- Runway 9R-27L
- Runway 9L-27R extension
Passenger terminal recommendations
Terminal Complex Overview

Terminal A
- Air Canada
- Alaska Airlines
- American Airlines
- Delta Air Lines
- Frontier Airlines
- Spirit Airlines
- Westjet

Terminal B
- United Express
Terminal Complex Overview

Terminal C
United Airlines
domestic flights

Terminal D
Aeromexico
Air China
Air France
ANA
British Airways
Emirates
EVA Air
Interjet
KLM
Korean Air
Lufthansa
Qatar Airways
Scandinavian Airlines
Singapore Airlines
Turkish Airlines
Volaris

Terminal E
United Airlines
International and
domestic flights
Passenger terminal requirements

- More aircraft gates to provide for growing domestic and international service offerings
- Modernized facilities and a consistent customer experience regardless of terminal
- Additional space on the concourses
- Investment in aging infrastructure to reduce operational costs
United Airlines in blue; all other airlines in red.

International terminals

To keep pace with demand, the airport needs additional gates to accommodate international flights.
Terminal plans: 2015 - 2025

Terminal C North Concourse

Parking Garage Expansion

Federal Inspection Services and Parking Garage

Mickey Leland International Terminal
Mickey Leland International Terminal will replace Terminal D

- Accommodates 15 widebody or 27 narrowbody aircraft parking positions
- Construction scheduled to begin in 2016 for a 2020 opening
Terminal plans: 2025-2035

- Terminal B North Concourse Replacement
- Garage/Hotel Expansion
- Terminal B ticketing and baggage claim
Terminal plans beyond 2035

- Terminal A Concourse Redevelopment
- Terminal A Garage
Roadway recommendations
JFK Boulevard intersections studied to determine future improvements

- JFK Blvd and Greens Road
- JFK Blvd and World Houston Pkwy
- JFK Blvd and Beltway 8
JFK Blvd and Greens Road near-term recommendations

- Provide acceleration lane along westbound Greens Road to facilitate free southbound right turn movement.
- Add an exclusive eastbound right-turn lane with channelization (additional right of way would be required).
- Greens Road is to be widened through Houston Public Works and Engineering initiative.
JFK and Beltway 8 near-term recommendations

- Add an exclusive southbound right-turn lane with channelization

- Relocate driveway on Beltway 8 westbound Frontage Road further west to provide sufficient distance for new free-flow southbound right-turn acceleration lane
JFK and Beltway 8 near-term recommendations (continued)

- Add an exclusive northbound right-turn lane with channelization.
- Add an exclusive eastbound right-turn lane with channelization.
Several Will Clayton Boulevard intersections were also studied:

- Will Clayton and Colonel Fisher
- Will Clayton and Lee Road
- Will Clayton and Humble Parkway
- Will Clayton and McKay Blvd
- Will Clayton and US 59 South
- Will Clayton and US 59 North
The airport is coordinating with Houston Public Works and Engineering to improve the Kenswick Drive and Will Clayton Intersection.
Kenswick Drive extension to connect to eastbound Will Clayton will relieve congestion on Lee Road.
Cell phone lot improvements at JFK Boulevard and Rankin Road

- Cell phone lot parking
- Future commercial development
- Restrooms
- Fueling station and convenience store

To rental car garage

To Airport
Cell phone lot improvements at Will Clayton Parkway and Lee Road

- Future commercial development
- Restrooms
- Future fueling station and convenience store
- Cell phone lot parking

To Airport
More public parking will be constructed along Will Clayton Parkway
Environmental considerations
Flooding on the Airport’s entry roadways has been addressed

- Drainage improvements have eliminated standing water on the roadways
- Both John F. Kennedy Boulevard and Will Clayton Parkway flooding has been addressed
With the changes in the aircraft fleet, noise exposure areas are shrinking

- **FAA established initial noise standards in 1969**

- **FAA introduced aircraft noise categories entitled “STAGES” in 1977**
  - STAGE 1: aircraft have never been shown to meet any noise standards (either by failing or never having been tested)
  - STAGE 2: aircraft meet original limits
  - STAGE 3: aircraft meet more stringent revised limits
  - STAGE 4: effective January 2006

- **By December 15, 2015, all civil jet aircraft must meet STAGE 3 or STAGE 4 standards**

- **STAGE 5 will be introduced in 2017 and 2020, depending on the weight of the aircraft**
2012 noise contours (1,528 daily aircraft operations)
2035 noise contours (2,188 daily aircraft operations) with Runway 8C-26C
Next steps
The IAH capital improvement program includes approximately $2.7 billion in planned projects.

<table>
<thead>
<tr>
<th>Ten-year capital improvement program</th>
<th>Total estimated cost ($millions)</th>
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<tbody>
<tr>
<td>Airfield</td>
<td>$816</td>
</tr>
<tr>
<td>Terminal</td>
<td>1,461</td>
</tr>
<tr>
<td>Roadways/parking/commercial ground transportation</td>
<td>97</td>
</tr>
<tr>
<td>Airport support/infrastructure</td>
<td>284</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,658</strong></td>
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Note: The estimated cost for the ten-year capital improvement program is for George Bush Intercontinental Airport projects only and excludes the cost of capital improvements at Ellington and William P. Hobby airports.
What will happen next?

- Houston Airport System will review comments received from public and interested stakeholders.

- HAS will prepare an “Airport Layout Plan” to obtain formal FAA approval for recommendations, to obtain federal funding for projects.

- Environmental reviews will be conducted before projects are constructed.
Summary of today’s presentation

- Houston Airport Systems would like your input
- All recommended improvements are located within existing airport property
- No new runways are required for the next 20 to 25 years
- Taxiway improvements will make the airfield more operationally efficient and flexible
- Timing of improvements will be determined by demand
- All improvements will be subject to environmental review
- Terminal construction will begin this March
Thank you for your interest