CHICAGO O'HARE INTERNATIONAL AIRPORT

FLY QUIET RUNWAY ROTATION TEST

JUNE 20, 2016

APPENDICES

APPENDIX 1

MEMORANDUM OF UNDERSTANDING

THIS MEMORANDUM OF UNDERSTANDING, is entered into this 29th day of May, 2015, by and between the undersigned members of the 99th General Assembly (hereinafter referred to as "Members") and the City of Chicago Department of Aviation (hereinafter referred to as "the Department").

WITNESSETH

WHEREAS, the State has the duty to provide for the health, safety, and welfare of its residents; and

WHEREAS, the 2003 O'Hare Modernization Act included a finding that O'Hare International Airport cannot efficiently perform its role in the State and national air transportation systems unless it is reconfigured with multiple parallel runways; and

WHEREAS, under the O'Hare Modernization Program, parallel runway 10C-28C was commissioned on October 17, 2013, dramatically increasing air traffic over northwest Chicago and the near northwest suburbs, and

WHEREAS, previously unaffected residents living as far as 12 miles from the airport have complained of near constant aircraft noise, beginning as early at 4:30am and ending as late as 1:00am; and

WHEREAS, the O'Hare Noise Compatibility Commission reported over 350,000 noise complaints filed in March 2015; and

WHEREAS, Fair Allocation in Runways (FAiR) represents a growing coalition of over 26 communities including the City of Chicago and suburbs negatively affected by the changes in flight patterns and runway usage resulting from implementation of the O'Hare Modernization Plan; and

WHEREAS, the Department and the Federal Aviation Administration ("FAA") plan to decommission diagonal runway 14L/32R prior to the commissioning of a new parallel runway 10R/28L in October 2015.

<u>The Department agrees</u>:

1. The Department will request that the FAA delay any action on the impacted runways that would lead to irreparable damage to the runways for so long as necessary to complete the agreed to Open House meetings and the three separate meetings referenced in the next section.

2. Officials of the Department will hold at least three meetings with representatives of the FAiR coalition to better understand FAiR's proposal to preserve and utilize the intersecting runways at O'Hare International Airport (O'Hare) in order to alleviate aircraft noise impacts from communities located east and west of O'Hare. These meetings will be set by agreement and will occur prior to August 1, 2015. Notice of said

meetings will be communicated to the leadership of FAiR, the O'Hare Noise Compatibility Commission (ONCC), the office of Congressman Quigley, Congresswoman Schakowsky, and the Members listed in this memorandum. At the final meeting, as chosen by the Department, the Department will give a final decision on the proposal, and will communicate to all parties any and all solutions available to address airport noise in the affected areas.

3. The Department will request and encourage the FAA to hold its four planned Open House meetings in areas/communities newly impacted by aircraft noise caused by new O'Hare Modernization Program (OMP) runways. To the extent residents are not able to attend the FAA's Open House meetings, the Department will work with the FAA to share information from the Open House meetings using the O'Hare Noise Compatibility Commission's (ONCC) public meeting schedule. The Department and ONCC will provide access to the FAA's Open House meeting information via their websites and social media.

4. At the request of the Members, officials or their designees of the Department shall meet with Members and their constituents to discuss the issues.

The parties mutually agree:

1. The federal government, namely the FAA, and the Chicago Department of Aviation are the only governments with the authority over matters related to the runways issues.

2. The State of Illinois has no authority to enact laws requiring the federal government to delay projects at O'Hare airport.

3. It is the responsibility of the Chicago Department of Aviation and the FAA to both ensure that the concerns of those impacted by the project have been heard and implement any feasible solutions.

Members and the Department have caused this Memorandum of Understanding to be executed on the 29th Day of May, 2015.

FOR THE DEPARTMENT:

Michael Rendina, Director of Legislative Counsel and Government Affairs

FOR THE MEMBERS:

Senator Thomas Cullerton

Senator Don Harmon

Senator Dan Kotowski

Senator John Mulroe

Senator Ira Silverstein

Representative Jamie Andrade, Jr.

Representative John D'Amico

Representative Will Guzzardi

Representative Louis Lang

Representative Robert Martwick

Representative Michael McAuliffe

Representative Martin Moylan

Representative Christine Winger

APPENDIX 2

CHICAGO

O’Hare MOU Meeting #2

July 20, 2015

Ginger S. Evans, Commissioner
City of Chicago, Department of Aviation

CORE GOALS

ORD

Operate Safely and Efficiently

Comply with All Existing Agreements

Analyze and Mitigate Noise Impact

Allow ORD to Grow

Areas Under Review

- Operational Mitigation
- Reporting
- Community Involvement

Process And Timing

- CDA review for benefits and viability
- By August 1, 2015 – Communicate any and all solutions available
- Implement tasks where CDA has authority
- Request ONCC to coordinate reviews with community representatives
- Consult with FAA and airlines
- Formally request consideration of further operational changes

Noise Observations

1980s Initiatives

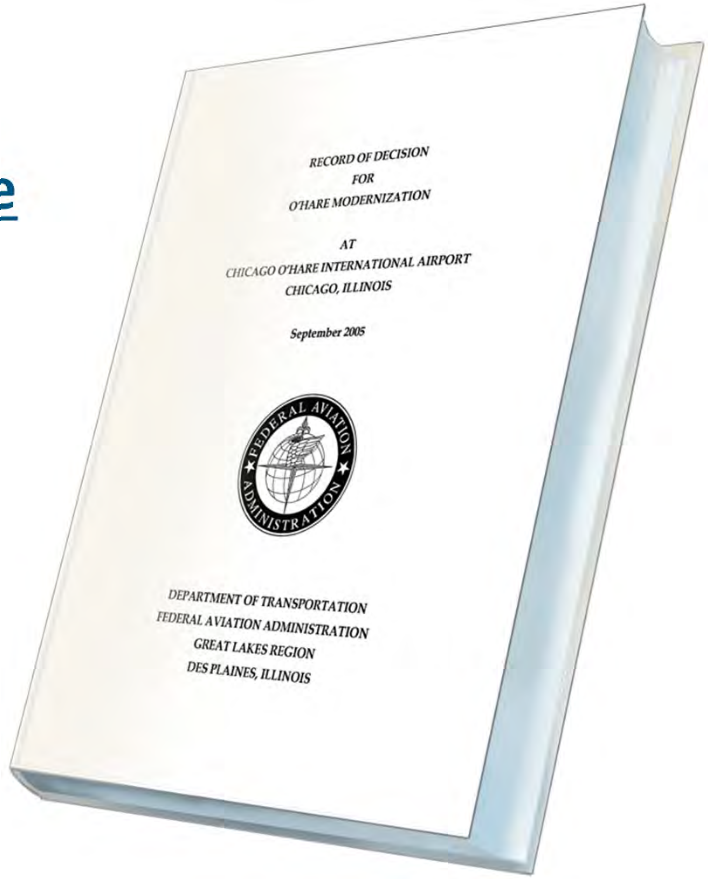
- Established a Noise Office and designated Noise Officer
- Began monitoring aircraft noise
- Established toll-free Complaint Hotline
- Constructed noise berms
- Regular noise contour updates
- Began School Sound Insulation Program
- Began Part 150 Study (Noise Exposure Maps &Noise Compatibility Plan)

1990s Initiatives

- Continued Part 150 Study (Noise Exposure Maps & Noise Compatibility Plan)
- Increased outreach
- Installed permanent Noise Monitor System
- Designed and constructed Ground Run-Up Enclosure (1st in U.S.)
- Continued School Sound Insulation Program
- Began Residential Sound Insulation Program
- ONCC established
- Fly Quiet Program announced

OMP Record of Decision (ROD)

The FAA's ROD was issued on September 30, 2005, giving environmental approval of OMP on the condition of many requirements including noise requirements.



Noise Monitor Requirements

Outcome of the EIS:

- Evaluate the effectiveness and applicability of the current noise monitor locations in relation to the full-build of the OMP and make changes as necessary, including adding new noise monitors.

Noise Abatement Requirements

Outcome of the EIS:

- Continue the Fly Quiet Program as available through implementation of the OMP including:
  - Preferential runway use
  - Arrival and departure flight procedures
  - Ground run-up procedures
- Any ONCC suggested changes to the Fly Quiet Program would be considered by the FAA.
- Relocate the GRE expeditiously to minimize any time that the facility would be unavailable for aircraft to perform ground run-ups.

Noise Mitigation Requirements

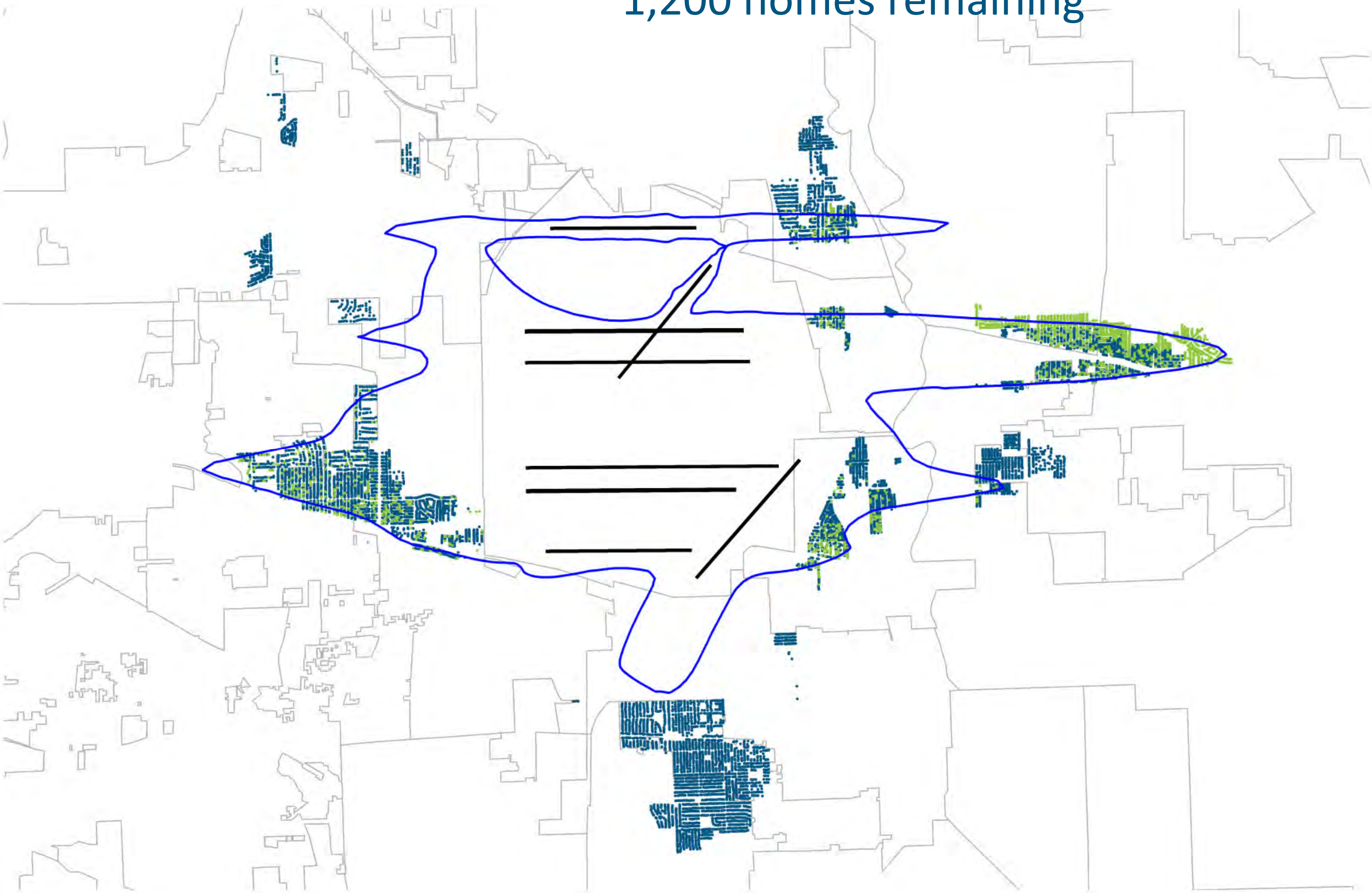
Outcome of the EIS:

- **Before Build-Out Occurs:**
    - Sound-insulate approximately 6,000 impacted residences (65 DNL)

- **After Build-Out Occurs:**
    - Create a new noise contour (based on 5 years in the future)
    - Sound-insulate any newly impacted residences (65 DNL)

Residential Sound Insulation Program

- CDA began voluntary RSIP in 1995
- Total homes completed to date = 10,922 homes complete (~$273 million)
  1,200 homes remaining



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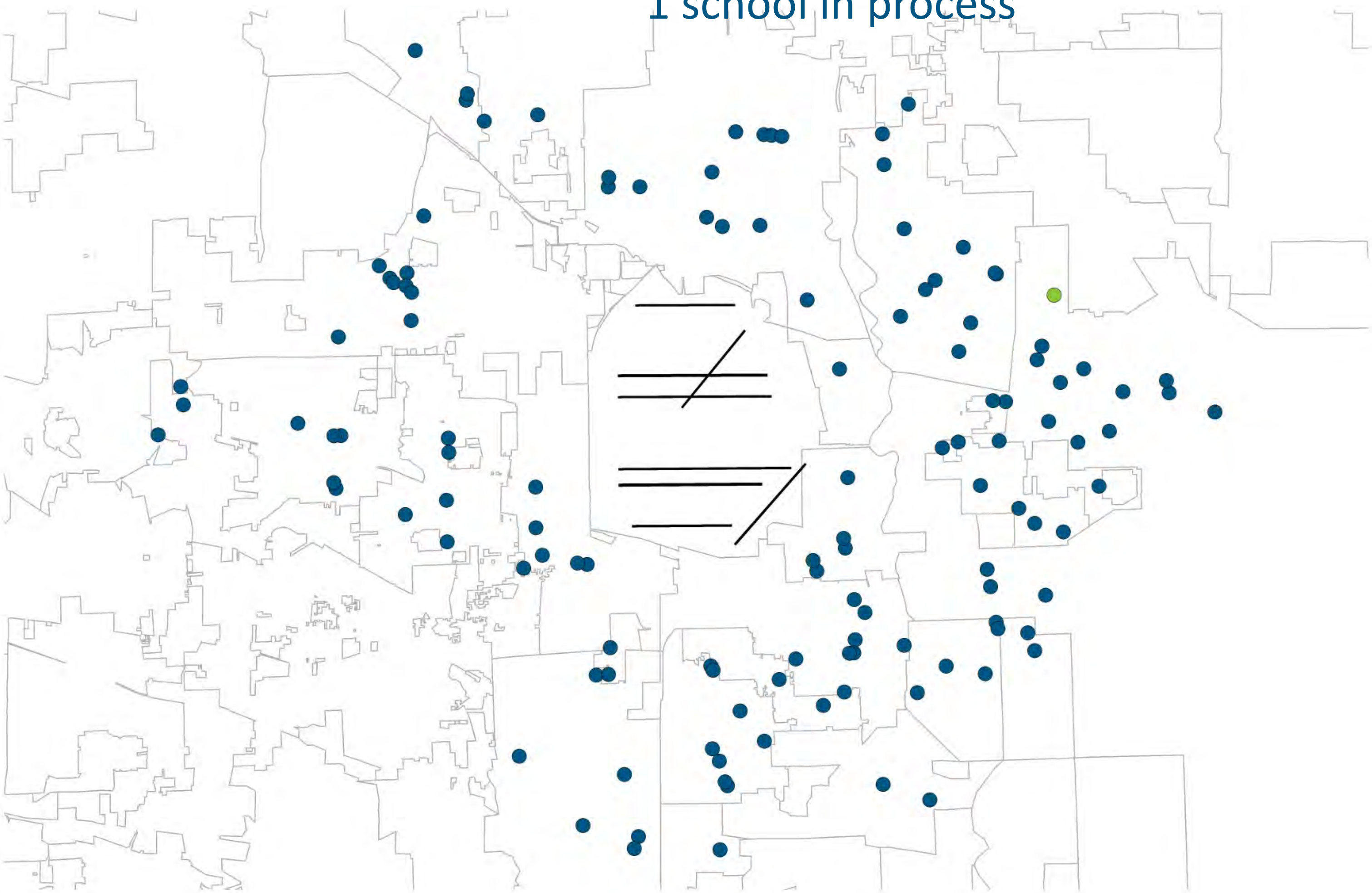
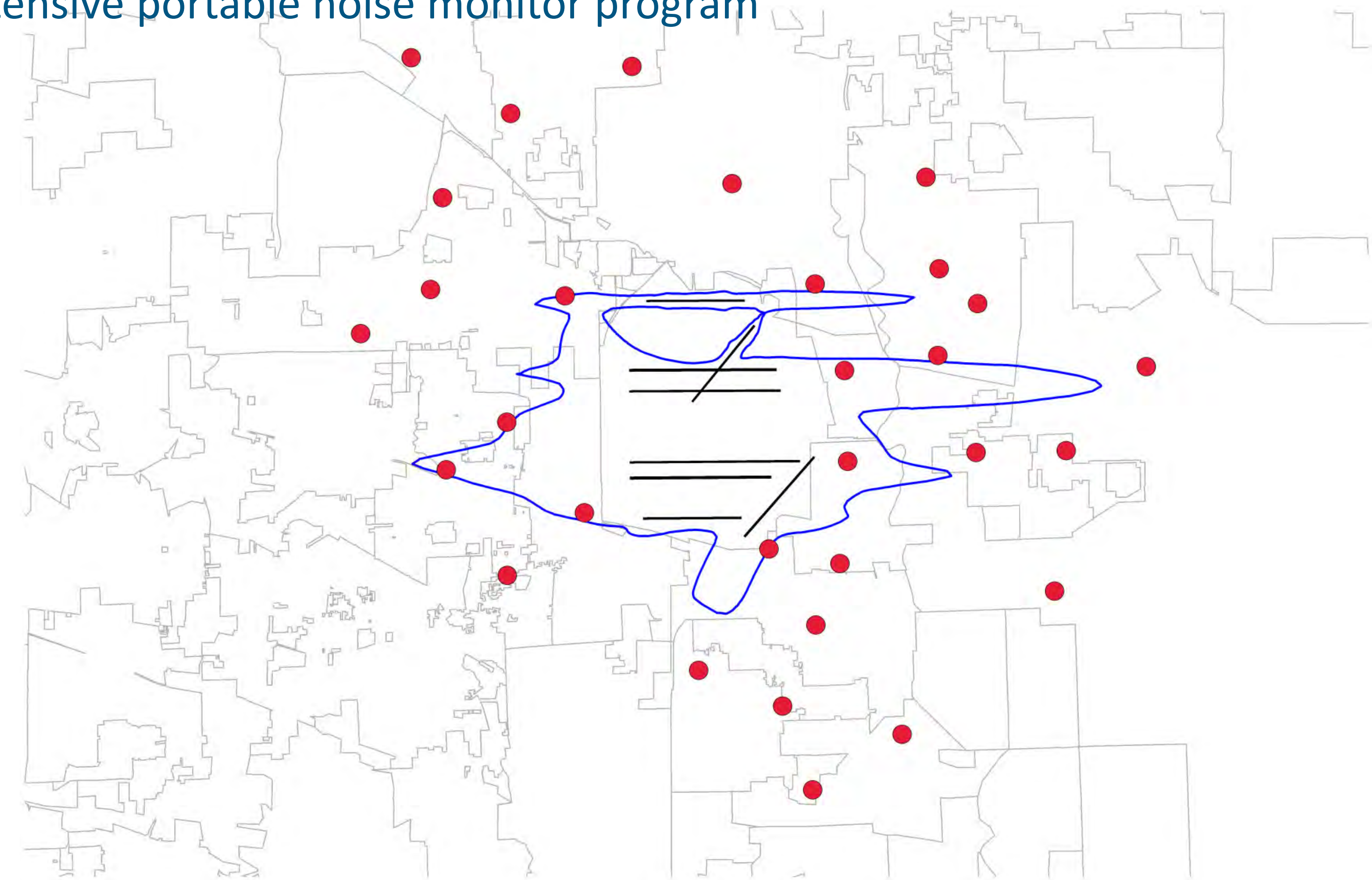
School Sound Insulation Program

- CDA began voluntary SSIP in 1982
- Total schools completed to date = 123 schools complete ($350 million)
  1 school in process



Noise Monitors

- 32 permanent noise monitors – soon to be more than 40, more than any other airport in the world
- Extensive portable noise monitor program



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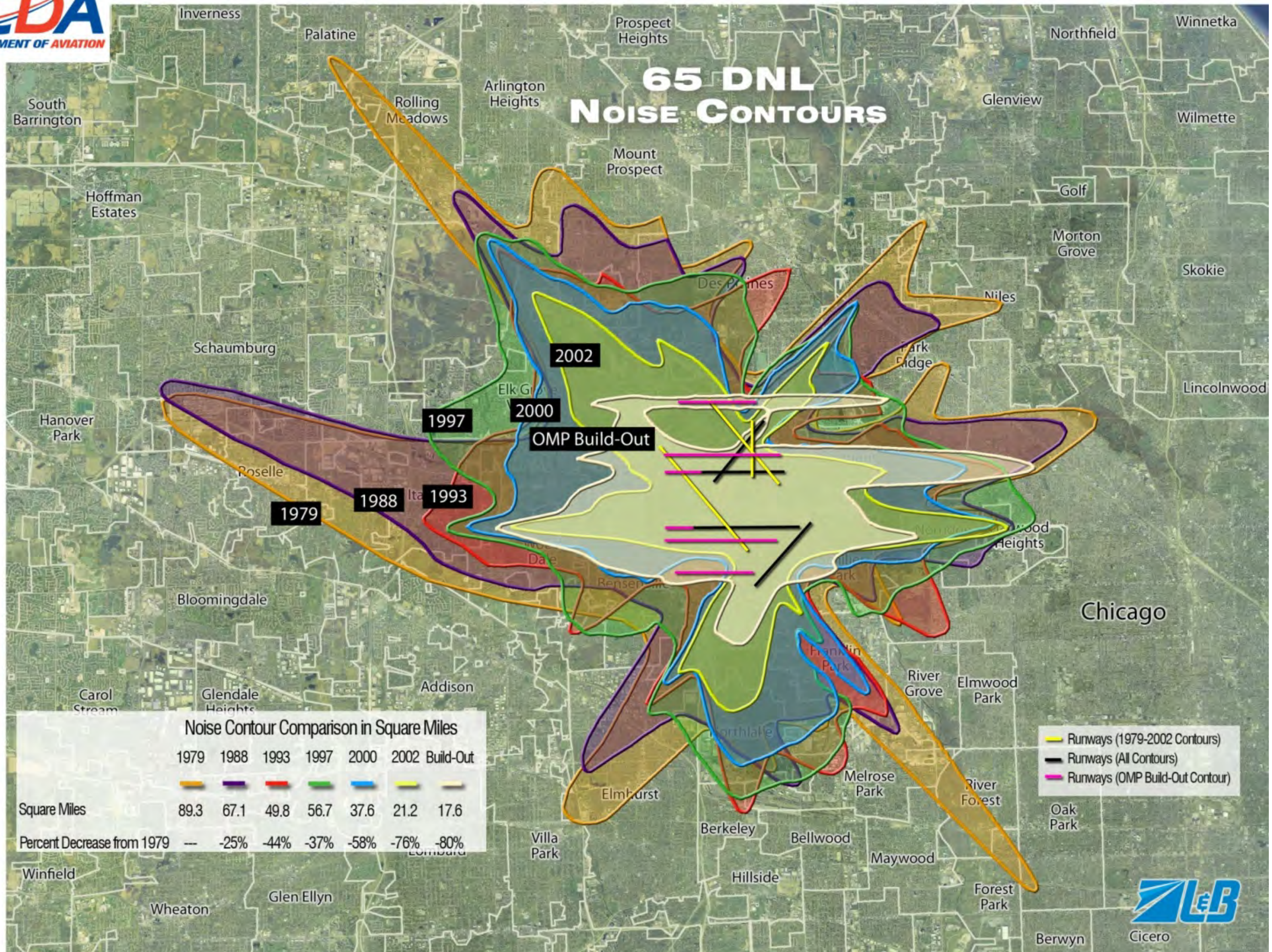
Fly Quiet Program

- Preferential Runway Use Program
- Preferential Flight Tracks
- Ground Run-Up Enclosure (1st in U.S.)
- Noise Abatement Signs
- Fly Quiet Manuals for Pilots and Air Traffic Controllers
- Construction Awareness Flyers
- Fly Quiet Reports – Quarterly

Chicago O'Hare International Airport

Noise Contours



Noise Contour Comparison in Square Miles

	1979	1988	1993	1997	2000	2002	Build-Out
Square Miles	89.3	67.1	49.8	56.7	37.6	21.2	17.6
Percent Decrease from 1979	---	-25%	-44%	-37%	-58%	-76%	-80%

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

Prior Commitments to Noise Program Improvements

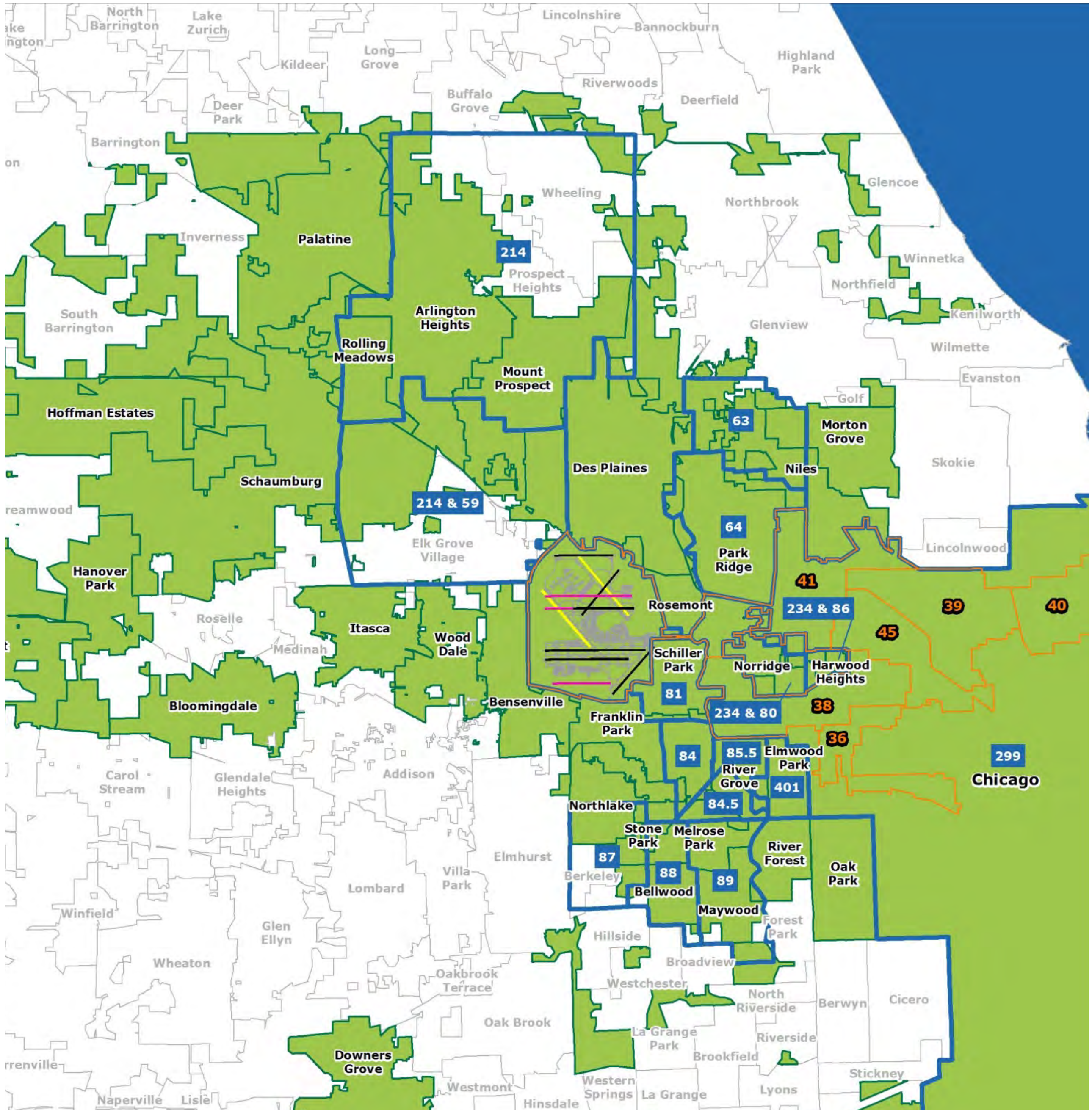
- FAA review of 65 DNL noise metric
- Congressional phase-out of Stage 3 aircraft
- Track and encourage airline/aircraft phase-outs
- Continue Residential Sound Insulation Program
- WebTrak (on-line flight tracker) – complete
- Potential permanent/portable noise monitor deployments – in process
- Potential Fly Quiet Program report enhancements – in process

