AERONAUTICAL INFORMATION CIRCULAR 9/22

TIME-BASED SEPARATION IMPLEMENTATION AT TORONTO/LESTER B. PEARSON INTERNATIONAL AIRPORT (CYYZ)

Amended Wake Turbulence Separation Standards

Time-Based Separation

On or soon after 0500Z Coordinated Universal Time (UTC) on 14 May 2022, timed-based separation (TBS) will be the wake turbulence separation standard used between aircraft pairs on final approach to all runways at Toronto/Lester B. Pearson International Airport (CYYZ) and will be based on the Enhanced Wake Separation groups of aircraft (A-G) previously published in aeronautical information circular (AIC) 28/20. Confirmation of the specific date and time will be published by NOTAM. All other phases of operation besides approach will be subject to Standard Wake Separation.

Background

During medium and strong headwind conditions, CYYZ experiences a decrease in the landing rate when operating with distance-based separation, because arriving flights are spaced a specified distance apart regardless of the wind conditions. When there is a strong headwind, the aircraft's movement relative to the ground is reduced resulting in increased time separation for each arrival pair. This increased time separation between arrivals reduces the landing rate and creates a lack of stability in the runway throughput when operating near capacity.

TBS dynamically adjusts separation distances using time, rather than distance, to keep landing rates consistent in strong headwinds. TBS forms part of a product developed by the UK's National Air Traffic Services (NATS) and Leidos, known as Intelligent Approach (IA), which was first introduced at Heathrow Airport (EGLL) in 2015 and, through collaboration with NAV CANADA, IA has been adapted for use in CYYZ beginning in May 2022.

TBS minima for wake turbulence were developed to mitigate the loss of runway throughput in headwind conditions by delivering time intervals between arrivals that are consistent with distance-based separation in low wind conditions. TBS has been demonstrated to be a suitable alternative to distance-based separation minima at EGLL where the headwind component is a determining factor.

TBS provides resilience to headwinds by reducing the wake turbulence separation based on the live wind conditions and therefore improves operational and safety performance. By keeping the time constant, the actual distance between aircraft will alter depending on the strength of the wind. In practice it will be rare for today's distance-based separations to be reduced by more than a mile and the distance between aircraft pairs will never be below minimum surveillance separation.

Note: Safety margins are added to the system for the calculation of the visual indicators provided to ATC to address variability of flying time and wind condition. This ensures the minimum is unlikely to erode in the event of a wind strength change.

TBS will achieve improved wake risk over and above ICAO distance-based separation minima and has been assured as safe for wake turbulence encounters risk based on direct measurement of wake turbulence at EGLL between 2008 and 2012. EGLL has not seen any material change in the number of wake turbulence encounter reports due to this change introduced in 2015.

Proven Benefits

TBS for arrivals has been in continuous operation at EGLL since March 2015 and has been very successful in demonstrating the safety and efficiency of the operation.

Proven Benefits of TBS at London/Heathrow (EGLL)	
▪ Improved on time performance and lower fuel costs for airlines.	▪ Effective management of controller workload for ANSPs.
▪ Consistent delivery of increased capacity.	▪ Fewer delays and reduces cancellations by maintaining a resilient and consistent landing rate.
▪ Increased punctuality.	▪ Improved landing rates to increase resilience and scheduled movements.
▪ Allows increased passenger numbers with larger aircraft while maintaining landing rates.	▪ Allows an airport to safely refine separations between aircraft.
▪ Average tactical capacity gain of 2 aircraft landings per hour in all wind conditions.	▪ An improvement of 1.5-2.5% in airport punctuality.
▪ An average saving of over 1,410 seconds per day in arrival separation on final approach.	▪ Fewer delays and cancellations.
All of which help to achieve the best customer experience possible.	

Changes to Procedures

TBS will be implemented at CYYZ on final approach on or later than 14 May 2022 and will be based on the ICAO Enhanced Wake Separation Groups (A-G) achieving improved management of wake risk over and above distance-based separations.

Standard Wake Turbulence Separation standards are based on four categories; light, medium, heavy, and super and will continue to be used on departure at CYYZ and throughout Canada. Separation and spacing rules between arriving aircraft and departing aircraft are unchanged.

Toronto Terminal and Tower air traffic controllers (ATC) will use IA to support the consistent and accurate delivery and monitoring of separation and spacing constraints through the display of indicators to the controllers. IA helps safely optimize arrival separation and spacing in all conditions and for all runway configurations, delivering capacity, safety, and resilience benefits without the need for expensive changes to ground infrastructure.

Changes for Flight Crews

Landing at an airport that is using TBS requires little or no change to flight deck procedures. Aircraft continue to be vectored or cleared onto final approach (depending on the type of approach) in the same way and at the same speeds as under the previous distance-based scheme. There are also no changes to current phraseology used between ATC and pilots.

The main difference under TBS is that ATC will separate aircraft on final approach by time, not distance. In practice this means that aircraft may appear closer on traffic alert and collision avoidance systems (TCAS) during headwind conditions although the actual separation will be constant in time.

Pilots should expect to be positioned closer behind preceding aircraft on final approach as headwinds increase. The tables below give some example separations in different wind conditions. TBS minima are based on a conversion of the current Enhanced Wake Turbulence separation minima in a light headwind condition (5 – 7 kts).

Examples of TBS conversion from distanced based minima						
Nautical Miles	3	4	5	6	7	8
TBS equivalent (seconds)	68	90	113	135	158	180

Examples of TBS distances (NM) in different winds		
Headwind	**Heavy – Heavy**	**Heavy – Lower Medium**
5 kts	4.0	5.0
25 kts	3.5	4.4
45 kts	3.0	3.8

Wake Encounter Reporting

With the change from distance-based separations to time-based separations there have been extensive safety studies particularly around the subject of wake turbulence encounters. However, as with any change to an operational concept, safety monitoring of events will be performed with the implementation of TBS.

Note: Pilots must continue to report wake encounters in the same manner they do today.

Runway Occupancy and Speed Compliance

TBS will not affect runway occupancy time, but as always, it is important to promptly exit the runway to reduce the risk of go-arounds by the following aircraft.

ATC speed instructions are mandatory and must be followed. Adherence to speed control instructions is key to achieving TBS benefits and allows ATC to operate close to the minimum separation standards meaning fewer go-arounds and improved airport efficiency. Conversely, noncompliance creates a need for increased separation. Thus, it is imperative that crews advise ATC before joining the approach if they are unable to comply with the speed, to allow for additional spacing to be provided. Final approach speeds are controlled to reduce the risk of catch up, which could result in a loss of separation or become a contributing factor for a go-around or a serious runway incident.

Note: Minimum runway occupancy times (ROT) and strict speed compliance on final approach are required by all aircraft due to reduced spacing between aircraft pairs. **Pilots must advise ATC if they are unable to comply prior to joining final approach.**

Further Information

For further information, please contact:

NAV CANADA
Customer Service
77 Metcalfe Street
Ottawa, ON K1P 5L6

Tel.: 800-876-4693
Fax: 877-663-6656
E-mail: service@navcanada.ca

Vanessa Robertson
Director Air Traffic Services (ATS) Standards