Ad Hoc Expert Meeting on

Climate Change Adaptation for International Transport: Preparing for the Future

16 to 17 April 2019

Airport Adaptation Measures Preparing for the Future

Presentation by

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Airports Prepare for Challenges in Many Ways

» Strategic Plans
» Master Plans/Capital Plans
» Sustainability Management Plans
» Asset Management Systems
» Safety Management Systems
» Continuity of Operations Plans
» Emergency Response Plans
» ACRP Reports and Tools
ACI Resolution No. 3 (June 2018)

» Encouraging Airports to Take Action on Resilience and Adaptation to Climate Change, Resolves to:

- Consider all practicable steps to reduce their GHG emissions through the use of the Airport Carbon Accreditation programme and by other means;
- Support efforts in international forums such as ICAO and the UNFCCC in assessing the potential impacts of climate change on critical infrastructure, including airports;
- Encourage member airports to take into consideration the potential impact of climate change as they develop their Master Plans;
- Encourage member airports to conduct risk or criticality assessments for their operational procedures and existing infrastructure which considers the risks imposed by more adverse weather events and climate change;
- Encourage member airports to develop and incorporate actions in accordance with their risk or criticality assessments at an early stage and in line with their overall business continuity management and emergency planning; and
- Encourage member airports to plan and develop effective communication channels and collaborate with internal airport staff, aviation stakeholders, including airlines, ANSPs, communities and municipality authorities responsible for weather monitoring and disaster management.

ACI Briefing Note: https://store.aci.aero/product/policy-brief-airports-resilience-and-adaptation-to-changing-climate/
Triggers for Incorporating Adaptation

$1 in proactive planning/upgrades saves $4 to $6 in response/rebuilding costs

River Flood Wall
St Paul Downtown Airport, Minnesota, USA

» Frequent River Flooding

» Developed Removable Flood Wall Reducing Economic Losses

» Deployed 5 times in last 10 years
  - 3,600 ft (1000m) long
  - 8.5 ft (2.5m) high
PANYNJ Design Standard

» Assessed Infrastructure
  – Vulnerabilities
  – Risk
  – Adaptations

» Developed design guidelines
  – Temperature
  – Precipitation
  – Sea level
  – Flood

Incorporate Into Infrastructure Processes

Airport Runway Length Revisited

» Climate Risk: Current 2010 Temperature

» Airport Impact: Take-Off Runway Length Requirements

Example Airport Mean Max. Daily Temp of Hottest Month: 84°F (28.9 °C)
Elevation: 1,000ft AMSL

Take-Off Requirement: 11,000 feet (3,352 meters)
**Airport Runway Length Revisited**

- **Climate Risk:** Future 2075 Temperature
- **Airport Impact:** Take-Off Runway Length Requirements

**Example Airport Mean Max. Daily Temp of Hottest Month:** 108°F (28.9 °C)
**Elevation:** 1,000ft AMSL

**Take-Off Requirement:** 13,700 feet* (4,175 meters)

*Must reduce maximum take-off weight!

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**Broward County, FL Predictions**

- 2060-2069
  - Precipitation depths – 9% increase
  - Sea level rise – 2 to 3 feet (1 meter)
  - Groundwater elevations rise

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*RS&H*
Ft Lauderdale-Hollywood Int’l Airport Implications

» Rising Groundwater Elevations
  – Compliance challenge
    • Reducing stormwater storage and treatment capacity
  – Significantly higher flood elevations

Available Alternatives

» Flood Impact
  – Fill above flood elevation
  – Flood proof structures

» Stormwater Impact
  – Lower groundwater
  – Pump storm water offsite for treatment
Hillsborough County Aviation Authority
TPA Office Complex

» Replacement Office Complex
» Adjacent to Tampa Bay
» 100-year storm event elevation
  – 1988: 9 ft (3m)
  – 2018: 10-12 ft (4m)

TPA Office Complex Recommendations

» First floor elevation at 15 ft (5m) AMSL
» All critical HCAA areas at 30 ft (10m) AMSL (3rd floor)
  – Network Ops Center
  – Airport Ops Center
  – Incident Command Center
» Hardening structure and glass for high winds

Surge Heights for a Landfalling Storm/Hurricane

<table>
<thead>
<tr>
<th>Storm Strength</th>
<th>Potential Surge Heights</th>
<th>Low Tide</th>
<th>High Tide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical Storm</td>
<td>Up to 4'</td>
<td>Up to 6'</td>
<td></td>
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<tr>
<td>Category 1</td>
<td>Up to 6'</td>
<td>Up to 8'</td>
<td></td>
</tr>
<tr>
<td>Category 2</td>
<td>Up to 12'</td>
<td>Up to 14'</td>
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<tr>
<td>Category 3</td>
<td>Up to 17'</td>
<td>Up to 19'</td>
<td></td>
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<tr>
<td>Category 4</td>
<td>Up to 21'</td>
<td>Up to 23'</td>
<td></td>
</tr>
<tr>
<td>Category 5</td>
<td>Up to 27'</td>
<td>Up to 29'</td>
<td></td>
</tr>
</tbody>
</table>

*Feet Above Mean Sea Level (AMSL)
Hong Kong. Taking Control of Rapid Recovery from Adverse Weather

» Severe Events
  – Achieving rapid response and recovery

» Response
  – Ongoing coordination with local community on early warning system
  – Airport leading coordination
    • Assist with ground control
    • Coordinates with all stakeholders i.e., airlines, ground and ramp services agents, Government depts, public transport operators, retail and catering outlets in the terminal and passengers

RS&H

FIGI. Nadi Floods Challenge Airport Resources

» Flooding Effect
  – Runway handling 747s closed for 16 hours
  – All roads to airport closed for 1.5 days

» Response
  – Ongoing coordination with Department of Town and Country Planning on new developments effecting runoff
  – Improving both landside and airside drainage to ensure fast free flow of water to sea

RS&H
Conclusions

» Each Airport and the Community It Serves is Unique

» Significant Challenges Ahead for Many Airports
  – Financial
  – Insurance
  – Regulatory

» Solutions Will be Found by Working Closely with All Stakeholders