Commitment to Community

- Active member of the ONCC
- Briefings for elected officials
- Complaint tracking (phone and Internet)
- Community Outreach Vehicle (COV)
- CDA website: www.flychicago.org
    - WebTrak (on-line flight tracker)
    - Property Locator
    - Monthly ANMS Reports
    - Quarterly Fly Quiet Reports
    - Introduction to noise primer
    - General noise information

O’Hare Noise Compatibility Commission (ONCC)

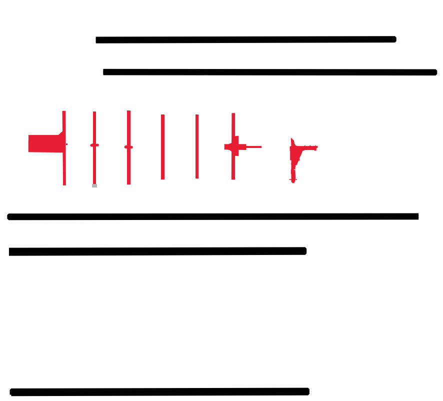
- Established in 1996
- Oversees noise programs
- Originally consisted of 26 members
- Today consists of 55 members:
  - 32 municipalities
  - Cook County
  - 16 school districts
  - 6 Chicago wards
- Industry recognized



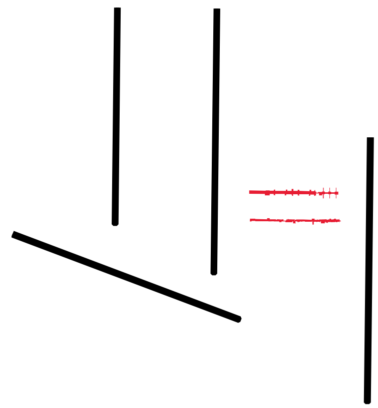
O’HARE & MIDWAY INTERNATIONAL AIRPORTS

Safety and Efficiency Observations

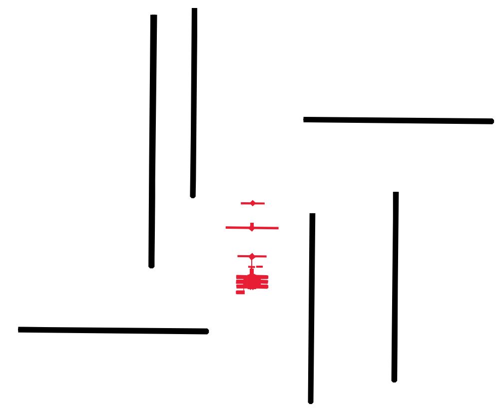
Hartsfield–Jackson Atlanta International Airport



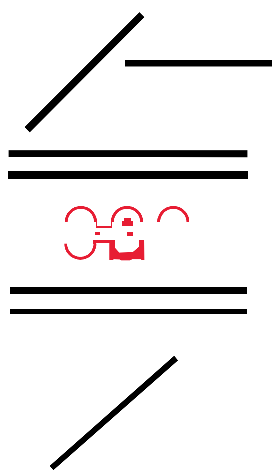
Washington Dulles International Airport



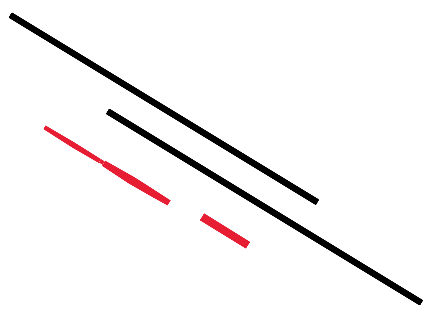
Denver International Airport



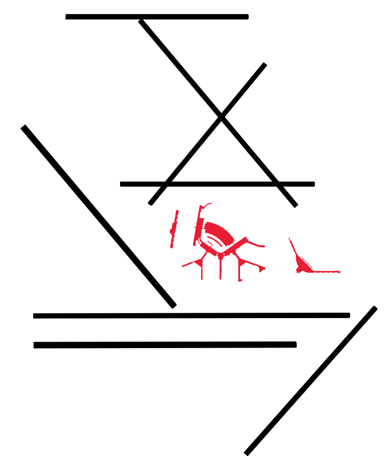
Dallas/Fort Worth International Airport



Dubai International Airport

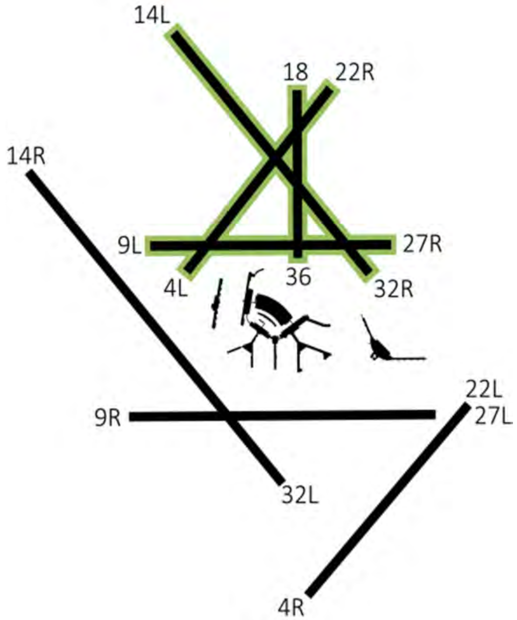


Chicago O'Hare International Airport



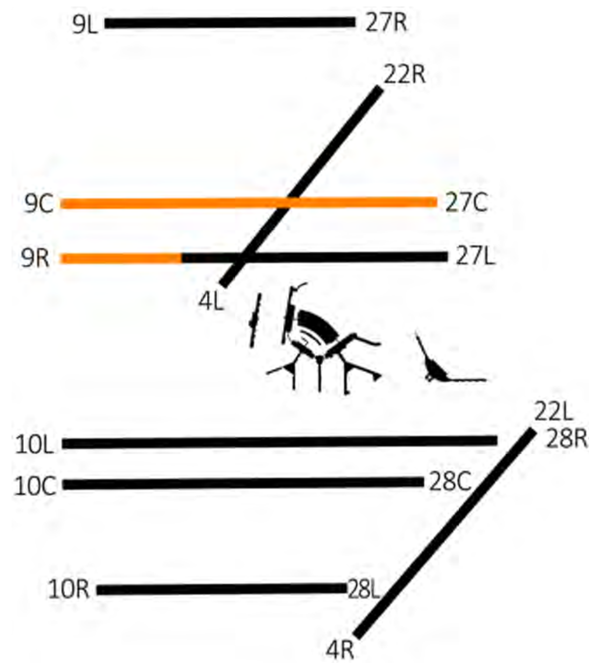
Parallel Runways are Safer and More Efficient

Intersecting Runway System (Pre-OMP Airfield)



Note: Green runways indicate the original "runway triangle" airfield.

Full Parallel Runway System

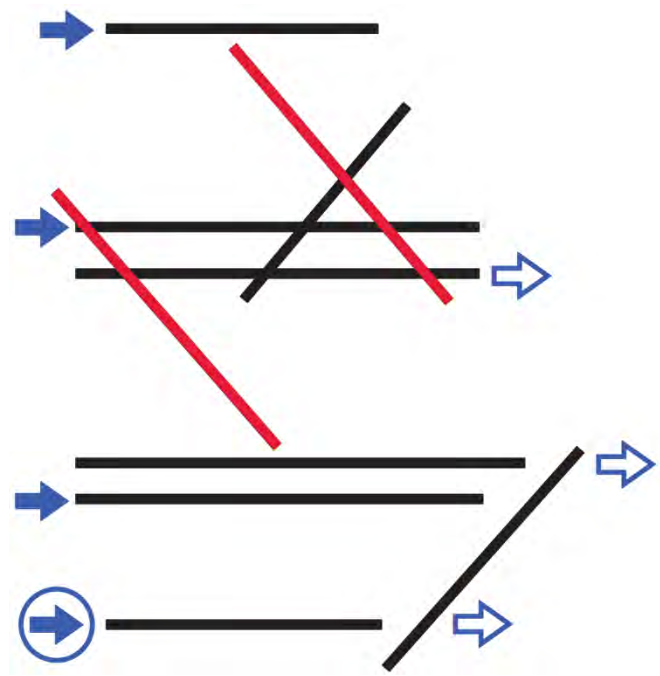


> *"...the essence of any successful plan to provide significant delay reduction at O'Hare involves* ***correcting the existing "runway triangle"*** *and realigning the airfield in sets of parallel runways that can handle more traffic,* ***safely and efficiently*** *in all weather conditions."*

(FAA Record of Decision for O'Hare Modernization, Sept. 2005)

Modern Hub Airports Rely on Parallel Runway Layouts for Safe and Efficient Operations

- Runways 14L/32R and 14R/32L provide limited utility in the full parallel runway system.
- City is evaluating suggested limited uses
    - Utilizing the runways during nighttime operations,
    - Staging snow removal equipment, and
    - Use for damaged aircraft.



“This [Runway 32L departures] is almost impossible to manage during busier arrival traffic periods.”

“Runway 14L/32R intersects two other runways… This precludes use of Runway 14L/32R simultaneously with those runways in either a full west or east flow operation, unless traffic on the other two runways are held.”

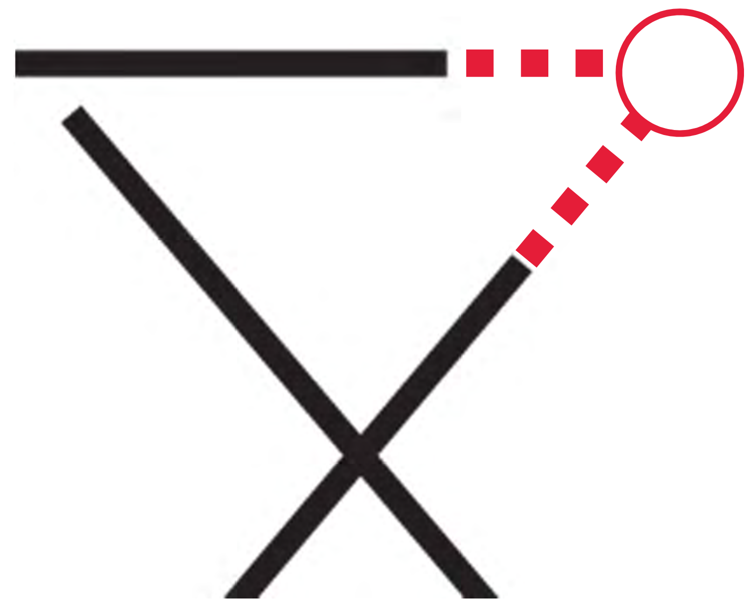
JDA Aviation Technology Solutions, O’Hare Crosswind/Diagonal Runway Layout and Usage, June 3, 2015.

FAA has steadily increased safety in the national airspace system, implementing a series of rules to upgrade older airfields

- Converging Runway Operations (CRO)
  - April 2014
- Runway safety areas
  - Deadline December 2015
- Irregular geometry (runway incursions)
  - 2016

2014 FAA Converging Runway Operations (CRO) Rule Increases Need for Full Parallel Runway System

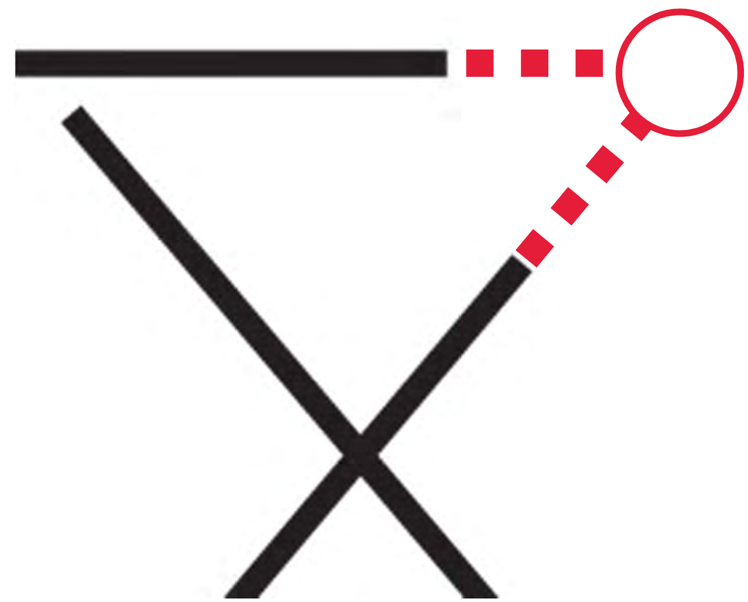
- April 2014 – FAA implemented new rules to manage runways with converging flight paths
  - Created safe separation between converging flight paths
- Increased separation effectively reduced throughput (capacity)
- Impact of rule would have further reduced capacity had it not been for OMP
  - Annualized arrival rate is an estimated 20 percent higher
- **The full parallel runway system eliminates CRO constraints**



The CRO rule addresses a safety recommendation from the National Transportation Safety Board (NTSB)

2014 FAA Converging Runway Operations (CRO) Rule Increases Need for Full Parallel Runway System

- The CRO rule was not known at the time of the EIS
- OMP Phase 1 and Phase 2A airfields include runway operations impacted by CRO due to certain crosswind runways
- OMP Phase 1 peak capacity is reduced from 241 to 196 operations per hour following implementation of CRO
- **The full parallel runway system eliminates CRO constraints**

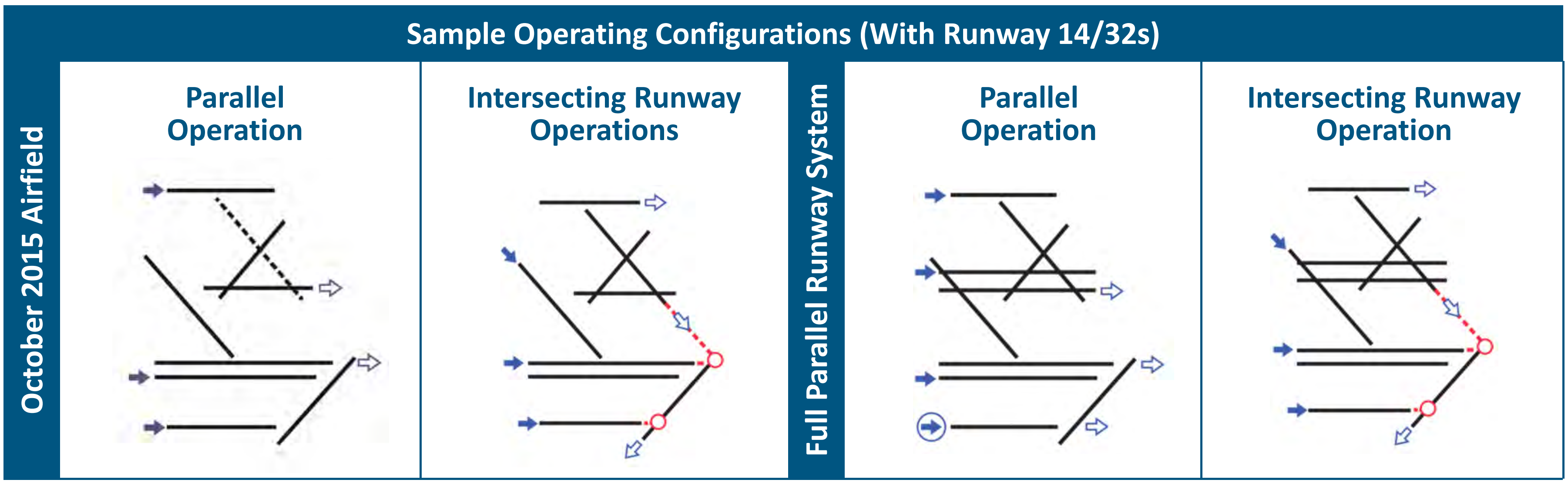


The CRO rule addresses a safety recommendation from the National Transportation Safety Board (NTSB)

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

The Use of Intersecting Runways Reduces Capacity

- Throughput rates significantly reduce with the use of intersecting runways.
- Intersecting operations increase with the use of Runways 14L/32R and 14R/32L.
- The use of Runways 14L/32R and 14R/32L require changes to airspace flows at Midway.
    - Approaches to Runway 32L or 32R require that easterly MDW arrivals fly at a lower altitude.



Need and Timing for Phase 2B – Estimated Delay Reduction

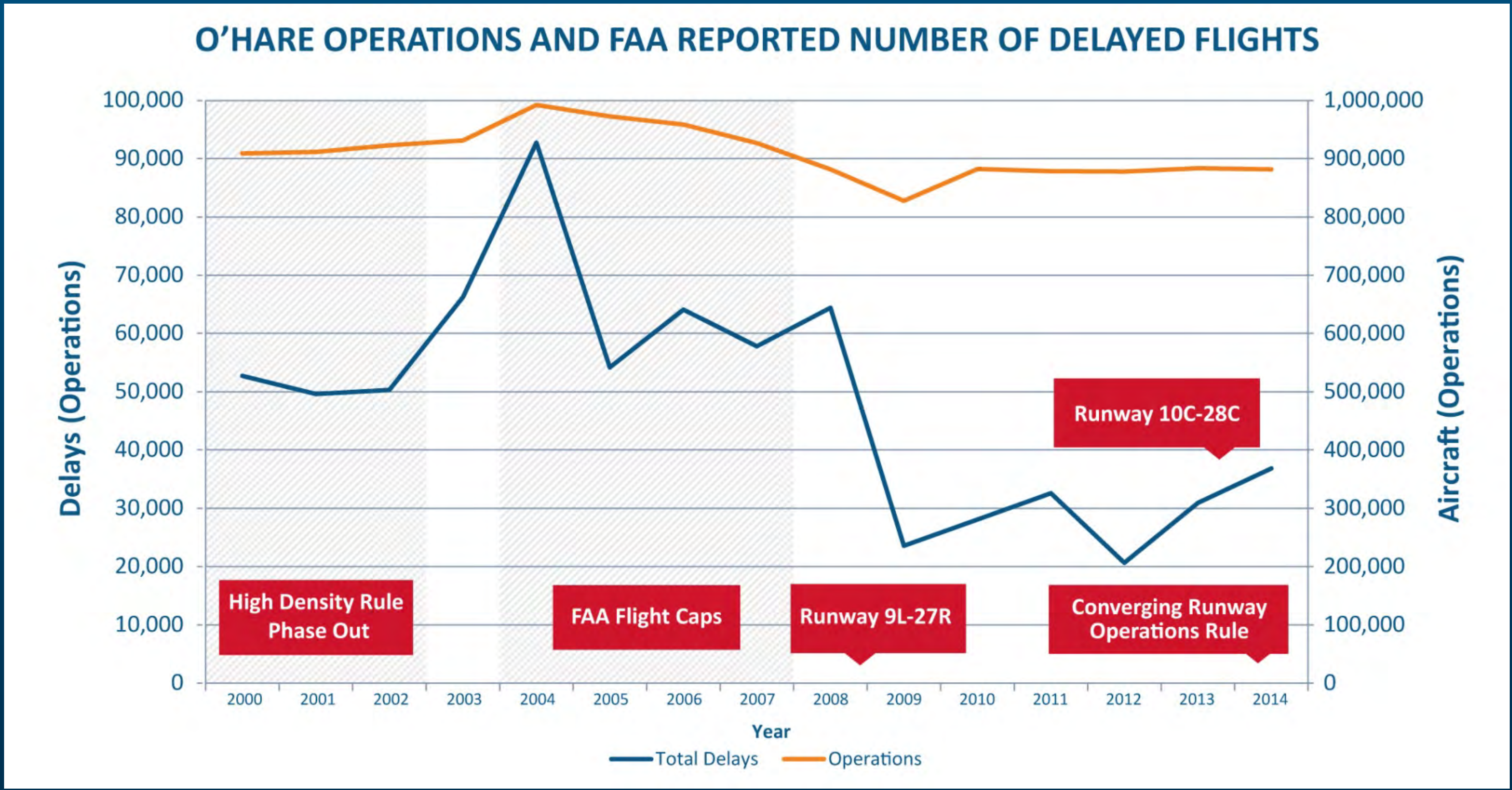
- FAA's "severe" delay threshold is 10 minutes per operation
- When delays approach that level, it indicates need for additional capacity (new runways)
- FAA's estimate is that completion of OMP Phase 2B is needed in 2020 to maintain average delay per operation below this threshold
- Estimate did not account for impacts of Converging Runway Operations Rule
- Current commitment per the ROD and subsequent analysis is to construct Phase 2B by 2020

Delays Have Reduced

- Average annual system impact delays have reduced 57% when comparing 2003-2008 to 2008-2014.

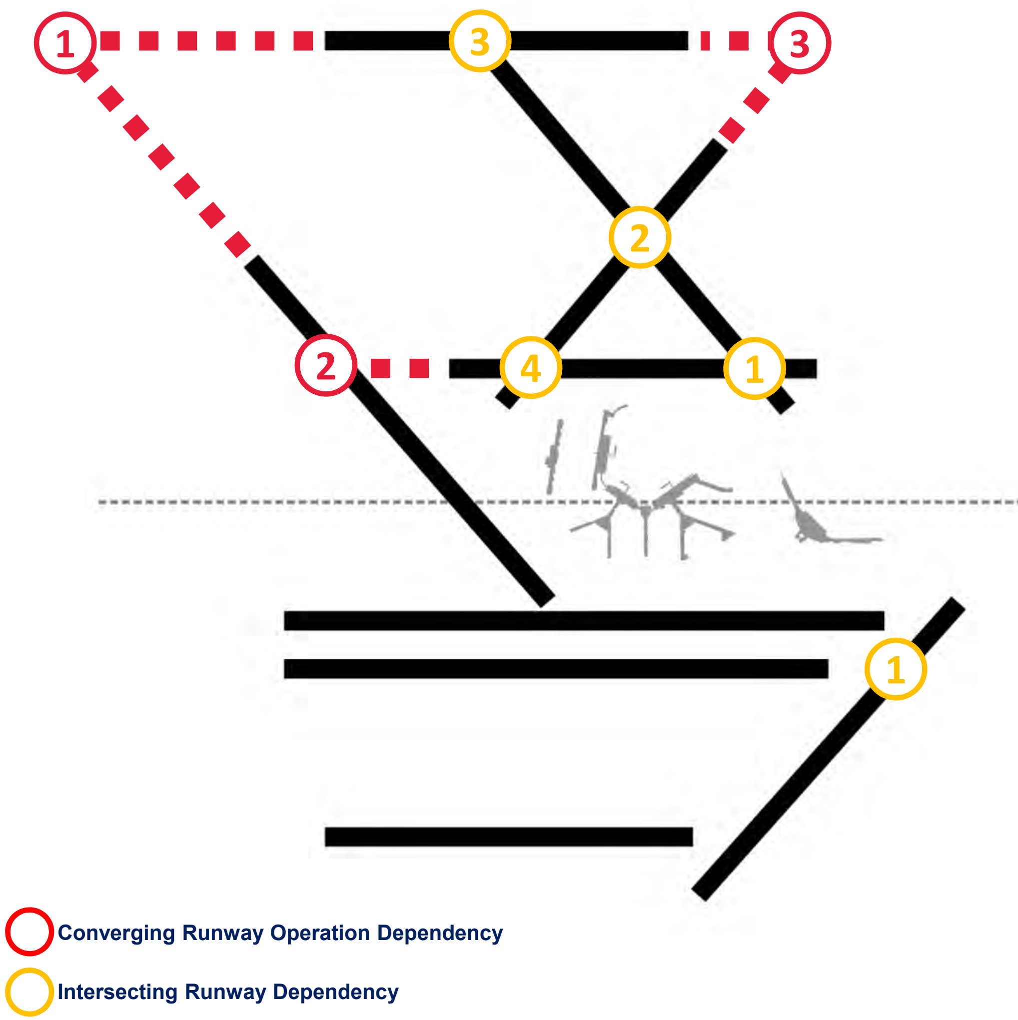
Runway throughput capacity has increased

	Poor Weather Arrival Throughput Rates (East/West)
Pre-OMP	56/72
Today's Airfield	84/106



Source: Federal Aviation Administration, Chicago O'Hare Performance Improvement, [June 2015].

In October, the South Airfield will be a Modern, Parallel System; but the North Airfield Includes a Complex Layout



NORTH AIRFIELD

10,005 FEET
LONGEST RUNWAY

3
NUMBER OF CONVERGING RUNWAY OPERATION DEPENDENCIES

4
NUMBER OF INTERSECTING RUNWAY DEPENDENCIES

SOUTH AIRFIELD

13,000 FEET
LONGEST RUNWAY

0
NUMBER OF CONVERGING RUNWAY OPERATION DEPENDENCIES

1
NUMBER OF INTERSECTING RUNWAY DEPENDENCIES

Balance in use of Airfields

- North and South Airfield
- East Flow and West Flow
  - Currently West Flow has 30% more capacity than East flow
  - Therefore Air Traffic favors West flow
- Construction causes short term changes to runway use (balance)

Areas Under Review to improve Noise Program

- Operational Mitigation
- Reporting
- Community Involvement

CONTACT

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APPENDIX 3

O'HARE INTERNATIONAL AIRPORT
NOISE RECOMMENDATIONS

INTRODUCTION

Everyone agrees that not all aircraft noise exposure can be eliminated. However, there is no question that the aircraft noise at O'Hare impacts our neighbors in many different ways. Over the past few months under the leadership of Commissioner Evans as charged by Mayor Emanuel, the Chicago Department of Aviation (CDA) has listened to many impacted citizens, community groups and civic leaders, visited surrounding neighborhoods, and studied O'Hare's noise landscape. Having now completed this process, CDA is committed to exploring new elements intended to enhance and improve our noise program.

