

# PASSENGER TERMINAL WORLD

SEPTEMBER 2021

## VIRTUAL QUEUING

LONG PASSENGER LINES CREATE STRESS AND INCREASE COVID ANXIETY. ISN'T IT TIME TO GO VIRTUAL?



**SUSTAINABILITY  
SPECIAL REPORT**  
HOW TO ACHIEVE NET  
ZERO CARBON BY 2050

### **Security**

IATA's views on the changing security landscape since 9/11; and key insights from TSA's Innovation Checkpoint

### **Reagan National**

Project Journey's lead architects share their thoughts on DCA's new 14-gate concourse

### **Electric flight**

Discover how electric and zero-emission aircraft are set to transform aviation



4

UPDATE

- 4 **Green dream**  
Pittsburgh International Airport's new self-sustaining green terminal
- 8 **Open for business**  
Four new or refurbished terminal openings suggest an industry in recovery
- 10 **Travel inside**  
Fraport debuts immersive visitor center
- 12 **Event horizon**  
Aviation security must evolve and reprioritize as airports emerge from the pandemic



24  
**Cover story**



30

FEATURES

CASE STUDY:  
REAGAN NATIONAL

- 16 **National treasure**  
Project Journey: Metropolitan Washington Airports Authority opens new commuter concourse

VIRTUAL QUEUING

- 24 **Cover story: A sense of place**  
Seattle-Tacoma embraces QR mobile tech to take the stress out of waiting in line

INTERVIEW: IATA

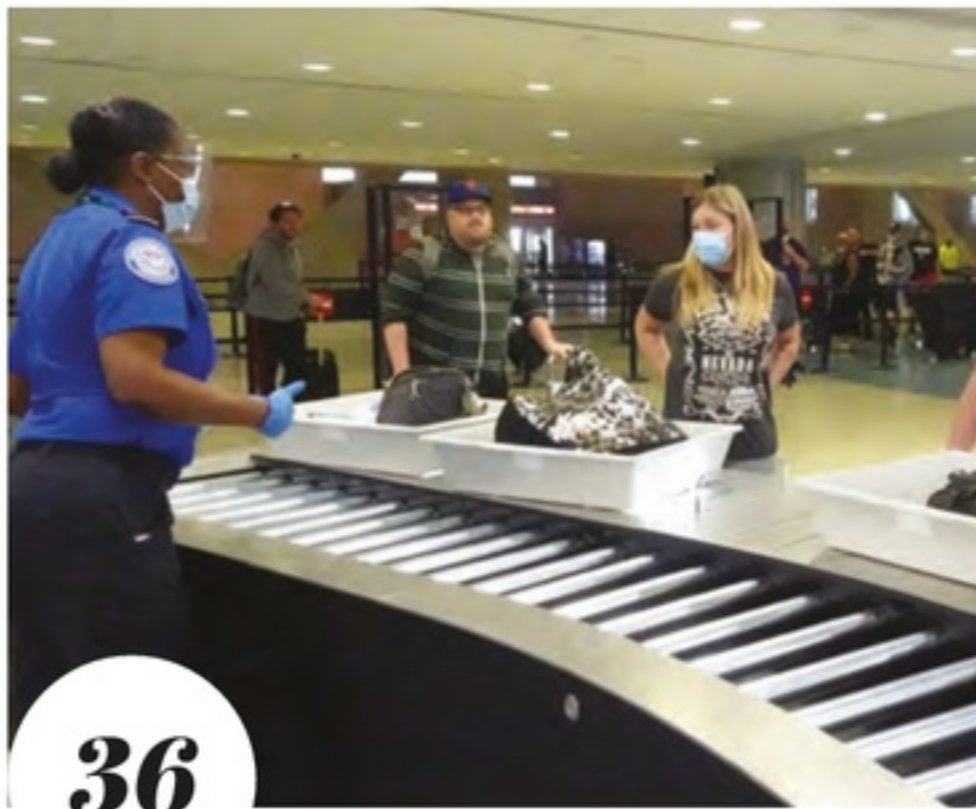
- 30 **A time to reflect**  
The changing security landscape two decades on from 9/11

SECURITY: INNOVATION CHECKPOINT

- 36 **High stakes**  
TSA reboots its security initiative at McCarran

SPECIAL REPORT  
SUSTAINABILITY

- 44 **Zero interest**  
How airports and operators intend to beat ACI World's deadline of net zero carbon emissions by 2050
- 52 **Take five**  
Arup's key strategies for sustainable development in the aviation sector