The May 29, 2015 MOU signed by the CDA and state legislators, stated in pertinent part that the CDA would "communicate to all parties any and all solutions available to address airport noise in the affected areas," prior to August 1, 2015. CDA has widely communicated with all parties and has reviewed and analyzed specific suggestions made by FAiR, SOC, and ONCC. The CDA has evaluated all suggestions made during these collaborations and has included those that are viable within CDA's own Recommendations.

In determining CDA's approach to Recommendations, we first established the primary goals for our actions. These goals are:

- Allow O'Hare to operate safely and efficiently
- Analyze and Mitigate noise impacts to the extent allowable and reasonable
- Comply with all existing agreements
- Allow O'Hare to grow

With these goals as our guiding principles, the CDA makes Recommendations in the following pages that we believe have a high chance of success to impact noise. In a separate document, we explain the difficulties and challenges of implementing the various other noise abatement ideas that have been presented to us.

LEGAL DISCLAIMER

The recommendations set forth by the City of Chicago through its Department of Aviation (CDA) in this document are proposals only, without force or effect. All such recommendations must be fully reviewed and vetted in the context of the Federal Aviation Administration's Record of Decision (ROD) for O'Hare Modernization dated September 2005, as well as any other applicable law or regulation, for compliance and compatibility. The City of Chicago in no way intends to depart from, or to represent departure from, its commitments and obligations under the ROD and subsequent grant agreements.

The following pages will outline the four (4) categories of CDA's Recommendations and proposed solutions, including: Abatement, Mitigation, Communications and Reporting, and Citizen Involvement with individual measures in each category that CDA believes can be implemented.

1. ABATEMENT

The goal of this section is to outline noise relief solutions for communities through a change in the airport's current operations. This must be done without jeopardizing safety or reducing the efficiency of the airport. It is necessary to maintain compliance with overall air traffic patterns and modern airfield geometry, intended to promote pilot awareness and safer operations.

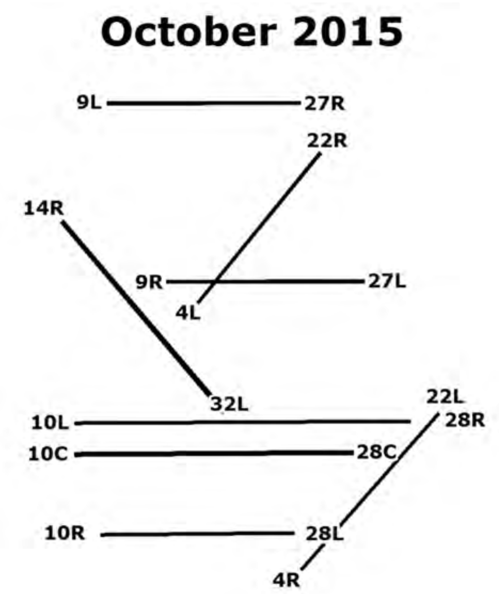
A. Fly Quiet. Our primary focus will be on the largest impact – nighttime noise. Nighttime noise most impacts the quality of life of airport neighbors. We've heard about these impacts consistently in our meetings and over time it appears in reports as a top area of concern. Not surprisingly, the FAA recognizes nighttime noise as disruptive and weighs it more heavily in its noise metric used to create contours. Lastly and most importantly, abatement of nighttime noise through operational changes is possible at O'Hare.

The Fly Quiet Program is an official group of measures recognized in the OMP Record of Decision, and it also provides the CDA a framework from which improvements can be made. Modifying this program offers several airport operational options that can help abate nighttime noise impacts. We plan to open the dialogue on the program to see what new or revised procedures can be implemented to abate noise in certain communities at certain times.

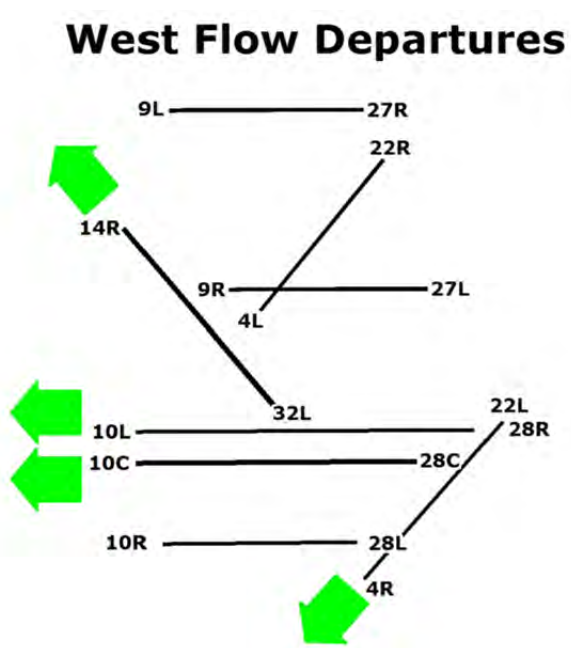
1. **Develop a Fly Quiet Rotation**. CDA is willing to change the intent of this program if community consensus and FAA approvals can be obtained. Specifically, changing the philosophy of Fly Quiet from concentrating on nighttime flights over compatible land near the airport to an approach that would spread out the noise via a rotation scheme that moves impacts due to nighttime flights from one community to another. This rotation would be on a set period (number of days or weeks), as weather and other operational conditions allow. The methodology we are using to analyze this initiative is outlined below.

   We would begin by identifying **all arrival and departure possibilities** on the airfield after the closing of runway 14L/32R and the commissioning of runway 10R/28L.

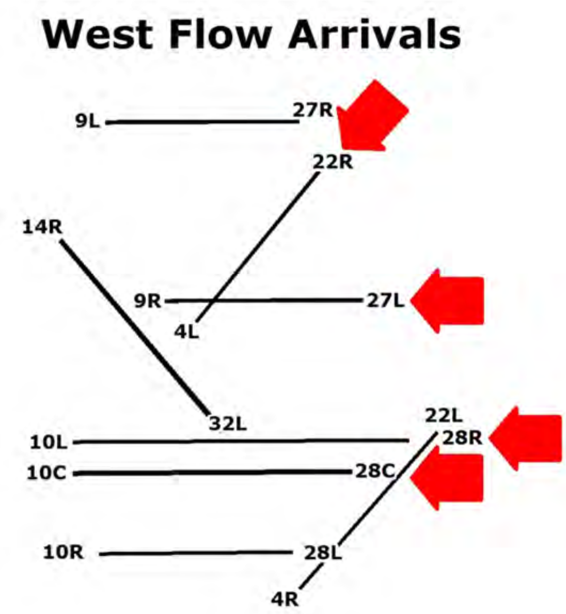
October 2015. This exhibit represents the configuration after the closing of 14L/32R and the opening of 10R/28L. After the Build Out of the OMP, there will be opportunities to revise/enhance this initiative with the addition of 9C/27C and the extension of 9R/27L.



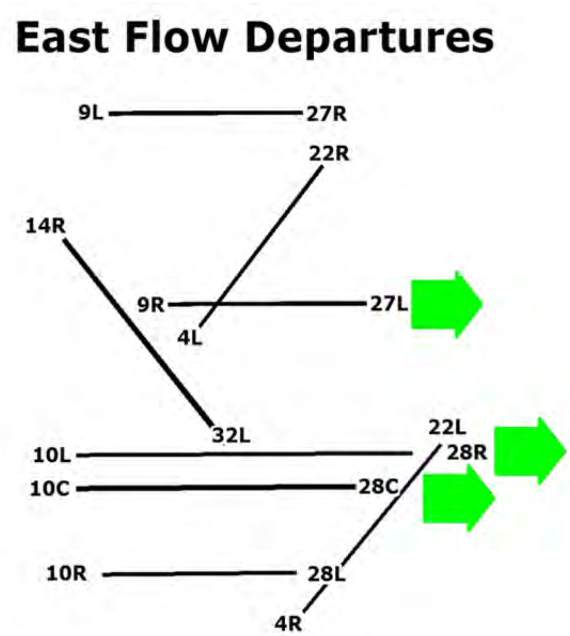
West Flow Departures. This exhibit highlights potential departure options for a Fly Quiet West Flow. Runways 27R and 28L will be closing nightly from 10 p.m. to 6 a.m. due to the closure of each air traffic control tower supporting those runways. Though 14R/32L will be decommissioned during the completion phase of the OMP, 32L is a viable alternative for west flow departures in the interim period until decommissioning or OMP completion.



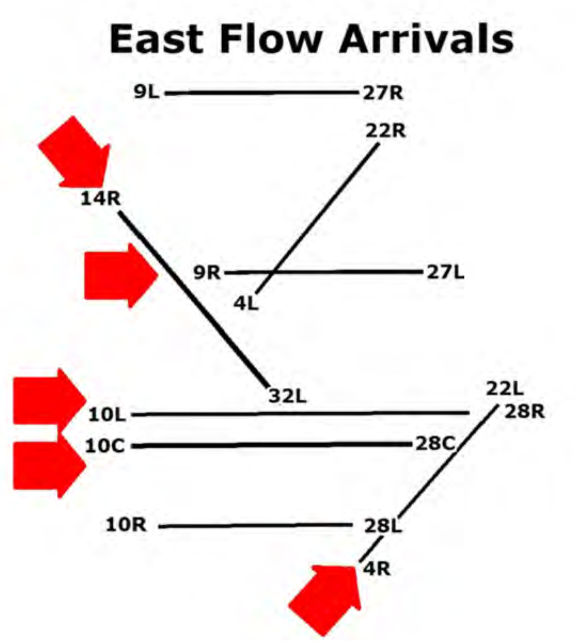
West Flow Arrivals. This exhibit highlights potential arrival options for a Fly Quiet West Flow. Runways 27R and 28L will be closing nightly from 10 p.m. to 6 a.m.



East Flow Departures. This exhibit highlights potential departure options for a Fly Quiet East Flow. Runways 9L and 10R will be closing nightly from 10 p.m. to 6 a.m. Runways 10L and 10C provide the safest and efficient east flow departures.



East Flow Arrivals. Similar to west flow arrivals there are several runway options. The optimum runways are 9R, 10L, 10C and 4R. Runways 9L and 10R will be closing nightly from 10 p.m. to 6 a.m.



We would then evaluate all possible alternatives that meet some important baseline criteria that would include:

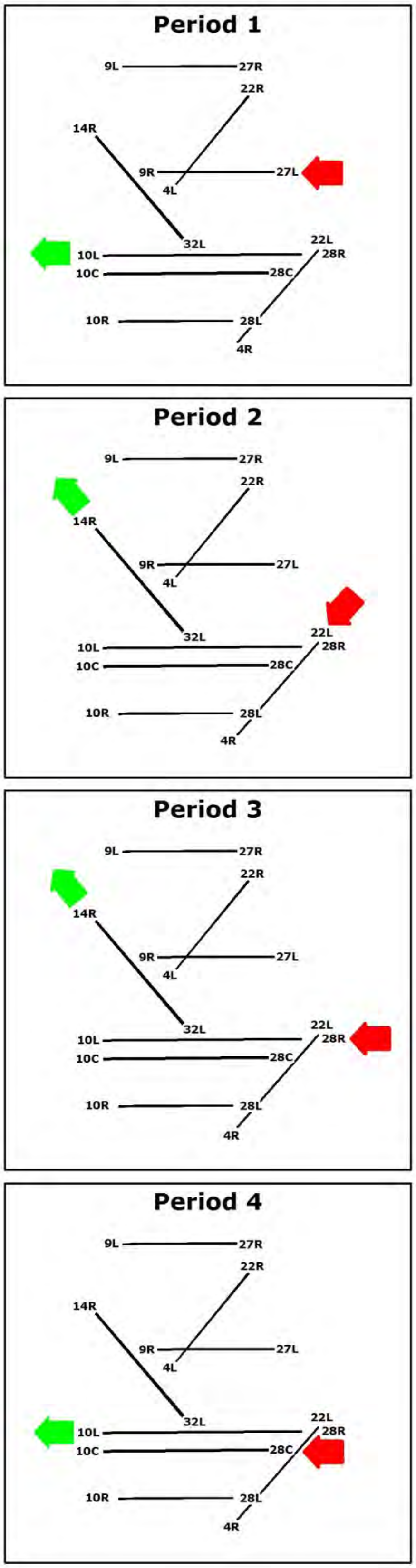
i. Departure runways would need to accommodate aircraft scheduled for nighttime departures in the period.

ii. Arrival runways should have minimal impact on surrounding ground movements.

iii. Alternate departure and arrival runways should be identified for periods when primary runways are out of service for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs.

iv. Make maximum use of all runways that are appropriate for each rotation.

Fly Quiet West Flow Concept



This example represents one possible **Fly Quiet West Flow** alternative of a rotational configuration that will help distribute the impact of noise on the surrounding communities in a balanced manner.

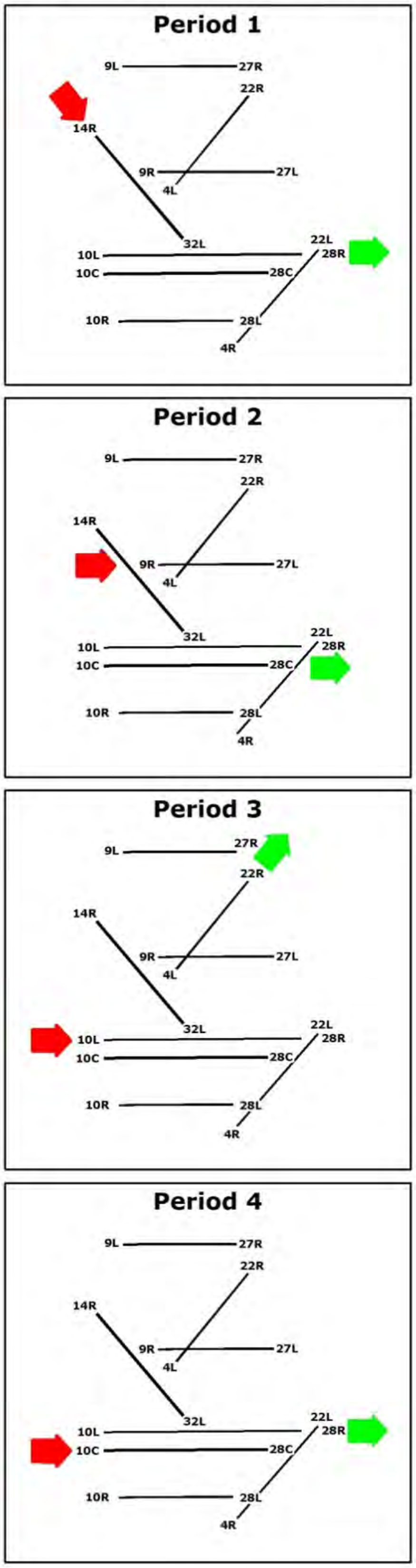
For each period (days or weeks), there will be a dedicated runway for arrivals and a dedicated runway for departures.

Operations for each period will be concentrated on specific designated runways in order to spread the noise impacts. There are numerous rotational options that CDA can analyze. **This specific example is merely a concept to illustrate how the rotation concept might operate.**

Note: Each runway will likely need a designated alternative to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs. Available runways are determined by CDA Operations, ATC, and prevailing winds.

The CDA will work with FAA to make Runways 9L/27R and 10R/28L available for this revised Fly Quiet concept. This would allow for a great spread of noise impacts for this alternative because of their locations. It should be noted that any change to the Fly Quiet Program would have to reviewed and agreed to by both the ONCC and the FAA.

Fly Quiet East Flow Concept



This example represents one possible **Fly Quiet East Flow** alternative of a rotational configuration that will help distribute the impact of noise on the surrounding communities in a balanced manner.

For each period (days or weeks), there will be a dedicated runway for arrivals and a dedicated runway for departures.

Operations for each period will be concentrated on specific designated runways in order to spread the noise impacts. There are numerous rotational options that CDA can analyze. **This specific example is merely a concept to illustrate how the rotation concept might operate.**

As stated above, each runway will likely need a designated alternative to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs. Available runways will be determined by CDA Operations, ATC, and prevailing winds.

Like the West Flow alternative, the CDA will work with FAA to make Runways 9L/27R and 10R/28L available for this revised Fly Quiet concept. This would allow for a great spread of noise impacts for this alternative because of their locations. As noted above, any change to the Fly Quiet Program would have to reviewed and agreed to by both the ONCC and the FAA.

2. **Utilize Runway 14R/32L.** The use of Runway 14R/32L, especially during nighttime operations and until the commissioning of 9C/27C and the extension of 9R/27L, is a reasonable possibility. The CDA is recommending to the FAA and the airlines additional utilization of this runway. This will provide more options for the Fly Quiet preferential runways.

3. **Modify existing preferential departure procedures.** Existing procedures could be examined to enhance preferential departure flight paths are over the most compatible land use.

4. **Enhance existing preferential departure procedures (RNP).** Existing procedures are vector (non-precision) procedures. By incorporating precision guidance (GPS or RNP) procedures, the adherence to the preferential flight tracks could increase.

5. **Redesign the Ground Run-Up Enclosure (GRE).** In March 1997, the Chicago Department of Aviation (CDA) opened a Ground Run-Up Enclosure (GRE) on the Scenic Hold Pad at Chicago O'Hare International Airport in order to reduce aircraft noise from aircraft engine ground run-ups. The GRE was built at a cost of $3.2 million, was the first of its kind in the United States, and has logged more than 15,000 run-ups since its commissioning. The GRE is a non-roofed, three-sided facility with acoustic panels that absorb and attenuate noise. The existing GRE will need to be relocated as an enabling project for Runway 9C/27C which will provide an opportunity for expanded capability at the future location.

6. **Require One-Engine Airfield Taxiing.** Require airlines to employ single engine taxi operations. This operational change not only reduces noise effects during night time movements, it also would reduce emissions and save the airlines operating costs. This has been an effective measure at other airports.

7. **Add Noise Abatement Signs.** Added noise abatement signs will serve a reminder to pilots about the Fly Quiet Program.

8. **Add the Fly Quiet Program to the Pilot Aeronautical Charts.** Adding the Fly Quiet Program into the pilot aeronautical charts will serve as a reminder to pilots about the Fly Quiet Program.

B. Fully Modernize O'Hare's Airfield.

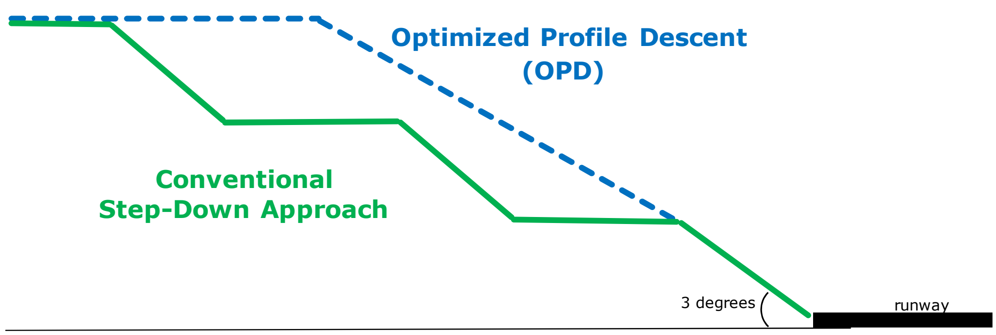
1. **OMP Build Out.** It is in the community's interest to complete the airfield so that use of the runways can be finally balanced as intended in the original design. Not only will use of the airfield be balanced between the north and south runways, the balance of east flow and west flow may be balanced from the current 70/30 split to closer to 60/40. Additional east/west runways will

provide the opportunity to decrease operations on existing runways and existing flight paths and therefore spread out the impact of aircraft noise.

Moving forward with the airfield will reduce the noise in the community in the southeast area from O'Hare created by the interim (2015 to 2021) condition of higher use of the south airfield, which is required until the north airfield is completed.

2. **Airspace Changes.** As O'Hare's airfield is modernized, so is the airspace that supports it. Completing the buildout of the OMP may provide opportunities to improve airspace configuration and/or procedures as a result of new technologies, evolving regulations, or other factors. The CDA will work with FAA and airlines to identify and evaluate those options.

   One example is Optimized Profile Descent (OPD) or Continuous Descent Approach. OPD is an aircraft arrival method that permits the aircraft to descend from cruise altitude to final approach using the most economical power setting at all times. OPD allows the aircraft to remain at higher altitudes on arrival to the airport and use lower power settings during descent.



   Conventional arrival procedures have multiple segments of level flight during the descent and each step down requires a change in power settings. OPD procedures enable arrival aircraft to descend from cruise altitudes to final approach with significantly fewer level-offs. Typically, this occurs between 30 and 15 nautical miles from the end of the runway. Since aircraft can use lower and steady power settings, OPD procedures can result in reduced fuel burn, lower emissions and reduced noise.

2. MITIGATION

RSIP and SSIP Programs. The CDA, working closely with the ONCC, has accomplished much in the area of Residential and School Sound Insulation. Together we have provided mitigation to those most impacted by noise and we have mitigated noise impacts for children trying to learn at school.

Since 1995, the Chicago Department of Aviation (CDA) has administered the Residential Sound Insulation Program (RSIP) in communities surrounding O'Hare International Airport and is one of the most aggressive programs in the world. More than $600 million has been spent on noise insulation, including over $273 million on over 10,900 residential units.

Since 1982, the Chicago Department of Aviation (CDA) has administered the School Sound Insulation Program (SSIP) in communities surrounding O'Hare International Airport and is the largest and one of the oldest programs in the world. More than $600 million has been spent on noise insulation, including more than $351 million on 123 schools.

However, these mitigation efforts do not provide relief to everyone impacted by airport noise. The CDA proposes to work with the FAA to identify additional mitigation for homes and facilities impacted by noise. This additional mitigation could include previously insulated homes in the 70 DNL and/or other noise sensitive facilities like libraries and churches.

3. COMMUNICATION AND REPORTING

A. **Upgrade the CDA Webpage to include expanded content on airport noise and operations.** The upgrade will include new subpages to answer general questions residents may have and provide information that will help residents better understand the complex issue of aircraft noise. The CDA will utilize various methods (such as whitepapers, graphics, or video tutorials) to provide pertinent understandable information on airport noise and operations.

B. **Continue to explore new noise software.** Continue the use of WebTrak software, one of the software systems recommended by the JDA/SOC reports. WebTrak allows users to watch the movement of flights and air traffic patterns within the Chicago metropolitan area. This flight tracking system includes specific information about flights departing from and arriving to O'Hare and Midway. Information includes the flight number, origin/destination airport, aircraft type, and altitude above mean sea level.

   1. WebTrak has a graphical interface that helps users easily identify aircraft and their locations. Aircraft departing and arriving to O'Hare and Midway are shown in different shades of green and red.

   2. In addition to the use of WebTrak, the CDA will continue to investigate and explore new noise software to provide more community education on the benefits and uses of this Airport Noise Management System.

C. **Improve the collection of stakeholder noise concerns.** The CDA understands the importance of addressing resident concerns from the communities surrounding O'Hare. In an effort to provide an improved level of customer service, the CDA will investigate various new resources for residents.

   1. Options to investigate include: a 'live chat' feature for citizen inquires relating to noise, an airport specific alternative to the City of Chicago's 311 City Services, and a mobile application for airport noise.

i. A 'live chat' featured on the CDA's website would allow residents to receive real time assistance in locating information on the CDA's website and answering basic questions relating to airport noise.

ii. An airport specific noise hotline would allow CDA to directly address community inquiries on various noise topics.

iii. A potential mobile application could include relevant noise information (i.e. sound insulation eligibility, complaint entry, noise monitor information, etc.) that is readily accessible in a format that is convenient for residents.

D. Review Industry "Best Practices". The CDA will review "Best Practices" outlined in Airport Cooperative Research Program (ACRP) research projects like Report 15 "Aircraft Noise: A Toolkit for Managing Community Expectations" and adopt any not being performed.

E. Maximize the use of social media to update citizens on relevant noise topics. Social media has become a standard for communication worldwide. It is timely and prudent for the CDA to embrace this medium and find ways to enhance contact with its stakeholders.

F. Report single-event noise data. The CDA intends to begin reporting on single-event noise events. For every noise event (aircraft or community) recorded by the Airport Noise Management System, the CDA proposes to report three metrics. The CDA's noise monitors record noise events based on threshold exceedance. Each noise event starts at the time the noise level exceeds a decibel threshold, typically slightly above the background or ambient noise level, and ends at the time the noise level returns to the threshold. The three metrics reported for each noise event would include the Lmax, the Leq, and the SEL. The three noise metrics are industry standard metrics and are calculated at the noise monitor. The Lmax is the peak noise event in decibels, the Leq is the average sound level for the event in decibels, and the SEL is the average sound level for the event in decibels accounting for both intensity and duration. SEL takes all of the energy under the line in a noise versus time chart and compresses it to a 1 second value.

This single-event noise data will be uploaded to the CDA's website on a regular basis. Each file will contain: the monitor Site ID, the date and time of the event start time, the date and time of the peak noise for the event, the duration in seconds of the event, and the Lmax, the Leq, and the SEL of the noise event, all in decibels.

We are not aware of any other airport in the country that uploads data in this quantity and manner, so this would be setting an industry precedent.

4. CITIZEN INVOLVEMENT

A. ONCC - The ONCC was established to 1) determine certain Noise Compatibility Projects and Noise Compatibility Programs to be implemented at O'Hare, 2) oversee an effective and impartial noise monitoring system, and 3) advise Chicago concerning O'Hare related noise issues. ONCC has served as a model for other airports nationwide.

The City proposes that the ONCC provide a forum for direct citizen engagement with the ONCC in order to reflect their concerns in any recommendations presented to the CDA and the FAA for consideration.

B. CDA - Our staff will explore new and innovative activities to provide communities the opportunity to have 'hands on' experiences relative to operational aspects of the airport by expanding current special events (e.g. Runway Runs, school tours, etc.). Additionally, the CDA will conduct additional Noise 101/Airport Operations 101 Workshops in the local communities.

ON-GOING NOISE MEASURES

While the MOU addresses solutions as of August 1, 2015, the CDA is fully committed to continuing analysis and remediation of noise issues. Below are some examples of measures that will continue to be studied and implemented, once the rigorous analysis and required coordination is completed.

1. Coordinate with American Airlines regarding phase out of MD80 fleet at O'Hare
2. Closely monitor FAA's data evaluation and reconsideration of the 65 DNL noise standard
3. Support the addition of newer generation Stage 4 aircraft
4. Continue to make enhancements to the monthly Airport Noise Management System (ANMS) reports and quarterly Fly Quiet Reports

NEXT STEPS

The CDA intends to analyze the above measures as needed and present the findings to the ONCC. Once the ONCC makes recommendations to the CDA, the CDA will make a submittal to the FAA if applicable. Based on the impacts of recommendations, the FAA will then make a decision on the applicable processes for review and implementation.

1. Introduction

The Chicago Department of Aviation (CDA) has received various documents, comments, and questions in regards to noise impacts resulting from implementation of the O'Hare Modernization Program (OMP) and/or the continued need to complete the runway system contemplated under that program. These documents were received from numerous entities concerned over impacts resulting from changes in airfield/airspace operations that have occurred as part of the OMP.

CDA has also engaged in a dialog with communities (including Fair Allocation in Runways [FAiR]) concerned about airport noise impacts in accordance with a May 29, 2015, Memorandum of Understanding (MOU) between the City of Chicago and members of the Illinois General Assembly. Among other things, this MOU asked the CDA to give a final decision on FAiR's proposal to preserve and utilize the intersecting runways at O'Hare International Airport (ORD) in order to alleviate aircraft noise impacts from communities located east and west of ORD.

CDA has also taken into consideration the Illinois General Assembly's 2003 O'Hare Modernization Act and the FAA's 2005 Record of Decision (ROD) approving the OMP.

In summary, the focus area of the above referenced documents revolves around several major themes. Those themes and CDA's position in regards to each of them, as well as CDA's final decision on FAiR's proposal, are as follows:

- *Retaining Runways 14L-32R and 14R-32L*. Retaining these runways does not resolve severe safety, complexity, and operational issues that arise from their interaction with the parallel runway system. Not only do these runways create issues in conjunction with the parallel runway system, they are not optimal options to mitigate noise impacts. Although the use of these runways would be less than today, operating, maintenance, and other costs associated with these runways would continue to increase. Additionally, the location of these runways impedes construction of the remaining elements of the full parallel runway system. CDA believes that Runways 14L-32R and 14R-32L must be decommissioned as planned; Runway 14L-32R in August 2015 and Runway 14R-32L in 2019-2020.
- *Deferring completion of the full parallel runway system*. Completion of the parallel runway system is necessary to efficiently and safely process demand, remain competitive with other large hub airports, and balance airfield operations. Completion of the full parallel runway system also removes restrictions associated with the length of north airfield runways, eliminates intersecting and converging runway operations, and allows for the completion of the residential sound insulation program. Continued implementation of the parallel runway system remains a priority.
- *Rotating the use of runways based on noise mitigation*. Rotating runways dynamically throughout the day on the basis of prescribed noise distribution would significantly reduce the efficiency of the airport, increase travel times, and add delays. However, CDA is currently exploring other noise mitigation options as well as options to dynamically rotate the use of runways during Fly Quiet hours when activity levels are low enough that efficiency and delays are not adversely impacted. These efforts are detailed in a separate document.

The following sections provide an overview of the documents received by CDA (Section 2), a summary of responses to the comments received (Section 3), and a copy of the specific comments received (Sections 4, 5, and 6). More information on noise mitigation initiatives and other actions that may be pursued by CDA are discussed separately in other documents.

2. Documents Received by CDA

Submittal #1: JDA Aviation Technology Solutions, Use of Visual Approach During Fly Quiet Hours

This submittal contains comments by the JDA Team focusing on options for reducing aircraft noise in the airport environs through modifications to approach procedures during Fly Quiet hours.

Submittal #2: JDA Aviation Technology Solutions – Analysis of the Need and Justification of Additional Runway Capacity at ORD

This submittal contains comments by the JDA Team regarding the need for additional new runway construction at ORD. Also discussed is the need for other airport facilities such as additional gates.

Submittal #3: JDA Aviation Technology Solutions, An Analysis of the Technical Basis of FAA's Noise Regulatory Framework and Its Application to the O'Hare Modernization Program

This submittal presents comments by the JDA Team regarding the scientific legitimacy of the day-night average sound level (DNL) noise metric and the use of 65 DNL as the threshold of significance for noise impact analysis.

Submittal #4: JDA Aviation Technology Solutions, O'Hare Crosswind/Diagonal Runway Layout and Usage

This submittal contains comments from the JDA Team in support of keeping Runways 14L-32R and 14R-32L open rather than opening new parallel runways.

Submittal #5: JDA Aviation Technology Solutions, Best Practices and Tools to Provide Noise Information to Communities

This submittal presents comments from the JDA Team urging use of the newest tools and technologies for assessing community annoyance to aircraft noise.

Submittal #6: Other Comments Received by CDA

These general comments were submitted listing various concerns over the efficacy of the OMP to date.

Submittal #7: FAiR Agenda for Community Conversation #2

This meeting's agenda and list of questions were submitted to the CDA at the second in a series of community meetings with CDA on July 20, 2015.

3. CDA Response to Comments

Comment No. 1: *Use Instrument Landing System (ILS) Approaches during Fly Quiet Hours to ensure aircraft are using higher altitudes.*

CDA Response: Use of ILS approaches would result in a higher number of flights at low altitudes, with a potentially negative noise benefit. Visual approaches provide noise dispersion, operational flexibility, and capacity enhancements. Aircraft on visual approaches will be turning towards the airport between 10 and 20 nautical miles from the airport, varying their tracks and therefore the noise-impacted area. Very few aircraft would fly identical tracks while turning towards the airport and nearly identical tracks once they are established on the final approach course. Requirements to fly the ILS approach will put all aircraft on a longer final approach course and lower altitude farther from the airport. As an example, an aircraft landing Runway 27L can be turned in for a visual approach 10 to 15 nautical miles from the airport at an altitude between 4,000 and 6,000 feet. Requiring all aircraft to fly an ILS approach will place all aircraft for Runway 27L at 4,000 feet and turning in to the ILS approach at least 15 nautical miles from the airport. This will have the net effect of more aircraft between 10 and 15 nautical miles from the airport at 4,000 feet, all with the same exact path over the same neighborhoods.

Most aircraft that are cleared for a visual approach will still follow ILS guidance when it is available and when the parameters for intercepting the localizer and glideslope are met. In instances when the aircraft is not following the ILS course, precision approach path indicators (PAPI) provide visual guidance for aircraft approaching the runway. PAPI equipment is visible up to 20 miles from the airport at night and provides vertical guidance to the runway. PAPI equipment is normally set to a three degree descent angle to the runway which is identical to the ILS. PAPI equipment also provides visual information to pilots during ILS approaches if weather conditions are conducive to visually acquiring the PAPI.

Use of ILS approaches during Fly Quiet hours would enable more consistency of arrival paths. While use of ILS procedures on arrival may bring potential noise benefits (perhaps reducing overall noise impacts), flight paths would be more concentrated potentially increasing noise impacts for certain residential areas. Overall, ILS procedures could potentially create additional operational delays, increased fuel burn, and other environmental concerns.

As noted by JDA, air traffic control procedures are the responsibility of the FAA and often the individual airlines. The requirements for visual approaches and Fly Quiet procedures are not mutually exclusive. This matter can be provided to the Air Traffic Manager at Chicago Terminal Radar Approach Control (TRACON) for review.

Comment No. 2: *Fly over noise compatible land uses.*

CDA Response: Industrial areas (i.e., Elk Grove Village) tend to be grouped and while they are immediately adjacent to residential areas, they provide several miles of compatible land use to the northwest and west of O'Hare. The industrial corridor to the northwest of the airport is commonly utilized for departures. Because this area can be used by departures from the north parallel runways, the use of this area is not dependent on keeping Runways 14L-32R and 14R-32L open. The most effective non-residential area is the I-90 corridor immediately to the east of Runway 9R-27L and future Runway 9C-27C and provides several miles of non-residential land use. Additionally, as noted by JDA, concentrating flight paths whether on arrival or departure can potentially have benefits to some but can also result in significant noise impacts and other adverse impacts in different areas. In most major metropolitan areas and in Chicagoland, there are few approaches within 15 nautical miles of the airport that do not have residential areas lying under the flight paths. ORD's high level of activity requires use of virtually all available airspace to safely space arriving and departing aircraft. Forest preserves and parks, which are noise sensitive land uses themselves, are limited, narrow, and not in alignment with the arrival/departure paths.

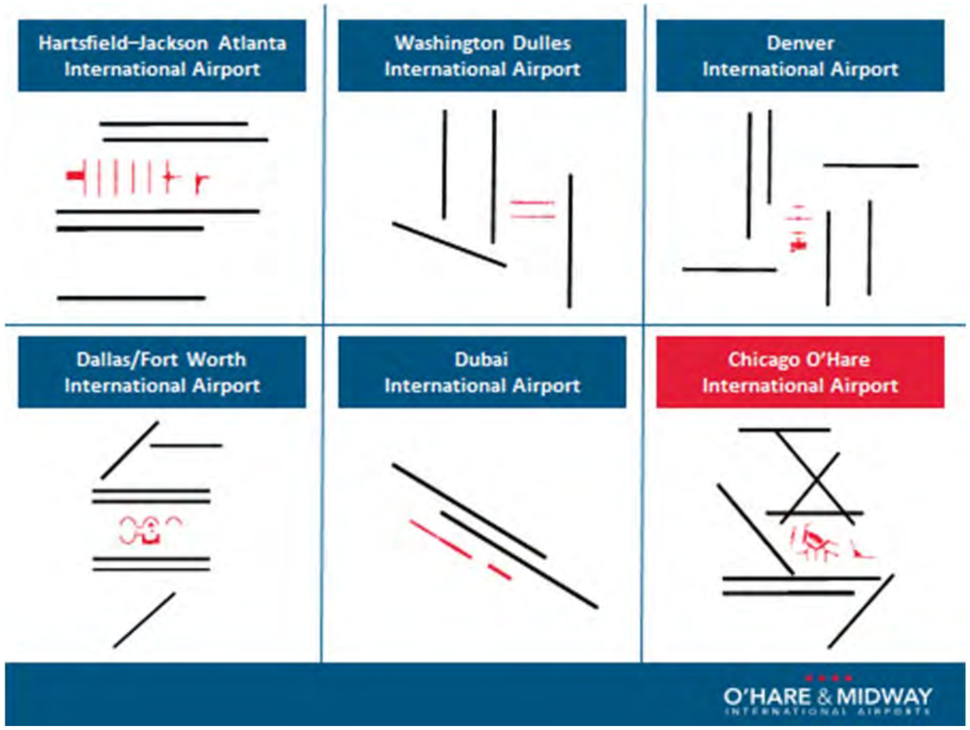
Comment No. 3: *Runway 9C-27C and the Runway 9R-27L Extension are no longer needed based on forecast demand levels.*

CDA Response: Total annual operations are not the correct metric for evaluating the need for airfield capacity. Rather, peak period (e.g. peak hour and/or bank) operations and Instrument Flight Rules (IFR) weather conditions dictate the requirement for airfield capacity. The full parallel runway system, including Runway 9C-27C and the Runway 9R extension, is needed to efficiently and safely process demand. The very nature of a hub airport is the ability to handle "banks" of substantial operations throughout the day. Delays during these banks ripple throughout the entire national airspace system. ORD needs to be competitive with other mid-continent hubs such as Atlanta, Denver, and Dallas-Fort Worth, all of whom have a parallel runway system. With the completion of the parallel runway system at ORD, peak good weather total throughput increases from an estimated 222 to 284 operations per hour – a 28 percent increase - and poor weather throughput increases to an equivalent of today's good weather rates. Increased throughput rates decrease delay and increase airport efficiency. Runways 9C-27C and the Runway 9R extension provide many benefits including balancing the north and south airfields as well as increasing operational flexibility due to weather and other operational considerations.

Construction of new runways takes many years to complete. The CDA cannot wait until peak hour delays become intolerable to begin construction. Therefore, it is prudent to construct in advance of rising delays and take advantage of a period of relatively low interest rates and favorable construction pricing by avoiding escalating construction costs. The CDA remains committed to the agreed schedule which is to complete Runway 9C-27C in 2020.

Having long runways on the north airfield that are designed to support long range aircraft types without restrictions in any weather condition is essential to ORD's future as a global gateway. Providing long arrival and departure runways on the north airfield will balance the airfield and prevent delays associated with the crossing streams of traffic. Today, many long-haul flights that require long runway lengths depart on paths to the northeast and northwest. However, the long runways that are needed for departure are on the south side of the airport. Unfortunately, when those long, south airfield runways are used by north-bound European and Asian flights, crossing streams of traffic occur, resulting in delays.

Importantly, parallel runways eliminate intersecting and converging runway operations. A new FAA rule in 2014 – Converging Runway Operations or CRO – has limited the operational value of converging runways. Converging flight path rules, which are being applied on a national basis, increase the need for a full parallel runway system. The full parallel runway system eliminates converging runway constraints. Increasing peak period demands associated with hub operations dictate that maximum capacity and flexibility be realized to handle the larger number of departures or arrivals as compared to a schedule with even distribution of demand. Note in the attached diagram that of several major hub airports, ORD is the only one with runways in 3 directions. The strong benefit of parallel runway operations is evident in the airfield designs of competitor airports.



The capacity gained from the full runway system will benefit flights today as well as allow for long term growth. ORD has experienced too many years operating under constrained flight conditions. After several decades, the High Density Rule (HDR) was finally fully phased out in 2002. Following the HDR phase out, traffic spiked and the FAA placed flight caps on the airport. These flight caps were lifted in 2008 in conjunction with the first OMP runway. The Airport has proven that traffic growth will continue even when accounting for brief periods of flat or declining growth. With the anticipated growth in traffic, having an airfield that can handle the demand is critical.

It is in the community's interest for the CDA to complete the airfield so that use of the runways can be finally balanced as intended in the original design. Not only will use of the airfield provide a balance between the north and south runways, but may have the potential to provide a balance between the west flow and east flow configurations from the current 70/30 utilization split closer to 60/40 or 50/50.

Comment No. 4: *Additional gates are needed to match runway capacity.*

CDA Response: The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. In addition, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency.

As envisioned by the OMP, the CDA remains committed to the need for additional terminal/gate availability. Airlines are growing capacity in high demand periods and, similar to the discussion regarding the need for airfield capacity, gate capacity needs are driven by factors other than annual activity levels. While annual operations have stabilized, airline scheduling demands on the airport are more dynamic in peak seasons. Higher demand is also being experienced in peak periods and the number of passengers is up substantially this year. New entrant airlines require additional international and domestic facilities. Aircraft sizes have increased and resulted in a net loss of parking positions within the central terminal area. The CDA continues to work with the airlines to more efficiently utilize existing gates and aircraft parking positions pending the development of additional aircraft gates based on demand.

We are responding to this comment as a one-time courtesy. Please note that CDA does not intend to expand our response to noise concerns into a discussion regarding overall airport development or operations.

Comment No. 5: *The 65 DNL is a flawed metric.*

CDA Response: The City of Chicago was instrumental in encouraging the FAA to evaluate the current noise metric. Mayor Emanuel personally engaged in addressing this critical issue. The O'Hare Noise Compatibility Commission (ONCC) also supported this initiative and will receive periodic updates during the course of the study. The Suburban O'Hare Commission (SOC) has membership in the ONCC and we encourage you to engage in this process through this established channel, just as the CDA will. The City continuously seeks funding for sound insulation projects. This funding is awarded based on impacts as determined using the DNL measurements. If changes are made to the standards which noise impacts are measured, the City would continue to work with the FAA and communities to provide sound insulation.

While the City is supportive of the FAA's re-evaluation of the DNL noise metric, DNL remains the FAA's standard for determining noise impacts and basis for sound insulation programs nationwide.

Comment No. 6: *Retain and continue use of Runways 14R-32L and 14L-32R.*

CDA Response: Runways 14L-32R and 14R-32L are used minimally today due to dependencies on other runways, which results in decreased efficiency in order to maintain safe operations. Use of Runways 32R and 32L have decreased dramatically since airspace changes and configurations implementing the parallel runway system and significantly decreased further since implementation of CRO in April 2014. As the new east-west parallel runways open, the use of Runways 14L-32R and 14R-32L will continue to decrease due to various operational issues not present in the full parallel runway system.

It is not feasible or prudent to retain and continue use of Runway 14L-32R for multiple reasons. First, this runway physically intersects three other runways, creating an inefficient airfield design and safety/confusion risks to aircraft operating on the airfield. This risk is evident by the FAA's identification of the intersection of Runways 14L-32R and 9L-27R as a runway incursion hotspot. A runway incursion is defined by the FAA as any occurrence at an airport that involves the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft. Runway incursions have the potential to cause substantial damage to persons and property, particularly due to the high rate of speed aircraft attain in the runway environment. As such, reducing the potential for runway incursions is a top priority for the FAA. Decommissioning Runway 14L-32R and the completion of the full parallel runway system would remove various runway incursion hotspots at ORD.

The FAA has also severely limited the operational use of Runway 14L-32R since Runway 9L-27R was commissioned and therefore, if use of the runway was limited to periods of low activity, the runway provides minimal, if any, noise benefits to the surrounding communities. As noted previously, the industrial corridor to the northwest of the airport is not dependent on the use of these runways and can be utilized by the north parallel runways. In order to utilize Runway 14L for arrivals or Runway 32R for departures, air traffic control must severely limit the number of operations the parallel runways on the north airfield can handle, eliminating gains in airfield efficiency that the parallel runway system provides. Furthermore, keeping Runway 14L-32R operational, even for limited operations, maintains the last remaining airspace conflicts with Midway airport, which Southwest Airlines has formally opposed. When landing Runways 14L/R at ORD, missed approach procedures restrict the airspace around Midway. Additionally, Runway 32L/R arrivals at ORD can restrict departures at MDW to a lower altitude, posing operational issues due to obstructions. The Southwest Airlines letter can be found in Section 7.

Maintaining Runway 14L-32R in an operational condition would require regular operating and maintenance (O&M) expenses, including daily visual patrols, lighting, striping, pavement repair and rehabilitation, rubber removal, and snow removal, as well as protection of separation standards, runway safety areas, and imaginary surfaces that would limit airport operations and development. On average, O&M expenses for this runway exceed $10 million annually. This runway would also require additional investment under the FAA's 2016 initiative to minimize irregular geometry, since the many intersections create troublesome and confusing geometry issues for taxiing aircraft. Retaining the runway during construction of Runway 9C-27C also presents design and grading challenges, further increasing costs. Given the FAA and O'Hare's funding priorities, maintaining a runway used for less than two percent of total operations is not prudent.

However, the City is recommending to FAA and the airlines additional use of Runway 32L, including utilization during nighttime operations. CDA recognizes that the operation of Runway 32L is dependent with both

Runways 27R and 27L and therefore limited during normal and peak period operations. However, Runway 32L poses less of an operational problem than Runway 32R because it does not physically cross other runways. In addition, Runway 32L does not have a conflict with Midway airspace. Some JDA suggested uses of the diagonal runways, such as for parking aircraft and staging snow operations, have no effect on noise and are not being considered as they are not beneficial to airport operations. These needs are better served using other pavement areas (e.g. taxiways or even pavement areas remaining following runway decommissioning).

While Runway 32L currently provides more operational utility than Runway 32R, retaining Runway 32L is an interim condition and would not be viable with future development of Runways 9C-27C and the Runway 9R Extension. Leaving this runway would add two runway intersections, recreating safety issues that are not present in the full parallel runway system. It would also create irregular airfield geometry that may confuse pilots and controllers leading to more safety concerns, but also present problems for matching pavement elevations and the placement of critical navigational equipment such as the ILS glideslope facility. Additionally, development area in the vicinity of Runway 14R-32L is necessary for additional gates and western access to ORD. Maintaining Runway 32L impedes western access because a tunnel would need to be constructed under the runway, adding nearly $100 million to the Illinois State Toll Highway Authority project.

Retaining Runway 14R-32L and adding gates to the west of the runway (as approved on the Future ALP) would necessitate additional runway crossings not accounted for in the original Environmental Impact Statement (EIS). These additional runway crossings, necessary to enter and exit the west terminal area if Runway 14R-32L were to remain, would pose additional runway safety and runway incursion issues not inherent in the full parallel runway system.

In summary, CDA believes that Runways 14L-32R and 14R-32L must be decommissioned as planned due to safety issues with irregular and intersecting geometry, a lack of operational efficiency, and increased costs associated with keeping the runways open. Additionally, CDA opposes retaining these runways as they provide no noise benefit to the surrounding communities and prevent future airport development opportunities.

Comment No. 7: *Revisit airspace design to minimize impact of arriving and departing aircraft/use alternate runway/airspace configurations.*

CDA Response: The use of specific runways and the airspace used to support operations on those runways is based on strict FAA requirements and conditions and cannot be easily or arbitrarily modified throughout the course of a day. At an airport, wind conditions may change rapidly around convective weather and in many situations; changes in wind conditions are short lived. An attempt to alter runway operating configurations can normally take as much as 20 minutes to complete. Individual small time frames may indicate short durations of time that other runway configurations may have been desirable, but the time necessary to alter the airport's operating configuration to move to that configuration may exceed the time that change was actually needed.

CDA is confident that FAA has designed the airspace in the most efficient and safe configuration possible. The existing airspace design has undergone thousands of hours of programming, evaluation, and training.

It is possible that upon completion of the parallel runway system, opportunities may exist to improve airspace configuration and/or procedures as a result of technologies, evolving regulations, or other factors. To the extent that those opportunities arise, CDA will work with FAA and airlines to identify and evaluate those options.

Comment No. 8: *Use of parallel runways and Fly Quiet Program.*

CDA Response: The Fly Quiet program has not changed with the commissioning of Runway 10C-28C. Prior to the commissioning of Runway 10C-28C, the primary arrival runway during west wind conditions was Runway 27L. The primary arrival runway during west wind conditions under today's airport is still Runway 27L. The primary departure runway under both scenarios is Runway 10L-28R which is 13,000 feet long. Those aircraft unable to utilize Runway 27L due to operational concerns are assigned Runway 28R, as they were prior to the commissioning of Runway 10C-28C. Runway 32L was closed for arrivals in 2010 and removed from the Fly Quiet options. Any modifications to existing operations would be different than the information contained in the O'Hare Modernization Environmental Impact Statement and may require study by the FAA to determine impacts on all areas affected by proposed changes.

CDA believes that evaluating runway utilization during Fly Quiet hours is an area of opportunity for beneficial noise relief, and will rigorously pursue it.

Comment No. 9: *OMP/New runways have done little to improve capacity or efficiency.*

CDA Response: Prior to the OMP airfield improvements, the arrival rate in poor weather in the east configurations was usually limited to 56 flights per hour or 72 flights per hour in the west configurations. Currently, the arrival rate in poor weather reaches 84 flights per hour in the east configurations and 106 flights per hour in the west configurations. Upon completion of the full parallel runway system, arrival rate in both the east and west configurations will reach 106 flights per hour.

The FAA System Impact Delays data proves a delay reduction of 57 percent in the last six years due to improvements already made to the O'Hare airfield. This is a comparison of actual measured average delays in 2003-2008 to actual measured average delays in 2009-2014. This metric measures only delay associated with the portion of a trip that is controlled by Air Traffic that is on the taxiway, runway and airspace portion of any given trip. In addition, ORD has also processed more flights in inclement weather conditions since the OMP airfield improvements were completed than previously.

Many different factors impact delays. In this regard it is also important to recognize that prior to the opening of the first new runway at O'Hare (Runway 9L-27R in 2008) flight operations at the airport were restricted by FAA in order to mitigate delays. In 2004, voluntary flight caps were put in place (later caps were made mandatory) for ORD traffic, limiting the number of scheduled arrivals and departures that could occur in any hour period. Flight caps were implemented by the FAA to manage capacity and delay issues at airports.

On-time flight arrival/departure performance is tracked by the U.S. Department of Transportation through the Bureau of Transportation Statistics (BTS) data. BTS data is valuable to understand what passengers are experiencing as it provides information on flight arrival/departure performance relative to scheduled arrival/departure time. However, BTS data does not tend to provide as accurate information for isolating the impact of airport projects because it is designed to measure flight performance rather than aviation system performance. In this context, for example, BTS reports on delays caused by airline factors (e.g. late flights due to flight crew availability) and other matters that are unrelated to an individual airports' ability to process arrivals and departures. From a BTS data reporting standpoint, ORD's performance is affected materially by its hubbing airlines' system wide performance relative to schedule integrity.

Irrespective of individual airline performance and BTS data reporting, FAA data confirms that OMP improvements have significantly enhanced ORD's ability to process aircraft arrivals and departures once those flights have started their journey to/from ORD. Airlines also report a significant improvement.

Comment No. 10: *Cargo flights are still occurring at ORD; promise of diverting flights elsewhere not realized.*

CDA Response: The City continues to provide facilities at the airport to allow the operation of cargo flights. Cargo activity provides jobs and economic growth opportunities. We are not aware of a commitment to divert cargo flights; and our FAA grant assurances do not allow us to restrict access to a federally funded airfield to any certified aircraft operation. CDA has supported improvements at Gary Chicago International Airport and we will continue to market services there for both cargo and general aviation.

Comment No. 11: *Western access remains on hold.*

CDA Response: The City is committed to providing western access to the Airport. However, one of the barriers to development of a western access is the physical conflict with Runway 14R-32L.

Comment No. 12: *Weather related delays have grown.*

CDA Response: Prior to the OMP airfield improvements, the arrival rate in poor weather was usually limited to 56 flights per hour in the east configurations or 72 flights per hour in the west configurations. Currently, the arrival rate in poor weather reaches 84 flights per hour in east configurations and 106 flights per hour in west configurations. Hence, the arrival rate at O'Hare has dramatically improved with the transition to a parallel runway system.

We are in a time where more frequent severe storms are occurring and are predicted to continue to occur. These conditions underscore the need for an efficient, well organized airspace and runway configuration at O'Hare.

Comment No. 13: *Explain how Runway 10R-28L will be utilized.*

CDA Comment: The use of Runway 10R-28L was evaluated in the FAA's on-going EIS Written Re-Evaluation and discussed in materials published by the FAA on their website on July 17, 2015. In east flow configurations, Runway 10R will be utilized as a primary arrival runway. Due to the proximity of Runway 10R to existing Runway 10C, it will be necessary for aircraft landing on Runway 10R to utilize an offset approach, rather than a straight-in approach. This is because the FAA's standard runway separation for triple simultaneous parallel approaches is 5,000 feet, whereas only 3,100 feet exists between Runways 10R-28L and 10C-28C.

It is expected that in west flow configurations Runway 28L will serve as a supplemental arrival runway. Utilizing Runway 28L as a primary arrival runway would severely limit the departure throughput on primary departure Runway 22L. Although the pavement for Runways 22L and 28L do not physically intersect, the FAA considers them intersecting runways for the purposes of maintaining safe separation between arriving aircraft descending to land on Runway 28L and departing aircraft climbing out after departure on Runway 22L. Therefore, it is expected that while Runway 22L departure operations are in effect, Runway 28L arrivals will be minimized.