36

ELECTRIC AIRCRAFT

- 54 **The fuel picture**  
After more than a century as a linchpin of global transportation, the future of fossil fuels is looking increasingly short

DISPLAYS

- 60 **Pixel power**  
Travelers at New York's four major airports are set to benefit from the latest in digital display technology

INTERVIEW:  
MELBOURNE AIRPORT

- 66 **Survive and thrive**  
Lorie Argus, chief of aviation, discusses Melbourne Airport's transformed Terminal 3



54



44



# *National* *treasure*



AN FAA-IMPOSED 'SLOT RULE' LIMITS THE NUMBER OF LANDINGS AND TAKE-OFFS AT DCA TO 62 PER HOUR



**ABOVE**  
The new 21,368m<sup>2</sup> concourse building opened in April 2021

**LEFT**  
Cesar Pelli's iconic masterpiece, the National Hall

A new 14-gate concourse has opened at Ronald Reagan Washington National Airport, replacing the previously unpopular Gate 35X and complementing the original building designed by César Pelli

**P**ilots fly complicated paths round restricted airspace to Ronald Reagan Washington National Airport (DCA), across the Potomac from Washington DC. Expansion of flights is prohibited by Congress – which permits limited slots for domestic traffic only – as well as by DCA's constrained island geography. But despite these limits, in 2015 an airport built for 15 million annual passengers served 23 million. Three separate concourse checkpoints restricted their circulation to central amenities, and 6,000 daily boarders from Gate 35X were bussed to aircraft from cramped holding pens.

So in 2015, Metropolitan Washington Airports Authority (MWAA) embarked on Project Journey, a US\$1bn investment to transform the DCA experience. In April 2021, a new 14-gate concourse opened ahead of schedule, providing jet bridges to aircraft and abolishing the tedious transit from Gate 35X. Furthermore, two new checkpoints extend DCA's post-security space around National Hall, allowing processed passengers to enjoy its shops and restaurants. The project was indeed a journey, accomplished during Covid, in narrow confines and beneath the shadow of greatness.



**KEY FACTS**

**21,368M<sup>2</sup>**  
(TOTAL AREA OF  
THE BUILDING)

**1,300M<sup>2</sup>**  
(NEW AMERICAN  
AIRLINES ADMIRALS  
CLUB)



AN FAA 'PERIMETER  
RULE' RESTRICTS  
DCA TO ONLY SERVE  
DESTINATIONS  
NO FURTHER THAN  
**2,012KM** FROM  
THE CAPITAL

ABOVE  
DCA is located south  
of the city along the  
Potomac River in  
Arlington, Virginia, USA

LEFT  
The new security area sits  
between the Metro and  
the existing terminal



**Gothic revival**

Designed by acclaimed architect César Pelli, DCA's Terminal B/C opened in 1997. Its style has been called high-tech gothic, and its centerpiece, the National Hall, is part cathedral and part Victorian railway terminus; its barrel vaults crowned with oculus-eyed Jeffersonian domes echoing the forms of the Capitol. For Air Alliance joint venture partners AECOM and PGAL, Pelli was a hard act to follow.

"In 1997, the National Hall was the new project's primary space," says PGAL president, Ken Brown, who worked on Terminal B/C. "The concourses were subservient in establishing a spatial hierarchy. As you leave the grand space and head to your aircraft, the space must respond to that activity, becoming more personal in scale." AECOM designed the two checkpoints that extend DCA's post-processing perimeter around the iconic chamber.

Each checkpoint is designed to accommodate 14 security checkpoint screening lanes and 20 airline self-service kiosks across 4,366m<sup>2</sup> of floor space. These expansive queuing halls were built in an acutely constrained space, strategically placed between the departure roadway and Metro rail system. "Now, passengers waiting for planes can experience the grandeur and new amenities of National Hall," says AECOM associate vice president, Michael Collins. "From a non-aeronautical revenue standpoint,

we've re-energized National Hall as a central boulevard. Since passengers can move freely, DCA can better serve a hub-type operation."

AECOM chose to complement Pelli's vocabulary rather than risk degrading it by imperfect imitation. "We took Pelli's segmental arch canopies as the form generator for our serpentine roof," Collins explains. "Imagine a flag that undulates and unfurls in the wind. We nestled that curvilinear structure down between the roadway and the Metro, so it doesn't overpower Pelli's terminal." Interior material palettes of terrazzo and laminate are likewise deferential in tone. "We didn't try to compete or make our own statement," says Collins. "Our buildings plug in seamlessly and speak the same language as the terminal."