Completing the rest of the full parallel runway system, in addition to the benefits previously noted, allows the arrival restrictions on Runway 28L to be minimized by shifting departures from Runway 22L to Runways 27L and 28R.

Comment No. 14: *Keep arrivals higher on approach; consider use of Continuous Descent Approaches and RNAV departure routes.*

CDA Response: Several Air Traffic separation standards dictate courses and paths that arrivals and departures must follow. With the exception of visual approaches, standard approach paths dictate that aircraft be established on prescribed paths and altitudes towards the airport. Similarly, departures have different rules that dictate separation from other arrivals and departures that require turns away from each other. Opportunities exist during Fly Quiet times to utilize Continuous Descent Approaches or Area Navigation (RNAV) departure routes to mitigate noise, but those procedures provide minimal benefits to operations close-in to the airport. The benefits of Continuous Descent Approaches typically happen much further from the airport and at higher altitudes, as Continuous Descent Approach procedures will still follow the glide slope on final approach to the runway.

Comment No. 15: *Assign runways based on aircraft type.*

CDA Response: Runway assignments are made based on many factors, including compass direction of arriving or departing flights, aircraft performance requirements, current demand for each runway, etc. For departures, assignments are made based on the specific departure fix that aligns with the destination city of the flight. This means that air traffic sorts the flights out on the ground, as crossing them in the air to reach their assigned departure fix creates immense challenges that diminish safety, reduce efficiency, and significantly increase controller workload.

The Fly Quiet period at the Airport is from 10:00 pm to 7:00 am. CDA is committed to evaluate options to distribute operations on runways based on aircraft type during the Fly Quiet period when operational activity levels are low enough that dynamic use of runways does not adversely impact travel times. For example, during the middle of the night aircraft arrive and depart infrequently and minimal interaction exists between flights. However, early morning banks of flights exist prior to 7:00 am that require the capacity and efficiency provided by the standard parallel operating configurations. Today, multiple parallel approaches are necessary prior to 7:00 am in order to accommodate traffic.

While operational levels are reduced during Fly Quiet periods, interactions between runways and FAA requirements may preclude movement of aircraft to different runways.

Comment No. 16: *Need to improve public involvement and transparent communications. Provide near real time noise data to communities.*

CDA Response: CDA is committed to increased distribution of data and reports to provide more accurate and timely access to information on aircraft operations and noise. Several tools and ideas are under evaluation, including:

- Upgrading the CDA webpage to included expanded content on airport noise and operations.
- Continuing to explore new noise software.
- Improving the collection of stakeholder noise concerns.
- Reviewing industry "Best Practices".
- Maximizing the use of social media to update citizens on relevant noise topics.
- Reporting single-event noise data.

These tools and ideas are discussed in more detail in a separate document.

Comment No. 17: *Explore rotating runways – when safety and efficiency permit – to bring relief to noise-afflicted areas, perhaps designing routes or runway usage that best minimizes the impact of arriving and departing aircraft.*

CDA Response: Over the course of normal operating hours at ORD, runway configuration changes are typically difficult and time consuming to complete due to the level of activity in the airspace and on the ground. In addition, runway operating configurations at ORD must provide significant operating capacity and flexibility almost continuously during daytime hours in order to accommodate normal aircraft arrival and departure activity.

Arriving aircraft are normally assigned routes to the airport as far as 120 to 150 nautical miles away. These routes are "paths" through the air, unique to each runway being used, and are designed to carefully merge aircraft from multiple en-route segments until they are uniformly aligned on a specific runway final approach segment. Shifting runway configuration and the routes arriving and departing aircraft fly takes extensive coordination between multiple air traffic facilities (including Chicago Center, Chicago TRACON, ORD Tower, Midway Tower, and various other facilities surrounding ORD) and the aircraft flight crews. This coordination process, which includes re-routing and communicating these changes to each aircraft, can take up to 20 minutes during normal operating hours. While runway shifting does occur during busy periods at ORD, it is typically necessitated by safety due to wind and weather changes.

In addition to the issues highlighted above, switching to a runway configuration outside of the primary east and west configurations does not provide the necessary capacity to efficiently process the demand at ORD. As noted in previous responses, this would result in increased delay and negate the efficiency and safety improvements that the OMP has realized to date.

Therefore, during most daytime operations, demand at the airport is high enough that rotating runways dynamically, particularly to a configuration other than east or west, would reduce efficiency, increase aircraft travel times, add delays, and increase pilot and controller workload.

Comment No. 18: *SB-636, which would raise the number of operational runways from eight to ten, is on the Governor's desk awaiting his signature. Passage of SB-636 would provide the mechanism to extend our current timeframe to explore, test, and analyze the maximum number of potential solutions without impeding the OMP. How do you see SB-636 playing a role in our shared goal of finding solutions?*

CDA Response: SB-636 increases the number of runways allowed at ORD from eight to ten. As previously discussed, CDA intends to close Runway 14L-32R on August 20, 2015, in conjunction with the opening of new Runway 10R-28L. Therefore, ORD will only have eight operational runways at the commissioning of Runway 10R-28L in October 2015, making SB-636 unnecessary.

CDA is committed to continue working with airport neighbors to find solutions that minimize noise impacts without negatively impacting safety and efficiency at ORD. These solutions are further discussed in a separate document.

Comment No. 19: *Why have the 14/32 diagonals not been fully utilized for arrivals in the last year?*

CDA Response: When Runway 10C-28C was commissioned in October 2013, the airfield transitioned to an east-west flow consistent with the FAA's OMP EIS issued in 2005. O'Hare has been operating in these airfield configurations detailed as part of the EIS, which do not include a provision for utilizing Runways 14L-32R and 14R-32L as primary arrival runways, due in part to efficiency and safety concerns stemming from intersecting runway operations. The implementation of CRO rules in April 2014, along with the closure of Runway 14R-32L for a significant portion of last year due to ongoing construction projects at the airport, have also been a factor in the decreased use of these runways. With the opening of a new parallel runway, the use of Runways 14L-32R and 14R-32L will decrease further, as Air Traffic will have a newer and safer alternative for operations. These concerns have been highlighted in many of the above comment responses.

Comment No. 20: *What specific Navaids equipment has already been removed from each of the 14/32 diagonals, and because nothing irreparable has been done, how easily can that equipment be replaced?*

CDA Response: The FAA shut down the ILS glideslope and localizer antennas for Runway 14L-32R in May 2015. Due to interference and limitations on the number of radio frequencies available for ILS systems, the associated frequencies and some of this equipment was relocated to Runway 10R-28L in order to flight test and activate them prior to commissioning in October 2015. Due to these issues, re-installing the ILS equipment on Runway 14L-32R is not a viable option. Runway 14L-32R does maintain approach capability in the form of GPS-based approaches to each runway end. However, not all aircrew and aircraft have the training and equipment necessary to utilize this type of approach.

Runway 14R-32L currently has an ILS system at the Runway 14R end. However, this system is known as a Category I ILS and does not allow aircraft to fly approaches in the extremely poor weather conditions that the east-west parallel runways, equipped with Category II/III systems, allow. Installing a Category II/III ILS system to Runway 14R is not a viable option as the runway is not able to meet the runway lighting requirements necessary for that system. Runway 32L was permanently closed to arrivals in 2010 in conjunction with the shortening of the runway for the Runway 10C-28C project, and thus does not have ILS or GPS approach capability.

Comment No. 21: *How has the removal of the Navaids Equipment limited the current and future use of the 14/32s?*

CDA Response: Please see response to Comment No. 20.

Comment No. 22: *Is there any correlation/conflict between 14L/32R and the new 10R/28L with regard to operations and safety, other than the present state law that limits ORD to eight operational runways?*

CDA Response: Please see response to Comment No. 6.

Comment No. 23: *According to the CDA/FAA's own data, from May 2014 to April 2015, there were 14,632 departures to the north from diagonal runways. The departure numbers are:*

> *32R – 6,831 – The most amount of departures. Runway is scheduled to be decommissioned.*
>
> *32L – 4,433 – Runway is scheduled to be decommissioned.*
>
> *04L – 3,358 – The least amount of departures. Runway is scheduled to remain commissioned.*

There were 11,264 combined operations from the 14/32 diagonal runways, both due to be decommissioned. Where would those operations be reconfigured?

CDA Response: Per the FAA's Aviation System Performance Metrics (ASPM) database, there were 440,589 departure operations at ORD between May 1, 2014, and April 30, 2015. 11,264 departure operations on Runways 14L-32R and 14R-32L represent approximately 2.6 percent of total departure operations handled over the entire year period, or an average of 31 departure operations per day. Many of these departures were during off-peak demand and nighttime hours. These departure operations may have also resulted from planned closures of primary departure runways for maintenance and construction activity that generally occurs during the off-peak hours in order to minimize operational impacts on the airport.

The number of average daily operations on these runways over the last year, particularly during the periods in which they generally occur can be managed by the departure runways planned to remain as part of the full parallel runway system as analyzed in the OMP EIS.

Comment No. 24: *Usage of 32R since the October 2013 reconfiguration has demonstrated it is a viable option and is necessary for the safety and efficiency of airport operations. In the 12 month period from May 2014 to April 2015, Runway 32R was utilized for departures ranging from 10 to 55 per hour on 100 separate days. The most significant usage of 32R was in conjunction with 28R and 22L at peak departure times or when strong crosswinds limit the use of 22L. On 8 days strong winds from the NW and NNW shifted more than 100 departures to 32R for a total of 2,004 operations, 29% of the total operations of the runway over the past 12 months. The most severe weather occurred on 10-31-2014 in which 32R was the primary departure runway with 514 of the 725 departures. Given the current usage of 32R, particularly in severe weather, what justification can be provided for the decommissioning?*

CDA Response: Runway 14R-32L was closed for a substantial amount of time during the period from May 2014 to April 2015, including the above referenced date of October 31, 2014, due to ongoing construction projects at the airport. Had Runway 14R-32L been open and available during this period, it is likely that it would have been utilized substantially more than Runway 14L-32R.

CDA and the FAA will continue to utilize Runway 14R-32L to accommodate this relatively small number of departures until the runway's currently scheduled closure date in 2019. Following the commissioning of Runway 9C-27C and the extension to Runway 9R, ORD will have more than sufficient runway capacity to absorb the number of departure operations that were handled by Runways 32L and 32R.

For additional information, please see response to Comment No. 6.

Comment No. 25: *The new Aeroterm Cargo Facility under construction is projected to increase cargo capacity by at least 50 percent. Where would those additional operations be configured?*

CDA Response: The Aeroterm cargo and associated collateral development under construction at ORD, as shown on the Future ALP, is similar in size and scope to the cargo facility evaluated by the 2008 Environmental Assessment. Additionally, cargo operations associated with this facility remain consistent with what was evaluated as part of the 2005 OMP EIS. As air cargo operations tend to occur during off-peak demand periods of the day, cargo operations associated with this cargo facility could be efficiently managed by the full parallel runway system.

Comment No. 26: *How will the new East/West runway 10R/28L to be commissioned this October be utilized: Departures? Arrivals? How many projected operations?*

CDA Response: Please see response to Comment No. 13 for a description on Runway 10R-28L utilization. Per the FAA's EIS Re-Evaluation documents released July 17, 2015, Runway 10R-28L is anticipated to be utilized by approximately 5 percent of total operations on an annualized basis.

Comment No. 27: *FAiR was briefed that the new SATCT will not be a 24 hour tower and the new south runway 10R/28L that is scheduled to be commissioned in October 2015 will not handle overnight operations. Because this new runway will not absorb any current nighttime traffic, what suggestions can you make to help alleviate nighttime air traffic over currently impacted communities?*

CDA Response: Please see the responses to the comments above. As previously noted, the CDA is committed to continuing analysis and mitigation on noise issues.

4. JDA Aviation Technology Solutions Reports

USE OF VISUAL APPROACH DURING FLY QUIET HOURS

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3 June 2015

Contents

1. **Use of Visual Approaches during Fly Quiet Hours**
(O'Hare Runways 28C/10C and 27L/9R)

a. Visual Approach Definition:

A Visual approach allows a pilot to fly direct to a runway without performing a full instrument approach. Visual approaches are used to expedite aircraft to the airport by shortening its flight path or by reducing the size of required spacing behind other aircraft. Visual approaches can reduce pilot and controller workload. An aircraft on a visual approach is required to remain clear of clouds and keep the airport or the aircraft he is following in sight, along with any other restrictions issued by the controller. This often includes an instruction to maintain (pilot) visual separation from adjacent or preceding aircraft.

b. Visual Approaches and Noise:

An aircraft on a visual approach is typically not flying a localizer or glideslope but instead is navigating manually and in most cases short-cutting, or on an angling approach to the runway or its final approach course. Unless otherwise stated, the only altitude requirement for aircraft on a visual approach is to maintain obstacle clearance. During Fly Quiet hours at O'Hare (2200-0700) the noise abatement procedure does not allow an aircraft to descend below 4000' until it is lined up on final approach (the extended runway centerline). Often, an aircraft on a visual approach and angling in to the runway must descend below 4000' to establish a stabilized final approach to the runway and land. If conducting a visual approach close to the airfield (i.e., within 10 nautical miles, or NM), this angling approach may not allow the aircraft to be in compliance with the "4000' until on final" portion of the O'Hare noise abatement procedure. An aircraft angling in on a visual approach and/or descending below 4000' is randomly generating noise in areas where it's not normally expected nor intended. In addition, pilots who are flying visual approaches sometimes make more frequent power adjustments because of the lack of glide slope and localizer information until they are on final approach. Power adjustments can create additional unwanted noise. There have been documented complaints to the City of Chicago Noise Office of aircraft appearing to violate noise procedure on approach into O'Hare during Fly Quiet hours. 1

c. Recommendation:

In order to maintain the integrity and intent of the O'Hare Fly Quiet Program, we recommend modifying the air traffic Fly Quiet guidance as follows: "Unless an emergency exists, visual approaches should not be used during Fly Quiet hours, unless 2

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Comment	Response
1	Use of ILS approaches would result in a higher number of flights at low altitudes, with a potentially negative noise benefit. Visual approaches provide noise dispersion, operational flexibility, and capacity enhancements. Aircraft on visual approaches will be turning towards the airport between 10 and 20 nautical miles from the airport, varying their tracks and therefore the noise-impacted area. Very few aircraft would fly identical tracks while turning towards the airport and nearly identical tracks once they are established on the final approach course. Requirements to fly the ILS approach will put all aircraft on a longer final approach course and lower altitude farther from the airport. As an example, an aircraft landing on Runway 27L can be turned in for a visual approach 10 to 15 nautical miles from the airport at an altitude between 4,000 and 6,000 feet. Requiring all aircraft to fly an ILS approach will place all aircraft for Runway 27L at 4,000 feet and turning in to the ILS approach at least 15 nautical miles from the airport. This will have the net effect of more aircraft between 10 and 15 nautical miles from the airport at 4,000 feet, all with the same exact path over the same neighborhoods. Please also refer to response to Comment No. 1 in Section 3.

the pilot is issued a clearance to maintain 4000' until established on final and the aircraft is turned far enough on final to allow it to meet the 4000' requirement." Because of air carrier requirements for shallow descents and stabilized approaches, this 4000' requirement would create the result of aircraft being aligned on the extended runway centerline approximately 10 nautical miles or beyond.

The authority most responsible for considering this recommendation is the Air Traffic Manager, Federal Aviation Administration, Terminal Radar Approach Control (TRACON), Elgin, IL.

d. Considerations:

Air Traffic Control often utilizes visual approach clearances to expedite the arrival of an aircraft to minimize flight time, reduce conflicts or avoid extended flight patterns otherwise needed to follow aircraft approaching from another direction. In busier periods, use of this clearance can slightly reduce required spacing behind preceding aircraft, reducing go-arounds or losses of required separation. However, it should be noted that controller complexity is affected whenever additional restrictions are placed upon how traffic is managed, especially if it contributes to aircraft spending additional time in the air. In this instance, Chicago TRACON controller complexity might increase slightly by reducing the usefulness of visual approaches or by slightly increasing flying time. Though Fly Quiet hours are typically a light traffic time of day, conditions can sometimes cause the shoulder hours to experience moderate traffic. Also, night staffing is consistently at reduced levels, so the responsible TRACON controller manages a larger amount of airspace than typical. ORD Tower controller complexity could be slightly enhanced, since all aircraft arrive via a single point, vs. a wider expanse and less predictable flight path when cleared on visuals. Guidance using "should" (vs. "shall") alleviates controllers or pilots from distraction from minor infractions or rigid adherence to a procedure that could occasionally lead to the development of an adverse situation. Otherwise, this requirement should have little effect on the efficiency of the ATC operation. It should have minimal impact upon flight time or fuel management, during a period when operators typically benefit noticeably because of reduced traffic.

Amending this procedure could have secondary noise impacts. Aircraft that might have been cleared for a short visual approach might overfly other noise sensitive areas by avoiding a low approach over closer-in communities. However, the additional distance flown is brief, likely at higher altitude, primarily within areas that traditionally accommodate such higher traffic via published procedures, or even in noise compatible areas such as forest preserves or over Lake Michigan. It appears impractical to further restrict visual approach procedures, even during light traffic periods.

2

Comment	Response
2	Use of ILS approaches during Fly Quiet hours would enable more consistency of arrival paths. While use of ILS procedures on arrival may bring potential noise benefits (perhaps reducing overall noise impacts), flight paths would be more concentrated potentially increasing noise impacts for certain residential areas. ILS procedures could potentially create additional operational delays, increased fuel burn, and other environmental concerns. As noted, air traffic control procedures are the responsibility of the FAA and often the individual airlines. The requirements for visual approaches and Fly Quiet procedures are not mutually exclusive. This matter can be provided to the Air Traffic Manager at Chicago Terminal Radar Approach Control (TRACON) for review. Please also refer to response to Comment No. 1 in Section 3.

Exhibit 1: Photo -: Approximation of ILS9R and ILS10C

(east flow, dotted lines in red); 10 nautical mile final point, areas likely to most benefit if procedure is adopted (green rectangles), additional areas likely to most benefit when opposite arrival runway is in use (blue).

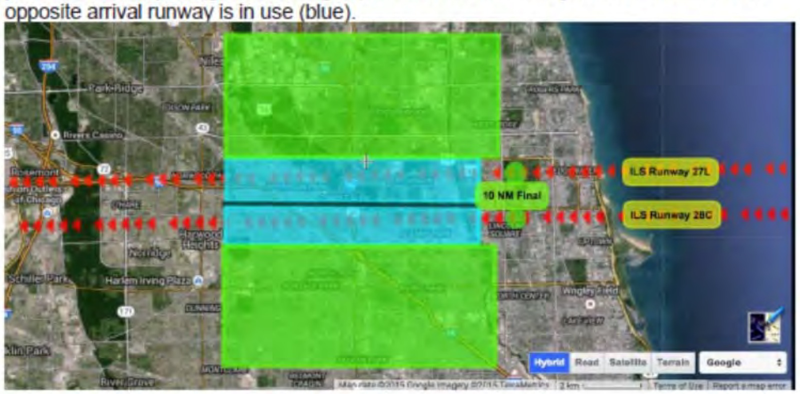

Exhibit 2: Photo - Approximation of ILS27L and IL28C

(west flow, dotted lines in red); 10 nautical mile final point, areas likely to most benefit if procedure is adopted (green rectangles), additional areas likely to most benefit when opposite arrival runway is in use (blue).

References:

http://www.flychicago.com/SiteCollectionDocuments/OHare/AboutUs/Fly%20Quiet/FQ%20Manual%20080814.pdf (O'Hare International Airport Fly Quiet Program, Arrival and Departure Procedures)

https://www.faa.gov/air_traffic/publications/media/AIM_Basic_4-03-14.pdf (FAA Aeronautical Information Manual, 5-4-23- no altitude requirement on visual approaches)

Exhibit 3: THE JDA TEAM

Author:

Rob Voss Senior Air Traffic Operations Subject Matter Expert (SME), is a JDA associated consultant and former career FAA Air Traffic Control Specialist, Operations Supervisor, Quality Assurance and Training Specialist, Plans and Procedures Specialist, Air Traffic Manager, Integration and Efficiency Specialist and finished his FAA career as a System Operations Senior Advisor. Rob spent more than 26 years with the FAA including assignments at Chicago Midway (MDW), San Francisco (SFO), Santa Rosa (STS), Scottsdale (SDL), San Carlos (SQL) and the Midwest Tactical Operations office. While working for several years outside of the FAA, Rob was an Air Traffic Consultant to the Deputy Airport Director (Noise Abatement) at SFO, where he provided analysis, advice and education involving aircraft noise and air traffic procedures and was the Project Manager for a FAR Part 150 noise exposure map update. He has also served as a contractor and Air Traffic Analyst at NASA-Ames Future Flight Central research and simulation facility.

Contributing:

Dr. Antonio A. Trani, is a JDA associated consultant and Professor with the Department of Civil and Environmental Engineering at Virginia Tech University and is Co-Director of the National Center of Excellence for Aviation Operations Research (NEXTOR). He has been the Principal or Co-Principal Investigator on 68 research projects sponsored by the National Science Foundation, Federal Aviation Administration, National Aeronautics and Space Administration, National Consortium for Aviation Mobility, Federal Highway Administration, and the Center for Naval Analyses. Dr. Trani has provided noise, capacity and safety consulting services to the Norman Manley International Airport, Punta Cana International, National Institute for Aerospace (NIA), Xcelar, Quanta Technologies, Los Angeles World Airport, Charles Rivers Associates, Boeing Phantom Works, Civil Aviation Administration of China (CAAC), British Airports Authority (BAA), SEATAC Airport Authority, Louisville International Airport, Delta Airport Consultants, Celanese, and the MITRE Corporation.

Dr. Sanford Fidell, is a JDA associated consultant and owner and President of Fidell Associates which provides consulting and research services and litigation assistance in environmental acoustics, transportation noise, and effects of noise on individuals and communities. He is the U.S. Representative to International Standards Organization (ISO) Technical Advisory Group on Community Response Questionnaire Standardization and to ISO Working Group 45 on Community Response to Noise. Dr. Fidell is member of the Acoustical Society of America and the Technical Committee on Noise. He was on the Design Review Group for the FAA's Integrated Noise Model software. Dr. Fidell has provided consulting services to community, airport and government agencies involved in aircraft noise controversies and assessments and

disclosures of aircraft noise impacts and has consulted on land use planning related to aircraft noise regulation. He is active in international standardization efforts for prediction of aircraft, rail and road noise impacts.

Dr. David Dubbink, is a JDA associated consultant and an Environmental Planning and Noise Management Specialist. He holds a PHD from UCLA in Urban Planning and Environmental Management. He is the designer and developer of ISIS (the Interactive Sound Information System). Dr. Dubbink is a member of the Acoustical Society of America, Institute of Noise Control Engineering, International Association for Impact Assessment and the Transportation Research Board, Committee A1F04, Transportation Related Noise and Vibration. He has provided training and consulting services on noise management to over 80 organizations worldwide.

Craig Burzych is an Air Traffic Operations Specialist, a JDA associated consultant and former career FAA Air Traffic Control Specialist. He spent 24 years working at the O'Hare Control Tower and 4 years working in the Chicago Midway Tower. He was detailed annually to lead the FAA Air Traffic Control support for the annual EAA Oshkosh "fly In" the single largest aviation show and exhibit held in the U.S. Chuck served as President of the National Air Traffic Control Association (NATCA) (Chicago ORD) 9 years and also was a NATCA Aviation Safety Inspector and a member of the FAA Runway Safety Action team for the Great lakes Region.

Cynthia Schultz PE, AAE is JDA's Vice President of Airports where she manages the airport line of business including, airport Safety Management System services, airport sustainability, airport strategic planning, airport security, facilitating new technology/products for airports, training for airports and airlines, airline negotiation and development of support services. Before joining JDA Cynthia was the Airport Director of Great Falls International Airport where she directed and led all airport operations, maintenance, administration, finances, security and support services including project management of engineering, architectural and construction, negotiation and administration of leases and concessions, safety, certification, design, construction and funding issues.

Joe Del Balzo, JDA Founder and President, served as the highest-ranking career professional (Acting Administrator) in the Federal Aviation Administration (FAA). Both in his long career with FAA (where he also served as FAA's Executive Director of System Operations, Executive Director for System Development, Director of the Eastern Region and Director of the FAA Technical Center) and in his subsequent private role as an aviation consultant, he has earned wide respect for his expertise in a wide range of aviation issues.

JDA
Aviation Technology Solutions

ANALYSIS OF THE NEED AND JUSTIFICATION OF ADDITIONAL RUNWAY CAPACITY AT ORD

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3 June 2015

Contents

Comment	Response
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2	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.

1. Need for Runway 9C/27C and the Runway Extension of 9R/27L at O'Hare

There has been much discussion among the public, the media and public officials about the desirability, need and justification for building the additional runway 9C/27C and the runway extension of 9R/27L which are part of the Chicago project known as the O'Hare Modernization Plan or "OMP".

Construction and operation of these additional runway components of the Master Plan will require significant financial resources and, once constructed, will again create additional areas of noise impact on various communities around O'Hare.

JDA Aviation consultants – led by former FAA air traffic control experts and Dr. Antonio Trani, a civil engineering professor who has served as a technical consultant on airport demand and capacity issues for the FAA and NASA – conducted a multi-part analysis which consisted of:

1. An examination of the original demand projections and assumptions that were used to design the components of the OMP Master Plan, including the runway and terminal components of the Master Plan.
2. An examination of the interdependent components of the OMP Master Plan – how runways and terminals and gates are needed to create a balanced airport to meet current and projected demand.
3. An examination of FAA's projected passenger and aircraft operations forecasts for O'Hare out to the year 2040 – 25 years from now.
4. An assessment of the principal causes of current reported aircraft operational delays at O'Hare and the airport components (e.g. runways and/or gates and terminal capacity) needed to address reduce those delays.

a. Observations and Conclusions

1. The currently FAA forecasted long term demand is far lower – and extends with a much slower growth rate for decades longer – than the forecast demand for passenger and aircraft operational growth used by Chicago and the FAA to justify the scope and timing of the OMP Master Plan. 1
2. Lost in much public and media discussion of the OMP is the fact the six parallel runway plan proposed by Chicago in its OMP Master Plan includes as necessary balancing components the construction of more than 2 million square feet of new terminals and associated gates, consisting of at least new Terminals 4 and 6 and a new Terminal 7 (the Western Terminal). Without the massive new terminal components (and associated gates) which are part of the OMP Master Plan, 2

there is no justification or demonstrable need for building the remaining proposed runway 9C/27C. In addition, each of the proposed terminals has major cost and/or logistical issues which – coupled with financial and technical opposition from American and United – raises significant doubt as to whether these new terminals (and gates) will be constructed. 2

3. Based on the new 2015-2040 FAA Terminal Area Forecast (as compared to the now obsolete forecasts used for the design of the OMP Master Plan) the end-of-year 2015 runway configuration – including the new 10C/28C and the soon to open 10R/28L – should provide sufficient runway capacity to meet FAA's projected demand for O'Hare until beyond 2035. In addition, to justify moving beyond the end-of-year 2015 runway configuration to add one more runway, Chicago would also have to build the new terminal and gate capacity prescribed in the OMP Master Plan to balance the throughput of the new runway capacity. 3

4. An analysis of various FAA airport performance reporting data bases suggests that a primary source of current operational delays experienced at O'Hare is due to the current unavailability of sufficient gate capacity. In the short term, O'Hare should focus on increasing gate and terminal capacity to match the performance capability of the end-of-year 2015 runway system. In the long term O'Hare should not build additional runways beyond the 2015 runway system until O'Hare constructs additional gate and terminal capacity to match the additional runway capacity, *i.e.*, the major terminal and gate components of the OMP Master Plan or similar terminal and gate capacity. 4

2. The OMP Master Plan

Balancing OMP's New Runway Capacity with Major New Terminals and Associated Gate Facilities.

It is axiomatic in planning major new airport development that all the major component parts of the airport – runways, terminals, gates, and surface transportation facilities – be designed in balance. Increasing the runway capacity of the airport, while failing to make corresponding adjustments to the capacity of the terminals and gates, simply moves congestion and delay from one airport component (e.g., runways) to the next critical component (e.g., terminals and gates).

This need to balance the capacity of the major components of the airport was recognized by the Transportation Research Board of the National Academy of Sciences in their report "Evaluating Airport Capacity" (ACRP Report No. 79):

> At most airports, the capacity of the airfield system determines the ultimate capacity of the airport. However, *prudent planning requires that airfield capacity be balanced with the capacities of other airport components, such as the terminal complex, ground access roadways, and the cargo complex*. This balancing is

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4	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.

usually accomplished in the facility requirements portion of an airport master plan.

p. 92 (emphasis added)

Chicago and the FAA recognized this need to balance the runway and terminal components of an expanded O'Hare in designing the components of what is popularly known as the "OMP". Chicago balanced these runway, terminal, and gate components in the OMP Master Plan.

Contrary to popular misconception, the FAA and Chicago emphasized that the OMP Master Plan involves far more than six parallel and two crosswind runways.

> "To meet the needs of airlines, passengers, air cargo operators, and other Airport users, the capacity of terminal and support facilities should be in balance with the capacity of the airfield. Thus, this component of purpose and need simply reflects the FAA's recognition that any undertaking to enhance the airside capacity at an already congested location also needs additional non-airfield capacity, including terminals, gates, and associated infrastructure."
>
> September 2005 FAA Record of Decision, p. 15 (emphasis added

See also July 2005 FAA Final Environmental Impact Statement ("FEIS"):

> "The estimated terminal area necessary to accommodate the projected demand ranges from about 6.9 to 7.4 million square feet. This is a net increase of approximately 2.5 million square feet, or 53 percent, over the existing terminal area."
>
> FAA FEIS, p. 2-33 (emphasis added).

In its Master Plan, Chicago noted that in addition to the need for more than 2 million square feet of new terminal space, the new terminals needed to provide an increase in gates from an existing 189 gates to 265 gates. Chicago OMP Master Plan, p. IV-25.

These massive new terminals and gate facilities needed to accommodate the capacity provided by the OMP runways were identified in Chicago's Master Plan as Terminal 4 (to be used by American Airlines), a new Terminal 6 (to be used by so-called "spoke" airlines – i.e. all other airlines but United and American), an extension to Concourse K, and a major new Terminal 7 (Western Terminal) (to be used by United Airlines).

Thus the balanced components of the OMP Master Plan airport – which Chicago and the FAA have variously called the "OMP" and by another name ("Alternative C" in the FAA's EIS) – included the eight runway configuration as well as major new terminals and major new gate increases on both the East and West sides of the airport. The specific terminal and runway features of the OMP Master Plan airport ("Alternative C" in FAA parlance) is shown on Exhibit A attached to this report.

3. OMP Master Plan Demand

The Demand On Which the OMP Master Plan Airport Was Designed Has Not Materialized -- Raising the Question As to Whether the Additional Runway(s) and Major Terminal Expansion Are Necessary.

The major components of an airport (e.g. runways, terminals, and gates) are sized and designed based on projected growth in passenger demand coupled with an assessment of how many aircraft operations will be necessary to carry that passenger demand to and from the airport.

Airport planners use an estimate of passengers who actually board an airplane at the airport (these are called "enplanements"). The number of future annual enplanements is then converted into estimates of annual aircraft operations as well as estimates of operations in peak periods of travel.

In the OMP Master Plan and in the FAA's EIS, Chicago and the FAA based the design of the OMP Master Plan Airport (Alternative C) from a base year of 2001 and a design year of 2018. From a base year (2001) demand of 29.4 million enplanements in 2001 carried in 911,000 flight operations Chicago projected passenger traffic at O'Hare to dramatically rise to 52.9 million enplanements in 2018 carried on 1.148 million operations. (See Exhibits 1 and 2)

Chicago designed the eight runway OMP system coupled with the massive new terminal and gate expansion of the OMP Master Plan airport (Alternative C) to meet these projected year 2018 demand figures (52.9 enplanements and 1.148 million operations). Moreover, Chicago projected the operations growth at the airport to be very rapid, projecting operations to exceed 1 million operations by 2007. Unfortunately, forecasts of aviation demand – particularly for future periods extending beyond 15 years – are known to suffer from significant uncertainty and inaccuracy. Indeed this inaccuracy has been especially significant in the case of the forecasts on which the runways and terminals of the OMP Master Plan Airport (Alternative C) was designed.

Based on the recently released 2015-2040 FAA Terminal Area Forecast (TAF) for O'Hare the projected demand for enplanements and operations is far lower than projected by Chicago and the FAA in the design and approval of the OMP airport (Alternative C). FAA now projects passenger demand will not reach levels (if ever) on which OMP was designed until the year 2035 – when the Master Plan projected this demand would be reached by 2018. FAA projects flight operations at the airport will not reach the levels which the OMP Master Plan predicted by 2018 until 2042. (See Exhibits 3 and 4)

5

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5	Total annual operations is not the correct metric for evaluating the need for airfield capacity. Rather, peak period (e.g. peak hour and/or bank) operations and Instrument Flight Rules (IFR) weather conditions dictate the requirement for airfield capacity. The full parallel runway system, including Runway 9C-27C and the Runway 9R extension, is needed to efficiently and safely process demand. Construction of new runways takes many years to complete. The CDA cannot wait until peak hour delays become intolerable to begin construction. Therefore, it is prudent to construct in advance of rising delays and take advantage of a period of relatively low interest rates and favorable construction pricing by avoiding escalating construction costs. The CDA remains committed to the agreed schedule which is to complete Runway 9C-27C in 2020. Please also refer to response to Comment No. 3 in Section 3.

Given the historical track record of high levels of inaccuracy and overstatement in FAA Terminal Area Forecasts, it may be prudent to view even the most recent 2015 FAA forecasts with some skepticism. But accepting the forecasts as accurate for the sake of discussion and analysis, it is clear that there is no likely need to build any additional runways at O'Hare – at the very least for many years into the future – and no need to build the massive terminal/gate expansion on which the eight runway OMP system is predicated.

Dr. Antonio Trani, a professor of civil engineering at Virginia Tech who has consulted extensively for FAA on airport design and operational matters, conservatively estimates that the existing O'Hare end-of-year 2015 runway configuration (with the new 10C/28C and the new 10R/28L will provide enough runway capacity into the distant future without the need to build the new runway 9C/27C at least until beyond 2034. The extension of runway 9R/27L might be considered but only if the airport shuts down (by choice) two existing long runways 32R and 32L, existing runways that could serve future large capacity operations at the airport. In a companion paper, JDA recommends that existing runways 32R and 32L be maintained.

5

With the 5 parallel runways and 2 cross-wind runways (14/22s) of the Fall 2015 O'Hare runway configuration Dr. Trani estimates that ORD has the runway capacity to handle 1.1 million operations per year (annual service volume) – with one caveat. As discussed below, information from FAA airport performance databases indicate that a significant percentage of the delays currently experienced by passengers at O'Hare are caused by the unavailability of sufficient gates to efficiently process flight operations.

4. ORD Delays

ORD Performance Data Suggest Current Gate Shortages Are Affecting Current O'Hare Delays

While there may not be a need to build additional runways or major terminal facilities in the foreseeable future, Chicago, the FAA and the airlines should examine the need for additional gates at O'Hare to address current traffic demand. Airlines, Chicago and the FAA could also implement demand management strategies to reduce delays at the airport if no additional gates are constructed.

An examination of FAA's ASPM database shows relatively large gate departure delays as compared to relatively modest airborne delays (See Exhibit 5). Dr. Trani has conducted a preliminary "first-order" analysis of gate needs at O'Hare to accommodate current operational conditions. He suggests that ORD current delay performance would benefit if O'Hare added 15-20 more gates. A comparative analysis was performed using Atlanta as a benchmark airport. The only airport with similar number of flight operations to O'Hare.

6

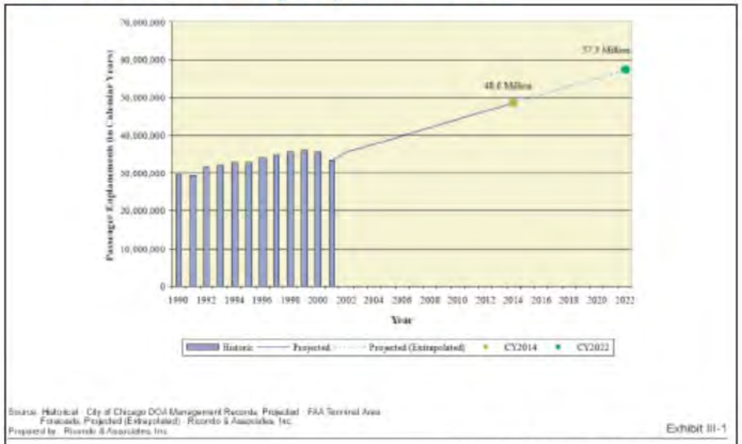
Comment	Response
6	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.

5. Conclusion

The media has reported that the major airlines are opposed to further terminal and runway expansion at O'Hare until there is concrete evidence of a proven rise in passenger and operational demand to justify such expansion. The JDA analysis set forth above shows that the reported airline opposition to such further expansion is justified.

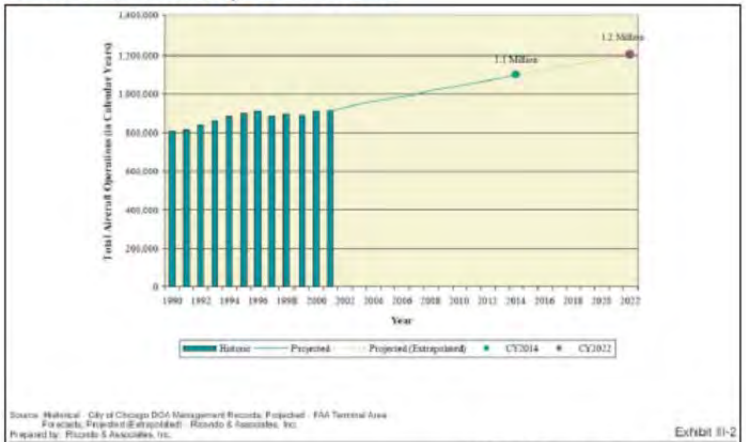
There is no need to construct runway 9C/27C. The demand is simply not there to demonstrate the need for the runway for the foreseeable future. In addition, even if future demand materializes to support added runway construction, such runway construction should be deferred until it can be balanced with appropriate construction of additional terminal and gate capacity. Otherwise added traffic supported by new runway capacity will simply increase delays to an overtaxed terminal and gate supply.

Exhibit 1. ORD EIS OMP Passenger Enplanement Forecast



2001 FAA Terminal Area Forecasts
Passenger Enplanements in Calendar Years

Exhibit 2. ORD EIS OMP Operations Forecast



2001 FAA Terminal Area Forecasts
Total Aircraft Operations in Calendar Years

Exhibit 3. ORD EIS OMP Enplanement Forecast and 2014 FAA TAF ORD Enplanements

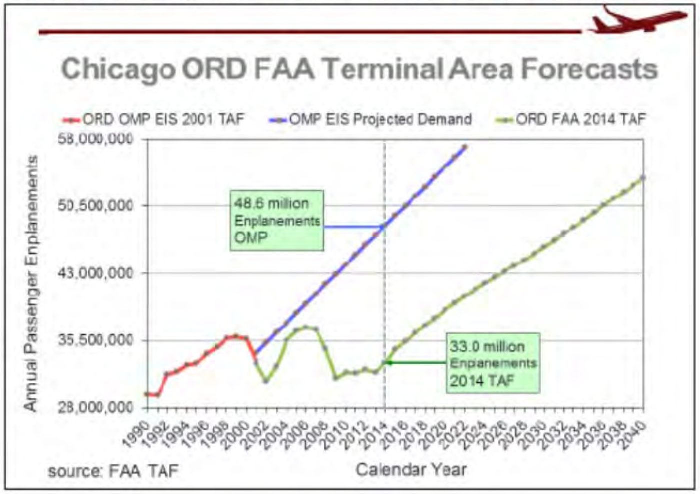


Exhibit 4. ORD EIS OMP Operations Forecast and 2014 FAA TAF ORD Operations

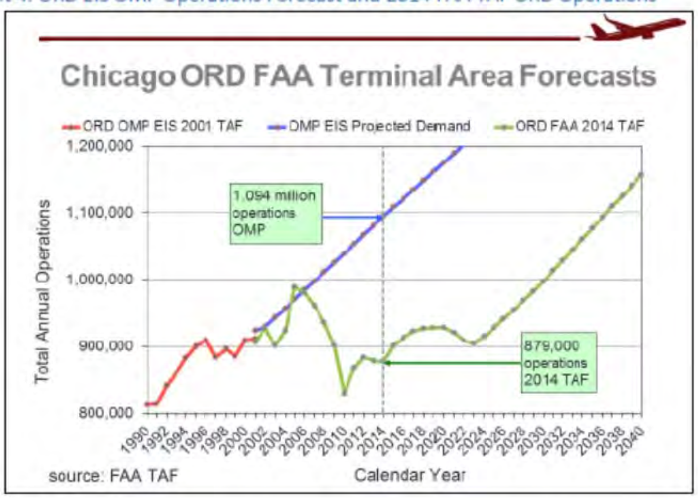


Exhibit 5. ORD Delays

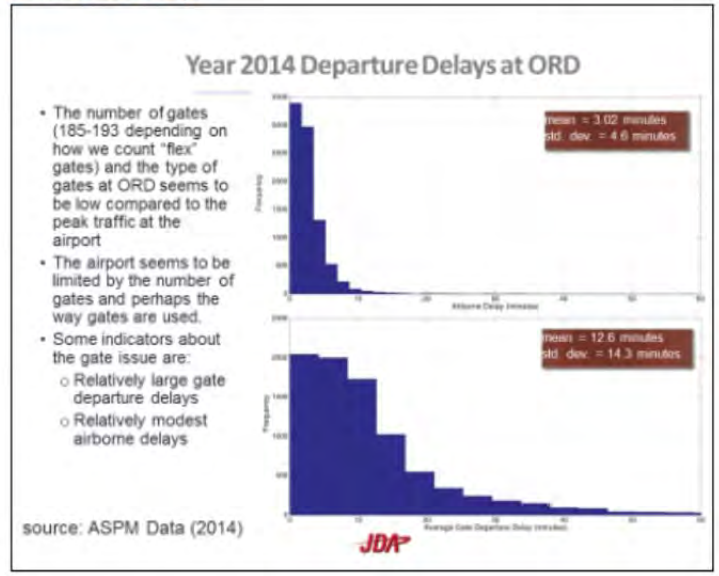


Exhibit 6: THE JDA TEAM

Author:

Joe Del Balzo, JDA Founder and President, served as the highest-ranking career professional (Acting Administrator) in the Federal Aviation Administration (FAA). Both in his long career with FAA (where he also served as FAA's Executive Director of System Operations, Executive Director for System Development, Director of the Eastern Region and Director of the FAA Technical Center) and in his subsequent private role as an aviation consultant, he has earned wide respect for his expertise in a wide range of aviation issues.

Contributing:

Dr. Antonio A. Trani, is a JDA associated consultant and Professor with the Department of Civil and Environmental Engineering at Virginia Tech University and is Co-Director of the National Center of Excellence for Aviation Operations Research (NEXTOR). He has been the Principal or Co-Principal Investigator on 68 research projects sponsored by the National Science Foundation, Federal Aviation Administration, National Aeronautics and Space Administration, National Consortium for Aviation Mobility, Federal Highway Administration, and the Center for Naval Analyses. Dr. Trani has provided noise, capacity and safety consulting services to the Norman Manley International Airport, Punta Cana International, National Institute for Aerospace (NIA), Xcelar, Quanta Technologies, Los Angeles World Airport, Charles Rivers Associates, Boeing Phantom Works, Civil Aviation Administration of China (CAAC), British Airports Authority (BAA), SEATAC Airport Authority, Louisville International Airport, Delta Airport Consultants, Celanese, and the MITRE Corporation.

Dr. Sanford Fidell, is a JDA associated consultant and owner and President of Fidell Associates which provides consulting and research services and litigation assistance in environmental acoustics, transportation noise, and effects of noise on individuals and communities. He is the U.S. Representative to International Standards Organization (ISO) Technical Advisory Group on Community Response Questionnaire Standardization and to ISO Working Group 45 on Community Response to Noise. Dr. Fidell is member of the Acoustical Society of America and the Technical Committee on Noise. He was on the Design Review Group for the FAA's Integrated Noise Model software. Dr. Fidell has provided consulting services to community, airport and government agencies involved in aircraft noise controversies and assessments and disclosures of aircraft noise impacts and has consulted on land use planning related to aircraft noise regulation. He is active in international standardization efforts for prediction of aircraft, rail and road noise impacts.

Dr. David Dubbink, is a JDA associated consultant and an Environmental Planning and Noise Management Specialist. He holds a PHD from UCLA in Urban Planning and Environmental Management. He is the designer and developer of ISIS (the Interactive Sound Information System). Dr. Dubbink is a member of the Acoustical Society of

America, Institute of Noise Control Engineering, International Association for Impact Assessment and the Transportation Research Board, Committee A1F04, Transportation Related Noise and Vibration. He has provided training and consulting services on noise management to over 80 organizations worldwide.

Rob Voss Senior Air Traffic Operations Subject Matter Expert (SME), is a JDA associated consultant and former career FAA Air Traffic Control Specialist, Operations Supervisor, Quality Assurance and Training Specialist, Plans and Procedures Specialist, Air Traffic Manager, Integration and Efficiency Specialist and finished his FAA career as a System Operations Senior Advisor. Rob spent more than 26 years with the FAA including assignments at Chicago Midway (MDW), San Francisco (SFO), Santa Rosa (STS), Scottsdale (SDL), San Carlos (SQL) and the Midwest Tactical Operations office. While working for several years outside of the FAA, Rob was an Air Traffic Consultant to the Deputy Airport Director (Noise Abatement) at SFO, where he provided analysis, advice and education involving aircraft noise and air traffic procedures and was the Project Manager for a FAR Part 150 noise exposure map update. He has also served as a contractor and Air Traffic Analyst at NASA-Ames Future Flight Central research and simulation facility.

Craig Burzych is an Air Traffic Operations Specialist, a JDA associated consultant and former career FAA Air Traffic Control Specialist. He spent 24 years working at the O'Hare Control Tower and 4 years working in the Chicago Midway Tower. He was detailed annually to lead the FAA Air Traffic Control support for the annual EAA Oshkosh "fly In" the single largest aviation show and exhibit held in the U.S. Chuck served as President of the National Air Traffic Control Association (NATCA) (Chicago ORD) 9 years and also was a NATCA Aviation Safety Inspector and a member of the FAA Runway Safety Action team for the Great lakes Region.

Cynthia Schultz PE, AAE is JDA's Vice President of Airports where she manages the airport line of business including, airport Safety Management System services, airport sustainability, airport strategic planning, airport security, facilitating new technology/products for airports, training for airports and airlines, airline negotiation and development of support services. Before joining JDA Cynthia was the Airport Director of Great Falls International Airport where she directed and led all airport operations, maintenance, administration, finances, security and support services including project management of engineering, architectural and construction, negotiation and administration of leases and concessions, safety, certification, design, construction and funding issues.

AN ANALYSIS OF THE TECHNICAL BASIS OF FAA'S NOISE REGULATORY FRAMEWORK AND ITS APPLICATION TO THE O'HARE MODERNIZATION PROGRAM

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28 MAY 2015

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Table of Contents

List of Tables

List of Figures

1 INTRODUCTION AND SUMMARY

1.1 Purpose of this Report

This report was prepared for the Suburban O'Hare Commission ("SOC"),[1] some of whose members have been overflown by substantially greater numbers of approach and departure operations following a recent runway re-alignment at Chicago's O'Hare International Airport (ORD). As shown in Figure 1, ORD's runways are being reconfigured as part of a project of runway and terminal modifications known as the O'Hare Modernization Program (OMP). The realignment is intended to increase airport capacity and reduce air traffic delays.

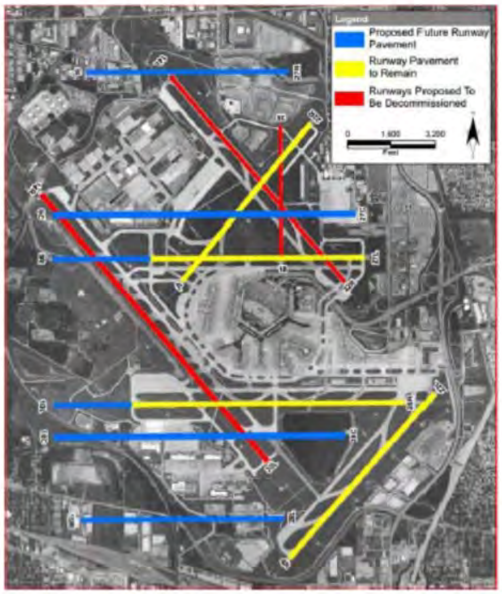

Figure 1: Planned runway re-configuration for ORD

(Source:https://www.faa.gov/airports/airport_development/omp/media/Chapter1_page51.pdf)

Predominantly east-west operations began at ORD in October of 2013, greatly increasing overflights of communities to the east and west of the airport with respect to air traffic patterns of prior decades. In some newly overflown areas, residents have complained about the effects of aircraft noise intrusions on their quality of life, despite prospective modeling that predicted actual noise exposure would not exceed a threshold considered by the Federal Aviation Administration ("FAA") as indicative of significant noise impact. Adverse community response to the new operational patterns at ORD has proved to be far greater than predicted by FAA's Environmental Impact Statement (EIS) for the OMP.

This analysis examines the history, data, derivation, and rationale for FAA's adoption of Day-Night Average Sound Level[2] as its preferred measure of aircraft noise exposure; and for FAA's selection of L_{dn} = 65 dB as its criterion of significant noise impact. The intent of the report is to provide SOC, other communities impacted by ORD aircraft noise, ORD-area residents, and interested public officials with an analysis of the scientific basis for:

1) FAA's selection of DNL as the noise metric for defining significant noise impact; and

2) FAA's selection of the L_{dn} = 65 dB value as a threshold of significant noise impact.

The report also examines the utility of noise metrics other than DNL for defining the significance of aircraft noise impacts, and describes modern methods for assessing aircraft noise impacts on communities.

1.2 Organization of Report

Chapter 2 of this report describes the framework of U.S. aircraft noise regulation. It also analyzes the adequacy of the technical rationale for FAA's use of L_{dn} = 65 dB as a definition of significant environmental impact of aircraft noise.

Chapter 3 reviews the utility of DNL as a measure of aircraft noise exposure. Chapter 4 provides improved estimates of noise impacts of the changes in aircraft noise exposure on ORD-vicinity communities. Chapter 5 recommends further actions intended to characterize community response to increases in aircraft noise exposure in communities to the east and west of ORD.

To the extent possible, the body of the report is written for readers with only a basic acquaintance with U.S. aircraft noise regulatory practice. Five Appendices contain supplemental information for readers interested in further technical detail.

1.3 Summary of Principal Findings

The 1979 Aircraft Safety and Noise Act (U.S. Public Law 101-193) required the U.S. Secretary of Transportation to

(1) establish a single system of measuring noise, for which there is a highly reliable relationship between projected noise exposure and surveyed reactions of people to noise, to be uniformly applied in measuring the noise at airports and the areas surrounding such airports;

[1] SOC is a coalition of Chicago suburban communities including Addison, Bensenville, DuPage County, Elk Grove Village and Township, Elmhurst, Hanover Park, Itasca, Roselle, Wood Dale and Schiller Park.

[2] Day-Night Average Sound Level is a 24 hour measure of cumulative noise exposure. It is abbreviated in text as DNL, and represented symbolically in mathematical expressions as L_{dn}.

(2) establish a single system for determining the exposure of individuals to noise which results from the operations of an airport and which includes, but is not limited to, noise intensity, duration, frequency, and time of occurrence; and

(3) identify land uses which are normally compatible with various exposures of individuals to noise.

FAA complied with this Congressional mandate by adopting the "equivalent energy" family of noise metrics identified in EPA's 1974 "Levels Document" (see Appendix B) as its system of noise measurements, and by publishing its recommendations for compatible land uses in 1985, in Part 150 of the Federal Aviation Regulations.

1.3.1 *Basis for FAA selection of L_{dn} = 65 dB as a criterion of significant noise impact*

FAA's 1985 adoption of L_{dn} = 65 dB in Part 150 of the Federal Aviation Regulations to identify land uses incompatible with continued airport operation and expansion, and as a definition of significant noise impact, was *not* based on objective analysis or systematic scientific research.

FAA asserts that its L_{dn} = 65 dB criterion for participation in noise mitigation efforts is based on a 1992 relationship between noise exposure and the percentage of community residents highly annoyed by noise. Many subsequent studies have shown that the 65 dB value significantly understates the geographic extent, and hence the size of the population adversely impacted by aircraft noise. As explained further in this report, FAA's use of an annualized average DNL value of 65 dB has other flaws which render its definition of the significance of noise impact technically inaccurate.

To remain consistent with the current international scientific consensus (per the International Standards Organization's Standard 1996-1, "Description, measurement and assessment of environmental noise — Part 1: basic quantities and assessment procedures"), FAA must reduce its definition of significant noise impact by about an order of magnitude, to $L_{dn} \approx 55$ dB. Failure to do so will deprive populations of communities of average tolerance for aircraft noise of protection from exposure to highly annoying noise.