Each checkpoint is fashioned from 3,053m<sup>2</sup> of electrochromic smart glass. "Every piece of glass can be addressed to a different shading co-efficient," Collins explains. "We can adapt the light transmittance from 60% all the way down to 1%." The checkpoints have roof-mounted sunlight sensors, and an automated system tints the glass according to external conditions. "It's completely programmable," says Collins. "We can basically put sunglasses on the building."

Project Journey also provides a new 14-gate concourse with 21,368m<sup>2</sup> of floor space including a 1,300m<sup>2</sup> upper level for an American Airlines Admirals Club. Its construction required 1,814 metric tons of structural steel, 5,734m<sup>3</sup> of concrete, 2,025m<sup>2</sup> of metal panels, 7,662m<sup>2</sup> of glass, 4,250m<sup>2</sup> of terrazzo flooring and 3,029m<sup>2</sup> of carpet. PGAL designed the concourse to honor the vocabulary and primacy of Pelli's terminal while creating space to serve passenger expectations, which have evolved considerably since 1997.

"We took Pelli's work and tried to make it more current," says Brown. "We reinterpreted the structural frame and adapted the concept of trees supporting the domes. We used fewer columns to remove visual impediments and create more open space." A diagonal circulation path through the centrum offers close proximity to shops, restaurants and workstations for passengers. "In the grand space of National Hall, passengers are part of a larger



We didn't try to compete or **make our own statement**

Michael Collins, AECOM



Planning and Design | Program & Construction Management | Facilities Management  
IT | Asset Management / IWMS



Rendering Courtesy of the Metropolitan Washington Airport Authority

Arora is proud to serve as a member of AIR Alliance's team for the Metropolitan Washington Airport Authority's Ronald Reagan International Airport Terminal Program!

**PROJECT SCOPE:**

- Electrical Engineering
- Plumbing Engineering
- Fire Suppression and Fire Alarm

**LEARN MORE:**

[aroraengineers.com/project/dca-terminal-bc](http://aroraengineers.com/project/dca-terminal-bc)

Atlanta | Baltimore | Boston | Charlotte | Chicago | Dallas | Los Angeles  
Nashville | New York | Philadelphia | St. Petersburg | San Jose

Rethinking Infrastructure®  
[aroraengineers.com](http://aroraengineers.com)



**SOME THINK  
AIRPORT  
EFFICIENCY  
HAS REACHED  
ITS LIMITS.  
WE THINK  
DIFFERENT.**

**MADE  
DIFFERENT**

[beumer.com](http://beumer.com)



More than 2,000m<sup>2</sup> of metal panels and almost 7,700m<sup>2</sup> of glass were used in the concourse's construction



Nothing [about the aesthetic] makes you think: **That was done in 2020**

Ken Brown, PGAL



Those departing from Gates 46-59 can now relax and recharge in one of 850 new seats



experience,” Brown continues. “But now this new interpretation of public space, on a smaller scale, creates opportunities for personalized experience.”

**Raise a glass**

César Pelli reserved most admiration for buildings energized by place and landscape. Early on, PGAL decided to create a north-facing glass curtain wall with views across the Potomac to Washington DC. “Few airports have that opportunity,” says Brown. “It meant we could work with the volume and introduce natural light in ways that direct and move passengers intuitively.” Insulated curtain-wall glazing relies on ceramic frit patterns to minimize glare. “Little kids plaster their faces to the glass to look at the airplanes,” he says. “Glazing systems as energy-efficient as solid walls enabled us to celebrate that.”

MWAA wanted a concourse that is not only faithful to Pelli’s aesthetic but also timeless for the future. “We were careful with colors and finishes,” says Brown. “We honored National Hall’s yellow-painted structural

steel but otherwise kept the palette neutral. We focused instead on how light enters the space and transforms even neutral surfaces. We used durable, maintainable materials. Nothing makes you think: That was done in 2020.”

**Construction checklist**

MWAA procured the services of Turner Construction on a construction-manager-at-risk contract, incentivizing the builder to minimize costs and improve the schedule. The National Hall checkpoints and new concourse involved 80 and 72 subcontractors respectively. However, a series of enabling projects were needed before Turner broke ground for the concourse in 2018.

The site was originally occupied by corporate offices and hangars that housed American Airlines ground-service operations. “Our first project was to build a new facility for American Airlines,” explains MWAA construction program manager, Ryan Wolfgang. “As a result, they saw no reduction in their overall operations during Project Journey. The next project was to demolish the corporate offices and hangars.” But adjacent to the offices was an electrical substation that powered the airport’s north side. It had to remain operational, so the concourse was built around it.