The noise exposure contours of the EIS for the OMP considerably understate the geographic extent of areas in communities and neighborhoods around ORD that are adversely impacted by aircraft noise. Full disclosure of these greater impacts in the EIS could have affected analyses of runway alignment alternatives in the EIS, and could affect ongoing decisions about future operations at ORD. Failure to acknowledge these greater impacts can exclude thousands of residents from eligibility for impact mitigation measures such as acoustic insulation.

1.3.2 *Varying tolerances of different communities for aircraft noise exposure*

FAA's interpretive criterion for the significance of aircraft noise exposure applies only to a hypothetical community of average tolerance for aircraft noise. In reality, communities differ considerably from one another in the prevalence of annoyance induced by the same levels of noise exposure. If FAA wishes its criterion of significant noise impact to apply with uniform effect in different communities, the criterion must reflect community-specific differences in tolerance for noise exposure.

ORD-vicinity communities newly exposed to high levels of aircraft overflights are almost certainly less tolerant than average of aircraft noise exposure. Numbers of unique noise complainant addresses lodged from ORD-vicinity communities have increased greatly since the latest runway opening at O'Hare in 2013. Even an L_{dn} = 55 dB criterion for significant noise impact underestimates the extent of the significantly noise impacted population in a community of lesser than average tolerance for noise exposure.

1.3.3 *Common mis-understandings of DNL as a noise metric*

DNL is a widely mis-understood and much-maligned measure of cumulative noise exposure. Much of the criticism that DNL attracts is technically ill-founded and mis-directed. Similar criticisms would almost certainly be directed against any other decibel-denominated system of units used in aircraft noise regulation. Criticism of DNL *per se* is, in effect, shooting at the wrong target. DNL is so highly correlated with all other measures of noise that are potentially useful for aircraft noise regulation that its ability to predict community response to noise exposure cannot differ greatly from that of other noise metrics. For example, some contend that CNEL (Community Noise Equivalent Level) is a more useful predictor of community response to aircraft noise than DNL. In reality, there is little meaningful difference in the predictability of community response to transportation noise, whether measured in units of CNEL, DENL, or DNL.

2 FRAMEWORK OF U.S. AIRCRAFT NOISE REGULATION

2.1 Purposes of Aircraft Noise Regulation, Measurement, and Prediction

Many discussions of airport/community controversies center on issues of aircraft noise exposure *per se*. Such close focus on noise exposure can obscure the fact that the underlying purpose for quantifying aircraft noise is *not* measurement for measurement's sake. Measurement of aircraft noise is only a means to an end. For regulatory purposes, aircraft noise is measured only to quantitatively predict its effects ("impacts") on noise-exposed populations. If aircraft noise did not disturb sleep, interfere with speech, and annoy people, few would find it worth the bother and considerable expense of measuring it in the first place. It follows that any noise metric which does not support useful prediction of community response cannot play a useful role in aircraft noise regulation.

For most practical purposes, aircraft noise regulation in the vicinity of airports nationwide is intended to protect some percentage of residential populations from exposure to highly annoying aircraft noise.[3] The generic questions that national regulatory bodies must answer are thus "How much noise is too much noise?", and "How can you tell?" FAA and other regulatory agencies have long sought objectively defensible answers to these questions, with only limited success.

2.2 Rationale for Aircraft Noise Regulation

FAA and other regulatory agencies routinely assert that their noise regulations are supported in some manner by formal technical analyses of statistical relationships between the prevalence of a consequential degrees of noise-induced annoyance in communities (percent highly annoyed, or "%HA") and a measure of cumulative noise exposure (such as DNL), expressed in units of decibels (dB).[4] "Dosage-response" relationships of this sort are commonly expressed as mathematical functions. This lends them the appearance, if not the substance, of accuracy, precision and scientific merit. Since FAA adopted DNL as its preferred measure of aircraft noise exposure, no other association of noise dose and noise effect has been as thoroughly investigated, nor based on as much empirical information.

Dosage-response relationships derived by logistic regression[5] (*cf.* FICON, 1992, and Miedema and Oudshoorn, 2002), vary continuously in slope over their ranges, and lack obvious

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[3] FAA maintains that aircraft noise regulation is intended to protect public investment in airport infrastructure, but the major pragmatic benefit of such regulation is nonetheless its limitation of residential exposure to aircraft noise. The population protected from exposure to highly annoying aircraft noise is *not* a percentage of the entire residential population in the vicinity of an airport, but only of the population exposed to a specified noise exposure level. The percentage of an entire residential population near an airport actually protected from exposure to highly annoying aircraft noise depends on the geographic distribution of residences with respect to noise exposure contours.

[4] This assertion by FAA is the agency's stated response to Congressional direction to the Department of Transportation in the 1979 ASNA statute to adopt a noise measurement standard based on a "highly reliable relationship between projected noise exposure and surveyed reactions of individuals to noise."

[5] Logistic regression is a statistical procedure that produces a smooth, S-shaped approximation to the centroid of a cloud of data points. A dosage-response curve produced by univariate logistic regression is driven by the correlation

breakpoints (other than near their asymptotes, which are of little regulatory interest). They also predict annoyance prevalence rates only in "typical" – that is, nominally average – communities, not in any actual community. In reality, annoyance prevalence rates in different communities vary greatly for the same noise dose measured in units of DNL. Thus, NEPA-based environmental impact disclosures for specific projects in actual communities, as well as regulatory policies supposedly derived from regression-based dosage-response relationships, do not properly disclose the potential range in community annoyance, and therefore do not offer uniform protection from exposure to highly annoying noise in communities nationwide.

2.3 Measurement of Community Response to Aircraft Noise

The term "community response" has served since the late 1970s as an informal term for the percentage of a representative sample of noise-exposed residents who describe themselves as consequentially annoyed by aircraft noise (Schultz, 1978). This percentage has been measured directly in hundreds of field studies of community response to aircraft noise exposure since the first modern social survey of this kind was undertaken at London Heathrow Airport (McKennell, 1963). The International Standards Organization (2013) has since published a technical specification describing the design of social surveys intended to quantify community response to transportation noise. Some of the key aspects of the technical specification include a standardized organization and wording of questionnaire items about the annoyance of noise exposure, and requirements for contemporaneous measurement and/or prediction of survey respondents' residential aircraft noise exposure levels.

If not determined empirically in a field study, the prevalence of high annoyance in a community can also be predicted *via* a dosage-response relationship. As further described in Section 2.5.3 of this report, FAA relies on one such relationship, developed for the 1992 FICON report, to predict community response to aircraft noise. This statistical relationship is now known to be technically inaccurate. Appendix C describes the International Standards Organization's current methods for quantifying the relationship between transportation noise exposure and annoyance prevalence rates.

2.4 Legislative Direction for U.S. Aircraft Noise Regulation

FAA regulates aircraft noise in accordance with Congressional direction, as specified in Public Law 85-726, the much-amended 1958 legislation which originally established FAA as an independent agency. Subsequent legislation, notably including the Airport Safety and Noise Act of 1979 ("ASNA", Public Law 96-193) and the Airport Noise and Capacity Act of 1990 ("ANCA", Public Law 101-508), has provided considerable additional Congressional direction.[6]

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between a single predictor variable (*e.g.*, DNL) and a single predicted variable (*e.g.*, % highly annoyed). Such a regression analysis is purely descriptive, lacks any inherent explanatory value, and does not address *bona fide* differences from one community to the next in tolerance for noise exposure.

[6] For largely political rather than technical reasons, exceptions have been made to general regulatory practice for certain airports, notably, Jackson Hole Airport (JAC) in Teton County, WY. For its own reasons, FAA has also permitted some airports (*e.g.*, MSP) to use AIP funding to acoustically insulate homes within the 60 dB DNL contour. FAA has also made no effort to challenge pre-ANCA compulsory or *de facto* restrictions on aircraft operations at airports such as Long Beach (LGB), John Wayne (SNA), and Denver (DEN).

The "dual mandate" in FAA's original (1958) charter – to not only regulate civil aviation, but also to promote it – created an inherent conflict of interest for the agency. FAA interpreted its dual mandate as encouraging a regulatory environment steeply tilted in favor of aviation industry interests. According to a former Department of Transportation Inspector General, "[FAA's] job was to promote aviation, and what they did is protected carriers to keep them flying." The 1996 Federal Aviation Reauthorization Act[7] eliminated FAA's dual mandate by striking language instructing FAA to promote civil aeronautics.

2.5 Underlying Assumptions of FAA-Sanctioned Assessment of Community Response

FAA noise regulatory positions rest on several fundamental assumptions (*cf.* Fidell, 2003) that were re-affirmed in 1992 by the Federal Interagency Committee on Noise in its "FICON Report":

1) Annoyance is the most useful measure of the general adverse reaction of communities to aircraft noise exposure; the preferred measure of annoyance is the proportion of community residents who consider themselves highly annoyed by aircraft noise.

2) A particular measure of cumulative noise exposure (Day-Night Average Sound Level) is the most useful descriptor of community noise.

3) A dosage-response function developed by U.S. Air Force researchers in the early 1990s (FICON, 1992) can accurately and reliably transform cumulative noise exposure levels, expressed in units of Day-Night Average Sound Level, into *predicted* annoyance prevalence rates in communities.

4) A level of aircraft noise expressed in units of cumulative noise exposure as L_{dn} = 65 dB serves as a strict threshold separating significant from "insignificant" transportation noise impacts in all communities. Various forms of federal participation (*i.e.*, funding) are available to mitigate only significant aircraft noise impacts, (*i.e.*, noise within the 65 DNL contour.)

These assumptions are discussed in the following subsections.

2.5.1 *Annoyance as the Preferred Measure of Aircraft Noise Environmental Impact*

This is the least technically controversial of the assumptions underlying FAA noise policy. Volume 2 (Section 3.2.2.1, pp. 3-3 *et seq.*) of FICON's 1992 report states that:

> "…the percent of the exposed population expected to be highly annoyed (%HA) [is] the most useful metric for characterizing or assessing noise impact on people", and that

[7] Public Law 104-264, Section 401 ("Elimination of Promotion"), http://www.gpo.gov/fdsys/pkg/PLAW-104publ264/pdf/PLAW-104publ264.pdf.

> "…the updated 'Schultz curve'[8] remains the best available source of empirical dosage-effect information to predict community response to transportation noise."

FAA adopted this position by the early 1980s, in response to ASNA. The selection of community annoyance as the criterion for significant noise interference remains consistent with the international scientific consensus expressed in the recent revision of the International Standards Organization standard, "Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures" (ISO, 2015), and with the European Union's Environmental Noise Directive (European Commission, 2002).

It is helpful to recall that the nature of annoyance of interest to FAA is *not* the annoyance of individuals, nor of exposure to transient noise events (*i.e.*, individual overflights), but the community annoyance of cumulative, long term exposure to multiple noise events. DNL, FAA's noise metric of choice (described in the next sub-section) predicts the annoyance of a full day's worth of noise-induced annoyance.

Further, it is not any particular day's annoyance that is of concern to FAA, but a hypothetical annual average day.[9] It is implicit in FAA's annual average day basis for estimating DNL values that seasonal variations in opening and closing of windows in residences, as well as variations in airport operations (such as differences in hot and cold season aircraft performance, fleet mix, runway and flight path use, and so forth) are adequately addressed through reliance on annual average conditions.

2.5.2 *DNL as the Preferred Measure of Community Noise Exposure*

DNL was formally defined in the Environmental Protection Agency's "Levels Document" (EPA, 1974). FAA was unenthusiastic about the utility of the measure prior to ASNA's requirement for adoption of a single, universally applicable aircraft noise measurement system. FAA's position subsequently evolved to near-exclusive reliance on DNL for quantifying aircraft noise exposure and predicting its consequences. Although the noise metric is frequently denigrated in public challenges to environmental impact disclosure exercises and other public debates, it is consistent with national and international scientific consensus standards, such as American National Standard ANSI S12.9/Part 4 and ISO 1996-1.

In practice, DNL values used to assess annoyance prevalence rates in communities (see next sub-section) are more often predicted (prospectively modeled) ones, rather than actually measured ones. One of the major purposes for predicting annoyance prevalence rates in communities is to meet NEPA requirements for disclosure of anticipated future noise impacts. Not all airports have systems capable of credibly measuring aircraft noise exposure in surrounding communities in any event. At those which do, discrepancies in DNL values

[8] The so-called "Schultz curve" is an early dosage-response relationship (Schultz, 1978) linking transportation noise exposure to the prevalence of a consequential degree of annoyance in communities. The original analysis by Schultz has been revisited several times in subsequent decades, and is now obsolete.

[9] The fictional nature of an "annual average day" of noise exposure is particularly clear in noise modeling exercises. A hypothetical "annual average day" is one on which the wind simultaneously blows at eight knots directly down each of an airport's runways (regardless of their actual orientations), while the annual average fleet utilizes annual average runways and flight paths while flying to annual average destinations. No such day actually exists, of course, nor is the pattern of noise exposure produced on such a hypothetical day ever experienced in all airport-area communities.

between prospectively predicted and empirically measured values of DNL as large as several decibels are commonplace at some measurement sites.

2.5.3 *Accuracy and Precision of the FICON Dosage-Response Relationship*

The "FICON curve" was developed by two employees of the U.S. Air Force Aerospace Medical Research Laboratory, Drs. Stanley Harris and Henning von Gierke, in the early 1990s (Feingold *et al.*, 1994). The starting point for their analysis was a database of paired DNL values and prevalence rates of high annoyance with transportation noise that had been compiled by Fidell, Barber and Schultz in 1989. Harris and von Gierke opted to fit a single curve to annoyance prevalence rates observed for all forms of transportation noise (road, rail, and aircraft), after intentionally omitting some of the aircraft data points which, in their opinion, appeared to be unreliable.[10] Both of these analysis choices – combination of community response data to all forms of transportation noise, and omission of some of the seemingly more extreme aircraft noise data points – led to a dosage-response relationship which considerably underestimated the annoyance associated with exposure to aircraft noise (Fidell and Silvati, 2004).

Figure 2 shows FICON's 1992 dosage-response relationship, which FAA continues to regard as reliable and definitive. For example, Chapter 17 of FAA's "Airports Desk Reference" confidently asserts that:

> *"Past and present research by the Federal Interagency Committee on Noise (FICON) verified that the DNL metric provides an excellent correlation between the noise level an aircraft generates and community annoyance to that noise level."*

Such claims are little more than circular, self-referential assertions of truth by claimed authority, without regard for evidence, intellectual examination, or fact.

FAA's assertion elaborates on a similar claim in Section A150.1 of FAR Part 150 that DNL provides "a system of measuring noise at airports for which there is a highly reliable relationship between projected noise exposure and surveyed reactions of people to noise…." The claim is commonly but uncritically repeated in the boilerplate sections of FAR Part 150 studies and Master Planning exercises that individual airports prepare, such as those of the Port of Seattle (2004).

[10] The omitted points included observations of annoyance prevalence rates made at Burbank Airport (Fidell *et al.*, 1985). With the advantage of another three decades of field measurements of aircraft noise-induced annoyance, these observations do not appear in hindsight to be as extreme as believed at the time by Harris and von Gierke. Subsequent field measurements of aircraft noise-induced annoyance have demonstrated adverse community response to aircraft noise at even lower levels of aircraft noise exposure than those excluded from analysis in preparing the FICON curve.

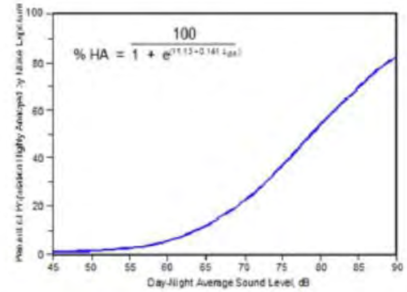

Figure 2: Dosage-response relationship developed by FICON (1992) and endorsed by FAA for predicting the prevalence of high annoyance in communities from cumulative noise exposure.

In reality, the FICON dosage-response relationship accounts for only about a fifth of the variance in the relationship between aircraft noise exposure and the prevalence of high annoyance in communities (Fidell and Silvati, 2004), and virtually none of the variance in the range of greatest regulatory interest – 55 dB $\leq L_{dn} \leq$ 65 dB (per Figure 6 of Fidell, 2003.) Figure 2 (above) is misleading because it does not display the data that FICON's relationship supposedly represents.

Figure 3 illustrates the enormous variability in annoyance prevalence rates of residential populations in different communities. Each of the 500+ open circles represents an empirical field measurement of the prevalence of aircraft noise-induced annoyance. Figure 4 shows that the FICON fitting function falls far short of the centroid of this cloud of data points. As such, it fails to explain or otherwise account for the great majority of the variability in the relationship. Mis-informed claims to the contrary are based on obsolete information and simplistic analyses.

The FICON dosage-response relationship is both obsolete and technically flawed in several ways. It is based on a limited set of dated field observations; fails to distinguish between the annoyance of aircraft, rail, and road noise; excludes data from certain surveys documenting high annoyance prevalence rates at modest noise exposure levels; and (as described in greater detail in Section 3 of this report) greatly underestimates the annoyance of aircraft noise exposure.

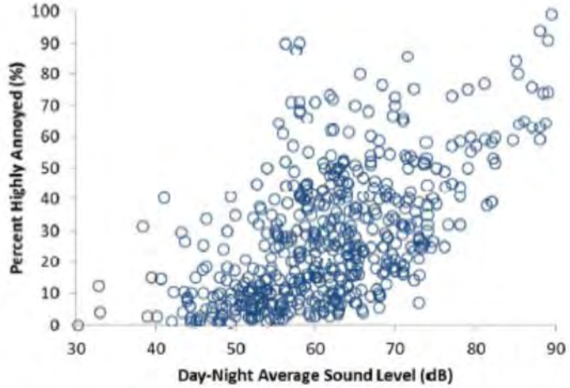

Figure 3: Illustration of the great variability in field measurements of aircraft noise-induced annoyance prevalence rates in approximately 550 communities.

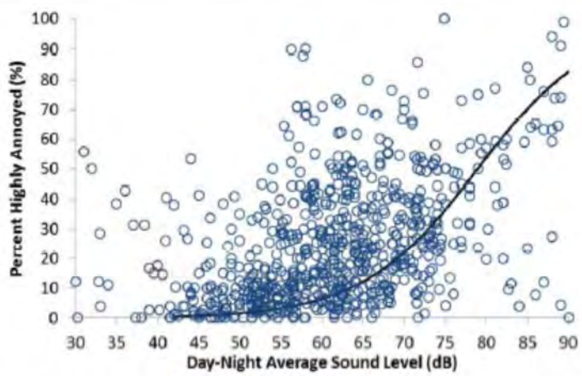

Figure 4: Summary of world-wide observations of the prevalence of all transportation noise-induced annoyance. The solid curve in the figure is a dosage-response relationship relied upon in the United States to predict annoyance prevalence rates in all communities to all transportation noise sources.

The FICON fitting relationship does not apply to any actual community, but only to a hypothetical community of nominally average tolerance for all transportation noise exposure.[11]

2.5.4 *Distinction of Significant from Insignificant Noise Impacts*

Judgments about the significance of noise impacts are critical for policy purposes. They affect, *inter alia*, NEPA-related disclosures and decisions about project alternatives, requirements for mitigating aircraft noise impacts, and subsequent eligibility for participation in airport-vicinity residential acoustic insulation and property purchase programs.

FAA does not use the term significance in its statistical sense, as a likelihood that an observation may have arisen by chance alone. As used by FAA, the term has *no* objective, systematic meaning other than as a policy threshold. For policy purposes, significance indicates only that the magnitude of predicted noise exposure exceeds L_{dn} = 65 dB.[12] Significance is dichotomous in FAA parlance – a noise impact is either significant or not significant. Significant noise impacts do not vary by degree for policy purposes, nor does the definition of significance of noise impacts vary from one community to the next, even though FAA acknowledges in its 1976 policy statement that "community responses to aircraft noise differ substantially [among communities]…."

A few moments' reflection reveals the lack of objective meaning of any claim that L_{dn} = 65 dB is a *scientifically* defensible definition of significant noise impact. No empirical, scientific study can be designed to determine the "correct" balance between conflicting societal interests. Such determinations self-evidently require value judgments about who should enjoy the benefits and who should bear the costs of satisfying demand for air transportation services. In the words of Kirsch (2015),

> *"Anyone who asserts that the FAA's [L_{dn} = 65 dB] standard for land use compatibility was established through an independent and objective scientific and technical exercise is either deceiving themselves or lacks a fundamental understanding of the relationship between science and public policy.... In the United States, all pollution standards are (or should be) based upon a technical/scientific foundation but the ... decision as to an acceptable level is, ultimately a policy decision. There simply is no scientific or technical standard for what is acceptable: that is a policy decision."*

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[11] The National Environmental Policy Act of 1969 (NEPA) requires disclosure of the expected environmental impacts of major federally-funded projects in specific communities. The fact that the FICON (1992) dosage-response relationship applies only to a hypothetical average community, rather than to any actual community, complicates its use in NEPA documents intended to disclose expected environmental impacts of aircraft noise exposure in actual communities affected by particular proposed actions. Appendix C describes how noise impact assessments may be conducted for specific communities, rather than for a hypothetical average community, by calculating a Community Tolerance Level value.

[12] FAA's "Policies and Procedures for Considering Environmental Impacts" (FAA Order 105.1E, 2004), for example, identifies L_{dn} = 65 dB as a strict noise exposure threshold for the purpose of defining a significant aircraft noise impact.

3 DNL AS A PREDICTOR OF COMMUNITY RESPONSE TO AIRCRAFT NOISE

Modern acoustic instrumentation can measure all aspects of aircraft noise, from the most obvious (sound pressure level, number, and duration of overflights) to the most subtle (rates of change of level, temporal variance, spectral complexity, *etc.*) Measurements can be made on time scales ranging from fractions of seconds to years, in narrow or wide bandwidths, in a variety of frequency weightings. Figure 5 (on the next page), adapted from Mestre *et al.* (2011), illustrates some common time scales and frequency weightings for aircraft noise measurement systems, represented by analogy to astronomical bodies orbiting an aircraft noise source.

The variety of alternative measurement systems can be bewildering unless it is recognized that each system of measurements reflects a tacit assumption that the aspect of aircraft noise to which it is most sensitive is the primary cause of annoyance. Such assumptions stem from beliefs dating to the 1950s:

1) that the findings of laboratory studies of the acoustic determinants of annoyance can be freely generalized to community settings; and

2) that annoyance with residential exposure aircraft noise exposure can be fully explained and accounted for in exclusively acoustic terms.

After decades of subsequent research, neither of these beliefs has proved correct.

A veritable alphabet soup of schemes intended to predict community response to aircraft noise arose starting as early as the 1950s. Many of these are described by Schultz (1972), Bennett and Pearsons (1981), and by Mestre *et al.* (2011). The findings of any one field study do not suffice to test hypotheses about the acoustic determinants of annoyance, however. Noise metrics which correlate well with social survey findings in an individual study often correlate poorly in other studies.[13] In the absence of a clear definition – let alone a substantial body of field measurements of community response to actual aircraft noise – it was difficult to determine the predictive worth of many of these metrics prior to the 1970s (*cf.* Kryter, 1984).

3.1 Early precursors to DNL

3.1.1 *Community Noise Rating (CNR)*

The first systematic efforts to predict community response to aircraft noise exposure were those of Rosenblith *et al.* (1953) and Stevens *et al.* (1955). As described by Fidell (2003), their "Community Noise Rating" approach to characterizing adverse community reaction to aircraft noise interpreted the findings of 20-odd case studies of community reaction to aircraft noise in terms of "sporadic" through "widespread" complaints, "threats of community action," and "vigorous community action." CNR values in airport neighborhoods were scaled from about 100 through 115, in decibel-equivalent units.

[13] This is due in large part to the limitations of purely correlational statistical analysis methods, such as multivariate regression, which are not based on causal relationships.

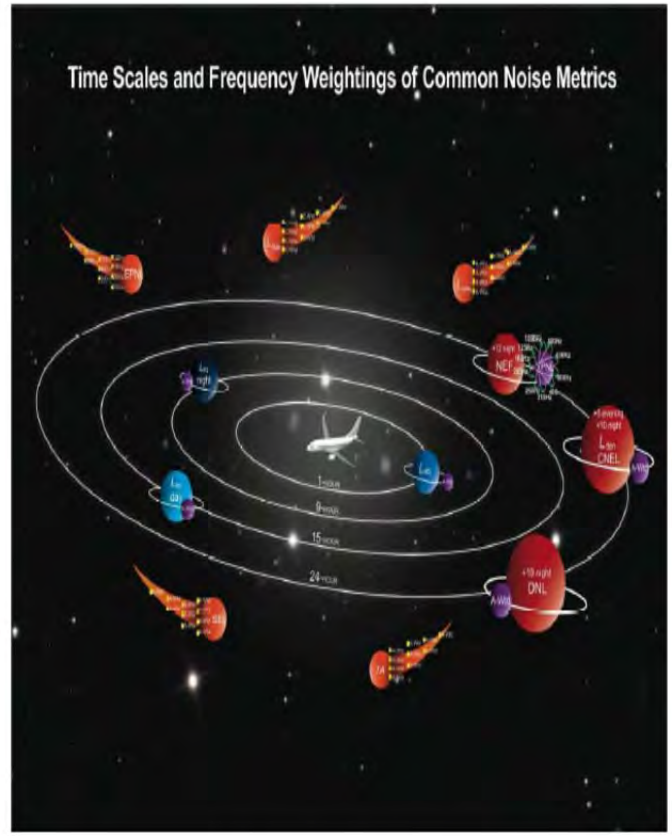

Figure 5: Common aircraft noise exposure metrics depicted as astronomical bodies orbiting a noise source, from Mestre *et al.*, 2011. The depiction emphasizes the various time scales and frequency weightings of different metrics.

A "Community Noise Rating" (CNR) value was determined by first estimating a "noise level rank" from a set of idealized spectral shapes for community noise. These shapes were developed from laboratory findings about the loudness of sounds in different frequency bands.[14] The noise level rank was normalized to standard conditions by site-specific factors such as ambient noise levels, time of day and year, tonal content, dynamic range of noise intrusions, and novelty of exposure. Each of these normalizations was accomplished by adding entirely *ad hoc* "correction factors" in increments of ± 5 dB.

CNR-based assessment of community reaction to environmental noise required a detailed case study, involved more-or-less arbitrary judgments about the detailed nature of noise exposure, and made no effort to account for the range of reactions associated with the same rating level. As seen in Figure 6 (taken directly from Galloway and Pietrasanta, 1963), the original CNR classification of community response distinguished three categories of severity of noise impact. Note further that community response was classified solely with respect to complaints (a behavior), not annoyance (an attitude).

Composite Noise Rating		
Takeoffs and Landings	Runups	Description of Community Response
Less than 100	Less than 80	Essentially no complaints would be expected. The noise may, however, interfere occasionally with certain activities of the residents.
100 to 115	80 to 95	Residents in the community may complain, perhaps vigorously. Concerted group action is possible.
Greater than 115	Greater than 95	Individual reactions would likely include repeated, vigorous complaints and recourse to legal action. Concerted group action would be expected.