This meant removing the substation’s roof and an exterior wall, reducing its height below the concourse level. It required considerable planning and was the one element of Project Journey that caused Wolfgang sleepless nights. “Utilities from the roof were supported with scaffolding,” he says. “Significant weather protection was needed. We installed a gantry crane to slide out joists and remove the roof. Later, the same crane put in the structural steel that would support the concourse-level floor.”

With demolition accomplished, concrete paving was needed to surround the new concourse. “Our apron paving contract had two phases because we simply couldn’t capture all the real estate in one shot,” says Wolfgang. “Before physical construction, the existing subgrade was





Ultimately, the concourse **opened three months** ahead of schedule

Ryan Wolfgang, MWAA



surcharged to consolidate it and alleviate settlement issues.” There followed a six-month settlement period with monitoring to ensure design-phase settlement estimates were achieved. “Once paving was completed, we flipped the location of aircraft, removed the pavement and started that surcharge phase over again.”

**Pandemic protocols**

Finally, construction proper could begin – but Turner soon had a pandemic to contend with. “Obviously, the building wasn’t going to construct itself remotely over Zoom,” Wolfgang observes. Covid restrictions caused serious supply-chain headaches and working on-site required protective equipment and pre-screening. “Our contractor planned carefully to not stack trades together,” says Wolfgang. “One incident of Covid without protocols in place had the potential to shut the job site down.”

But the pandemic brought benefits, too. “Reduced traffic opened up more real estate,” says Wolfgang. “Consequently, we completed the underground hydrant fueling system for American Airlines ahead of time, before the concourse opened.” Ultimately, the concourse opened three months ahead of schedule. The virtual environment also enabled designers scattered across the eastern seaboard to meet, identify issues and resolve them at a moment’s notice.

“Working remotely actually made our team stronger,” adds Arora Engineers mid-Atlantic director, Jocelyn Dugdale Bernhardt. “Technology allowed us to share photos and video. It made designers look at everything, not just their own disciplines.” She has some simple rules when dealing with multiple subcontractors: “Ask the questions you need to ask. If you’re asked a question and don’t know the answer, just say ‘I’ll get back to you’ – and do so in a timely manner.”

César Pelli believed citizens should expect buildings to create a more humane world. Project Journey does this by replacing the old ordeal of Gate 35X with a seamless new experience. However little details in the spirit of Pelli abound, including a new barrier between the National Hall and adjacent landside ticketing. “We designed a light-mesh, clear-glass separation to fill the arches,” says Collins. “It’s a virtually invisible security barrier that blends with Pelli’s terminal. I think he would have approved.”

“The right decision was ultimately what got built,” Brown concludes. “MWAA has been a great partner and an engaged collaborator. They have high expectations and are concerned about their budget. But they put real trust in us and encouraged us to push the envelope. Unless you have stakeholder input and endorsement from the airport, these projects don’t work. They just can’t be successful.”

The new concourse is part of a US\$1bn initiative to transform the customer experience at DCA



**Service plan**

Arora Engineers provided mechanical, electrical and plumbing (MEP) design within the Air Alliance joint venture, led by AECOM and PGAL, which delivered Project Journey at Reagan National Airport (DCA).

“In the last five years, joint ventures have tackled several aviation projects,” says Arora Engineers COO for planning and design, Mark Mosko. “There’s often one design architect and one pragmatic architect. It’s common for billion-dollar programs.”

He continues, “Electrical distribution within the airport is conduit: primary duct-banks with electrical feeds. We integrate power from a primary source into an internal primary distribution or switchgear substation. We have a large room that

gets the primary feeds. We add secondary distribution to smaller remote rooms, then field distribution to electrical equipment.”

Plumbing systems rely on rainwater management and recycled water from bathrooms. Arora Engineers delivered HVAC design for the American Airlines space at DCA. Like electrical distribution, HVAC systems move a primary-source feed – hot or chilled water – via mechanical then secondary rooms to field devices that provide heat or cooling as needed.

Fire safety practice encompasses fire alarm and fire protection systems. “Fire protection is sprinklers,” says Mosko. “Buildings have a temperature-controlled wet system: the pipes are pressurized

with water. The National Hall sits above a roadway, so a dry system ensures against car fires. Because pipes are not actively pressurized with water, they don’t freeze in cold weather.”

He adds, “There was already a strong relationship between the Air Alliance partners and MWAA going into the project. Collectively, we provided a cohesive, balanced design response.”

Arora Engineers has diversified from its MEP origins to offer services that address the entire design lifecycle. Its involvement at DCA doesn’t end with Project Journey: it has contracts for fit-out projects in several airline lounges and agency-wide implementation of an upgraded asset management system.