Figure 6: Three zones of severity of community response in the original Community Noise Rating System

3.1.2 *Noise Exposure Forecast (NEF)*

Following development of the Effective Perceived Noise Level ("EPNL") metric in the late 1950s[15], CNR values were converted into NEF values as follows:

NEF = EPNL + 10 $\log_{10}$ [Number of daytime flight operations + 16.7 * (Number of night Time operations)] – 88 dB.

The constant 16.7 represents a 10 dB night penalty on the number of operations per hour (not the cumulative number of operations) when the ratio of 16 daytime hours to 9 nighttime hours is taken into account. Both constants (16.7 and 88) in the above equation are entirely arbitrary, and based only on the experience and engineering judgment of Galloway and Pietrasanta. The constants were intended, respectively, to 1) weight night time flights ten times more heavily than day time flights, and 2) to avoid confusion between CNR and NEF values. In practice, the approximate relationship between NEF and CNR values was NEF = CNR – 72 dB.

On the basis of nothing more than field experience and engineering judgment, NEF values of 30 dB or less were believed to be suitable for aircraft noise exposure in areas of single family detached dwellings. NEF values between 30 and 40 dB were thought to be tolerable in neighborhoods of higher density housing, and NEF values in excess of NEF = 40 dB were thought of as suitable only for industrial and recreational purposes.[16]

When NEF values were supplanted by DNL values subsequent to publication of EPA's "Levels Document" in 1974, a further "correction" of 35 dB was added to NEF values to distinguish them from DNL values. All of the above "corrections," "adjustments," and constants were based on the personal opinions of acoustical consultants practicing in the 1950s through 1970s. None of their opinions were supported by any form of comprehensive, community-based, systematic, peer-reviewed, theory-based, or otherwise objective study or analysis.

3.2 DNL and the "Equal Energy" Hypothesis

DNL is the best known of the "equivalent energy" family of noise metrics. The tacit belief underlying use of DNL to predict community response to aircraft noise is known as the "equal energy hypothesis." This hypothesis holds that annoyance with aircraft noise exposure is equally determined by the number, duration, and acoustic energy of aircraft noise exposure. In other words, the hypothesis asserts that it is not simply the maximum level of an aircraft overflight that controls its annoyance, nor the duration of individual overflights, nor the numbers of overflights, but the multiplicative product of all three.

Because DNL directly expresses the simple product all of the primary factors (level, duration, and number) which can reasonably affect the annoyance of aircraft noise exposure, it is equally sensitive to all of them. Thus, if the number of aircraft operations increases by a factor of two (that is, by 3 dB, as explained in Appendix B), so does DNL. If the durations of aircraft overflights increase by a factor of two, DNL also increases by 3 dB. If the acoustic energy of individual aircraft overflights increases by 3 dB, so does DNL. In practice, this means that DNL is highly correlated with any sensible measure of aircraft noise.

Mestre *et al.* (2011) conducted an elaborate demonstration of the high correlation of DNL with virtually all other plausible measures of aircraft noise exposure. They used INM to model aircraft noise exposure at a notional one-runway airport served by a typical fleet of aircraft. They computed values of a variety of noise metrics at a closely spaced grid of points, and then computed a correlation matrix among all of the noise metric values.

The correlations between all other noise metrics and DNL were nearly perfect; so high, in fact, that DNL values varied from other noise metrics by little more than scale factors and constants. The very high correlations between DNL and other noise metrics mean that

[14] CNR antedates development of the Perceived Noise Level scale, and so conducts its calculations on the notion of cumulative exposure to noise in an "equivalent 300-600 Hz octave band."

[15] Development of EPNL was a direct consequence of the community noise impact controversy surrounding the start of B-707 operations at New York Airports in 1958.

[16] Beliefs about the suitability of aircraft noise exposure in outdoor recreational settings such as parks and wilderness areas have evolved greatly since, as evidenced by Public Law 100-91, the National Parks Overflight act of 1987.

mathematically, dosage-response relationship based on noise metrics other than DNL *cannot* explain any more variance in the relationship between DNL and the prevalence of high annoyance in airport neighborhoods than DNL already does.

The only aircraft noise metrics that were not nearly perfectly correlated with DNL were threshold-type metrics, such as numbers of events in excess of a sound level, and durations of exposure in excess of sound level. Such threshold-based noise metrics share an important limitation for regulatory purposes: their slopes are so steep that regulation based on them would be essentially dichotomous. As noted by Mestre *et al.* (2011), the values of time-above and number-above noise metrics "…are zero until a threshold is reached, after which they climb steeply until saturation is reached…. Once the threshold is exceeded, a small change in DNL can produce large changes in [*the noise metrics time- and number-above*]. The steep slope is an artifact of the logarithmic nature of DNL but the linear nature of TA and NA." In other words, the threshold-based metrics "time-above" and "number-above" are ill-suited for aircraft noise regulation, because they are insensitive to different degrees of aircraft noise over large portions of their ranges.

A further limitation of the threshold noise metrics for regulatory purposes is that they are sensitive to the composition of a fleet serving an airport. A fleet containing large numbers of, say, business or regional jets, but small numbers of larger jet transports, could produce the same values of a time-above noise metric as a fleet containing large numbers of much noisier four engine airliners, but very few smaller aircraft. Note also that INM calculations of metrics such as "time-above" and "number-above" are for informational purposes only, and not as predictors of community response.

DNL makes two further assumptions about the origins of annoyance with aircraft noise exposure. The first is that nighttime (10:00 PM through 7:00 AM) aircraft operations are an order of magnitude (10 dB) more annoying than aircraft operations at other times of day. The second assumption is that the optimal frequency weighting for predicting annoyance is the A-weighting network. It has been understood for several decades that the first of these assumptions is at best only approximately correct (*cf.* Fidell and Schultz, 1980). In practice, however, it matters little whether an aircraft noise metric assesses an 8 dB, 10 dB, or a 12 dB nighttime penalty. On a national basis, numbers of daytime operations dwarf numbers of nighttime operations, except at a small number of predominantly express delivery or air cargo airports.

Likewise, even though A-weighting of aircraft noise may not be an optimal approach to estimating its annoyance, it is probably good enough for most purposes. A low-frequency weighting network may be preferable for predicting annoyance in special cases (such as runway sideline and other airport-adjacent neighborhoods subjected to considerable ground run-up, thrust reverser, and start-of-takeoff roll noise). A loudness level weighting[17] would probably be preferable as well, but would yield only a minor improvement in the correlation of annoyance with exposure in most cases.

3.3 Use of DNL to Predict Prevalence of Noise-Induced Annoyance in Communities

The first systematic attempt to use of DNL to estimate the prevalence of a consequential degree of annoyance in communities was made by Schultz (1978). Schultz converted the noise

[17] The loudness of a sound varies with *both* frequency and absolute level. The A-weighting network does not vary with absolute sound pressure level.

measurement units of field studies available in the mid-1970s into units of DNL to conduct the first large-scale meta-analysis of the world-wide findings of social surveys on the annoyance of transportation noise. He included in his analysis all of the then-available information about transportation noise-induced annoyance, and produced a single fitting function for the combined data set. The relationship that Schultz derived was an informal ("eyeball"), rather than a statistical fit, described by an arbitrary third-order polynomial function.

As noted in Section 2.2, a number of other meta-analyses have since been completed, including those of Fidell *et al.*, 1989; Finegold *et al.* (1994); Miedema and Vos (1998), Miedema and Oudshoorn (2001), Fidell and Silvati (2004), and Fidell *et al.*, (2011). More recent meta-analyses have yielded transportation mode-specific fitting functions, produced by a variety of curve fitting methods. The most recent effort, described in Appendix H of ISO Standard 1996-1 (2015), is derived from first principles rather than as a statistical curve fitting exercise. As described in Appendix C, it also provides a well-defined, quantitative role for non-acoustic factors, in conjunction with DNL values, as a predictor of annoyance prevalence rates.

3.4 Common Mis-understandings of DNL

DNL is a widely mis-understood and widely mis-interpreted noise metric that is often distrusted by the public for a number of reasons. Mestre *et al.* (2011) point out that:

> A cumulative, 24 hour time-weighted annual average exposure level is an abstract concept, far removed from common experience. A quantity of noise exposure expressed in units of DNL cannot be directly experienced by casual observation in the same sense that the maximum sound level of a single noise event can be heard.
>
> Even though DNL values reflect all of the noise energy occurring during a 24-hour period, its very name (Day-Night *Average* Sound Level) is commonly misconstrued as implying that the measure is somehow insensitive to high level noise events.
>
> The logarithmic arithmetic necessary to manipulate DNL values, and the normalization of the decibel notation of its units to 10log10 (86,400 seconds/day) are non-intuitive and poorly understood by non-technical audiences.
>
> Public understanding of prospective aircraft noise modeling and annual average day exposure contours, the context in which it often encounters DNL-based information, is weak. Prospective contours are inevitably speculative to some degree, since there are no facts about the future. The public nonetheless often confuses prospective noise contours with actual aircraft noise measurements, or with retrospective noise contours. Contours are also sometimes interpreted as step functions, and would be more reasonably depicted with shading rather than as sharp boundaries.
>
> The public does not fully appreciate the difference between DNL, a cumulative noise metric, and the interpretive criteria that FAA applies to DNL values for policy purposes. DNL is used in environmental impact disclosure documents as a required metric of noise exposure. The resultant focus on the metric in lieu of descriptive discussion of noise impacts is confusing and potentially misleading.

DNL often suffers from a "shoot-the-messenger" reaction to unpopular policies that are expressed in units of decibels. This leads to a common criticism of DNL as a metric, rather than criticism of the manner in which noise exposure levels are interpreted for regulatory purposes.

3.5 Means for improving public communication of community noise impacts

The simplest solution to the problems of public confusion with DNL is to shift the focus of airport/community controversies away from noise exposure *per se*, back to where it belongs, on aircraft noise impacts. One way in which this may be accomplished is to label aircraft noise exposure contours in units of annoyance prevalence rates. Rather than labeling cumulative noise exposure contours in environmental impact disclosure documents in units of decibels, the same contours could be labeled in units of percentages of the population is highly annoyed by aircraft noise exposure.

Thus, for example, a set of noise exposure contours might show the decision makers for whom environmental impact disclosure documents are intended the areas within which 30%, 25%, 20%, 15%, 10%, and 5% of the residential population are highly annoyed by aircraft noise.

4 IMPROVED ESTIMATES OF AIRCRAFT NOISE ANNOYANCE IN ORD-VICINITY COMMUNITIES

Writing 44 years ago, Wyle (1971, p. 51) observed that inferences about noise impacts on communities in earlier times

"… were generally made in 5 dB intervals, since many of the initial relationships were based solely on the intuition of the authors, and it was considered difficult to assess the response to any greater degree of accuracy."

Four decades later, it is no longer the case that estimates of noise impacts on communities must rely on crude, *ad hoc* interpretations of a sketchy noise effects literature, nor upon the intuitions of acoustical consultants. As described in Section 2.5.3, it is now apparent that the 1992 FICON dosage-response relationship on which FAA depends to transform aircraft noise exposure into the estimated prevalence of annoyance in communities considerably underestimates the actual prevalence of annoyance in most communities. Figure 7 illustrates the differences between FICON (1992) and the latest predictions of the prevalence of high annoyance due to aircraft noise exposure of Annex F of ISO Standard 1996-1.[18]

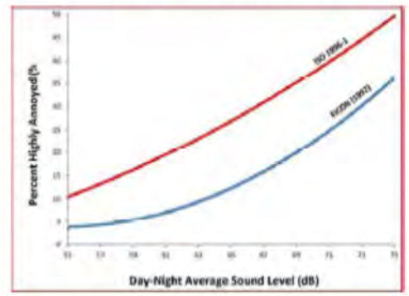

Figure 7: Graphic comparison of FICON (1992) and ISO (1996-1) predictions of aircraft noise-induced percentages of high annoyance for a community of average tolerance for aircraft noise.

At the same aircraft noise exposure levels, the modern (red) function shows considerably greater percentages of residential populations to be highly annoyed by aircraft noise exposure than the obsolete (blue) function.

Table 1 contains the same information as Figure 7, but in tabular form, for the case of a community of nominally average tolerance for noise exposure. The obsolete and incorrect

[18] The 2015 revision of ISO 1996-1 contains two dosage-response relationships for aircraft noise, one derived by conventional univariate regression methods, and one derived from first principles. For the special case of a community of nominally average tolerance for aircraft noise exposure, the two relationships are effectively identical.

FICON relationship indicates that about 12% of the population of a community of average tolerance for noise exposure is highly annoyed at an exposure level of L_{dn} = 65 dB. This indicates that FAA considers a significant aircraft noise impact to be one that consequentially annoys at least 12% of the residential population. Put another way, FICON's dosage-response relationship indicates that FAA's definition of significant aircraft noise impact of L_{dn} = 65 dB protects about 88% of the population from exposure to highly annoying aircraft noise.

Table 1. Tabular comparison of FICON and ISO predictions of aircraft noise-induced percentages of high annoyance for a community of average tolerance for aircraft noise.

Day-Night Average Sound Level, dB	% Highly Annoyed, *per* FICON (1992)	%Highly Annoyed, *per* ISO 1996-1
55 dB	3.3%	10.5%
56	3.8	11.9
57	4.3	13.3
58	5.0	14.7
59	5.7	16.3
60	6.5	17.9
61	7.4	19.5
62	8.4	21.3
63	9.6	23.1
64	10.9	25.0
65	12.3	26.9
66	13.9	28.9
67	15.7	30.9
68	17.6	33.2
69	19.8	35.2
70	22.1	37.5
71	24.6	39.8
72	27.3	42.1
73	30.2	44.5
74	33.3	47.0
75	36.5	49.5

Table 2 updates the DNL values which correspond to FAA's policy position to the current international scientific consensus standard. The cell entries in Table 2 display the equivalent DNL values required to protect the same population proportions from exposure to highly annoying noise for the obsolete (FICON) and current (ISO) dosage-response relationships. It is apparent from the rightmost column of Table 2 that FAA's L_{dn} = 65 dB definition of significant aircraft noise impact actually highly annoys about 27% of the population, not the 12.3% of the population that FICON predicts. Put another way, FAA's definition of significant aircraft noise protects only about 72% of the population from highly annoying aircraft noise exposure, not the 88% that FICON mistakenly estimates.

Table 2. DNL values for aircraft noise exposure that annoy equivalent percentages of residential populations, as predicted by FICON (1992) and by ISO 1996-1, Annex F

Predicted Percent of Population Highly Annoyed by Aircraft Noise	Percent of Population Protected from Exposure to Highly Annoying Aircraft Noise	Approximate DNL value (*per* FICON, 1992), decibels	Approximate DNL value (*per* ISO 1996-15), decibels
2%	98%	51.3 dB	46.3 dB
4	96	56.4	48.9
6	94	59.4	51.1
8	92	61.6	52.9
10	90	63.4	52.9
12	88	64.8	54.6
14	86	66.1	56.1
16	84	67.2	58.5
18	82	68.2	60.1
20	80	69.1	61.3
22	78	70	62.4
24	76	70.8	63.5
26	74	71.5	64.5
28	72	72.3	65.6
30	70	72.9	66.6
32	68	73.6	67.5
34	66	-	68.4
36	64	-	69.4
38	62	-	70.2
40	60	-	71.1
42	58	-	71.9
44	56	-	72.8
46	54	-	73.6
50	52	-	74.4

It is important to recall that the figures in Table 1 and Table 2 apply only to a special and rare case: a community of exactly average tolerance for noise exposure. Just as there are far more people who are either shorter or taller than average height than there are people of exactly average height, far more communities are either more or less tolerant of aircraft noise exposure than a hypothetical average community.

The great increase in numbers of unique aircraft noise complaints in ORD-vicinity communities since October, 2013 provides ample reason to believe that these communities are considerably *less* tolerant than average of aircraft noise exposure. This is the case even though it is well known that raw numbers of aircraft noise complaints can be artificially inflated by large numbers of robotically-filed complaints from small numbers of complainants.

Robotically-filed complaints are easily distinguished from non-robotically lodged complaints, however, and do not reasonably justify dismissing *all* complaints as spurious. Fidell *et al.* (2012) have shown that numbers of aircraft noise complaints per complainant follow Zipf's Law. The modal (most frequent) number of complaints per complainant at many airports is typically a small integer. Excluding from analysis hundreds or thousands of repetitive complaints from individual complainants has little effect on the modal number of complaints, because the number of such complainants is small. It is therefore unreasonable to dismiss complaints as unreliable indices of community response simply because many are generated by a few complainants.

The clear implication of the great increase in aircraft noise complaints since October of 2013 is that FAA's threshold of significant aircraft noise impact of L_{dn} = 65 dB highly annoys even more of the population than the 27% that it annoys in a community of average tolerance for aircraft noise as predicted by ISO 1996-15.[19]

The tolerance of communities for aircraft noise exposure can be measured empirically, as explained in Appendix C. Absent such direct field measurement, however, it is still possible to estimate the proportions of the residential populations of ORD-vicinity communities who are highly annoyed by aircraft noise from the new east-west runway orientations. It is also possible to estimate confidence intervals for predicted annoyance prevalence rates. This can be accomplished with respect to the variance of known distributions of tolerances for aircraft noise exposure, as explained by Fidell *et al.* (2014).

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[19] The distinction between annoyance (an attitude) and complaints (a behavior) as indicators of community response to aircraft noise has in any event been rendered less important for regulatory purposes by a July 2013 D.C. Court of Appeals ruling. The ruling confirms that FAA has the authority to regulate flight paths on the basis of noise complaints, even with respect to areas outside the 65 dB DNL contour. In other words, the ruling indicates that FAA need not necessarily base its aircraft noise regulatory positions solely upon levels of aircraft noise exposure, but can also base them on documented aircraft noise complaints.

5 CONCLUDING COMMENTS

FAA identifies L_{dn} = 65 dB as a threshold of significant aircraft noise impact. This policy position relies on FICON's obsolete and flawed analysis of dated surveys that considerably underestimate the impact of aircraft noise on annoyance of communities. FAA's noise impact assessment methods do not reliably predict the adverse impact on ORD-vicinity communities of aircraft noise exposure following ORD's runway reconfiguration. At L_{dn} = 65 dB, the dosage-response relationship on which FAA depends to convert DNL values into estimates of the percentage of a community highly annoyed by aircraft noise underestimates the prevalence of aircraft noise-induced annoyance by more than a factor of two in an average community.

FAA's current threshold for significant noise impact (L_{dn} = 65 dB) is not based on a "highly reliable relationship between noise exposure and surveyed reactions of individuals to noise." They agency's current, demonstrably incorrect, rationale is inconsistent with the latest international technical consensus standard for assessment of population-level transportation noise impacts. If FAA's wishes to base its policy positions on objective scientific evidence, and to maintain consistency with the rationale established by its prior dosage-response analyses, then this definition of significant noise impact will have to change.

FAA's limitation of regulatory and financial relief for noise damages to properties within the 65 dB DNL contour is also inconsistent with a July 2013 D.C. Court of Appeals ruling confirming that FAA has the authority to regulate flight paths on the basis of noise complaints outside the 65 dB DNL contour. 1

The 2001 Data Quality Act (U.S. Public Law 106-554) requires that federal agencies maximize the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency. To comply with this mandate, FAA regulatory positions with respect to aircraft noise effects will have to be updated to reflect the current international technical consensus about the prevalence of aircraft noise-induced annoyance. For FAA to maintain consistency with the contemporary objective scientific information – information that FAA acknowledges should provide the technical support and justification that it cites as a basis of its current regulatory framework – any such updating carries the strong implication that the agency's policy on the significance of noise exposure must also change.

Merely updating the definition of significant aircraft noise impact on a community of hypothetically *average* tolerance for noise exposure implies a reduction of about an order of magnitude (10 dB) in community-compatible aircraft noise exposure levels, from L_{dn} = 65 dB to approximately L_{dn} = 55 dB. For the sake of nationwide uniformity of regulatory effect, however, an even greater reduction in the definition of significant noise impact is necessary in communities of less-than-average tolerance for aircraft noise exposure.

The actual tolerance of a particular community for exposure to aircraft noise can be empirically quantified by means of a social survey, as explained in Appendix C. Such a social survey would permit estimation of a CTL value for ORD-vicinity communities that would permit better-informed decisions to be made about the significance of noise impacts resulting from ORD's runway reconfiguration project. It would also permit systematic and specific application of policy-based decisions about the percentage of a community that deserves protection from exposure to highly annoying aircraft noise to ORD-vicinity communities. 2

Comment	Response
1	The City of Chicago was instrumental in encouraging the FAA to evaluate the current noise metric. Mayor Emanuel personally engaged in addressing this critical issue. The O'Hare Noise Compatibility Commission (ONCC) also supported this initiative and will receive periodic updates during the course of the study. The SOC has membership in ONCC and we encourage you to engage in this process through this established mechanism, as the CDA will. The City continuously seeks funding for sound insulation projects. This funding is awarded based on impacts as determined using DNL measurements. If changes are made to the standards by which noise impacts are measured, the City would continue to work with the FAA and communities to provide sound insulation While the City is supportive of the FAA's re-evaluation of the DNL noise metric, DNL remains the FAA's standard for determining noise impacts and basis for sound insulation programs nationwide. Please also refer to response to Comment No. 5 in Section 3.
2	CDA is committed to increased distribution of data and reports to provide more accurate and timely access to information on aircraft operations and noise. Several tools and ideas are under evaluation, including: • Upgrading the CDA webpage to included expanded content on airport noise and operations. • Continuing to explore new noise software. • Improving the collection of stakeholder noise concerns. • Reviewing industry "Best Practices". • Maximizing the use of social media to update citizens on relevant noise topics. • Reporting single-event noise data. Please also refer to response to Comment No. 16 in Section 3.

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7 GLOSSARY OF ABBREVIATIONS AND SYMBOLS

AIP: Airport Improvement Program

ANCA: **U.S. Airport Noise and Capacity Act of 1990 (Public Law 101-508)**

ANSI: American National Standards Insitute

ASNA: U.S. Airport Safety and Noise Act of 1979 (Public Law 96-193)

CTL: Community Tolerance Level. CTL is the value of DNL at which half of a community is highly annoyed by transportation noise exposure, and half is not.

CNEL: Community Noise Equivalent Level, a California state law noise metric similar to the European Union's Day-Evening Night Sound Level noise metric.

CNR: Community Noise Rating

CTL: Community Tolerance Level

DENL: Day-Evening-Night Average Sound Level

DNL: Day-Night Average Sound Level

EIS: Environmental Impact Statement

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FICAN: Federal Interagency Committee on Aircraft Noise, 1993 successor to FICON

FICON: Federal Interagency Committee on Noise, 1980 – 1992, successor to FICUN

FICUN: Federal Interagency Committee on Urban Noise, 1979-1980

ICAO: United Nations International Civil Aviation Organization

INM: Integrated Noise Model

ISO: International Standards Organization

L_{ct}: Mathematical symbol for Community Tolerance Level

L_{dn}: Mathematical symbol for Day-Night Average Sound Level

L_{den}: Mathematical symbol for Day-Evening-Night Sound Level

NA: INM abbreviation for the "Time Above" noise metric

NEF: Noise Exposure Forecast

NEPA: National Environmental Policy Act of 1969 [42 U.S.C. 4321 *et seq.*]

OMP: O'Hare Modernization Program

ONAC: EPA Office of Noise Abatement and Control

ORD: O'Hare International Airport

SEL: Sound exposure level, an EPA-endorsed integrated energy metric of sound normalized to a 1-second duration. (See also SENEL)

SENEL: Single event noise exposure level, a unit developed by the California Department of Aeronautics to compare the equivalent energy of individual aircraft overflights.

TA: INM abbreviation for the "time above" noise metric

%HA: The percentage of community residents who describe themselves a highly annoyed by transportation noise exposure.

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9 APPENDIX A: CHRONOLOGY OF MAJOR U.S. AIRCRAFT NOISE RESEARCH AND REGULATORY DEVELOPMENTS

This Appendix summarizes the evolution of U.S. aircraft noise regulation since the establishment of FAA as an independent agency within the Department of Transportation in 1958. Increases in aircraft noise exposure that accompanied the introduction into service of military and civil jet aircraft in the 1950s were accompanied by increasing public concern with aircraft noise effects on individuals and communities, and by a concomitant increase in legislative concern. Prior to the application of modern social survey methods to measurement of community response to aircraft noise in the early 1960s, however, understandings of aircraft noise effects in residential neighborhoods were limited to anecdotal case studies. Likewise, prior to the development of integrating sound level meters and other digital analysis techniques in the late 1960s, technical understandings of aircraft noise exposure were considerably more limited.

The following subsections describe developments in federal legislation, noise measurement technology, and technical understandings of community response to transportation noise during several distinct periods.

9.1.1 *Post-World War II Period – Start of Commercial Jet Service*

The U.S. Air Force and Navy initially became concerned about the habitability of military housing following the introduction of jet aircraft to military bases during the late 1940s and 1950s. The Air Force (particularly the Aerospace Medical Research Laboratory at the then-Wright Development Center, now Wright-Patterson Air Force Base) and other federal agencies sponsored considerable research during this time period which set the pattern for subsequent civil regulatory policies (*cf.* Ades *et al.*, 1953; Rosenblith *et al.*, 1953; Stevens *et al.*, 1955; Galloway and Pietrasanta, 1963; and BBN, 1967).

This early research was directed not only to measurement, modeling and understanding of aircraft engine and flight noise, but also to noise effects on individuals and communities. The early research led to development of environmental noise modeling and community noise assessment tools such as the Noise Exposure Forecast and the Composite Noise Rating systems.

9.1.2 *Start of Commercial Jet Service – Passage of Noise Control Act of 1972*

Commercial jet service began in the United States in 1958, the same year that the Federal Aviation Act (P.L. 85-226) established the modern FAA. The first large scale social survey of community response to aircraft noise was conducted at London Heathrow Airport in 1961 (McKennell, 1963).

The Effective and Tone-Corrected Perceived Noise Level noise metrics of FAR Part 36 were also developed in this time period to represent the frequency-weighted noisiness, rather than the broadband acoustic energy, of sounds.[20] Adoption of these metrics were part of the fallout of the Port of New York Authority's studies of the noisiness of Pan American Boeing 707

[20] The original publication of FAR Part 36 was in 1969, more than a decade after the start of commercial jet service in the U.S. Much of this delay was attributed at the time to the deliberate haste necessary to resolve technical questions about aircraft noise measurement – even though the U.S. Air Force and the Port of New York Authority had completed much of the relevant research prior to the start of commercial jet service. Civil aviation escaped meaningful noise regulation throughout this decade, in part due to FAA's early Congressional direction to promote civil aeronautics.

jets (Fidell, 2014). The Port had established a policy in 1951 of prohibiting operations at its airports by any aircraft that were noisier on takeoff and landing than existing four engine, propeller-driven passenger aircraft. Aircraft manufacturers had interpreted the Port's policy as "no greater overall sound pressure level."

The Port Authority concluded that B-707 overflights at altitudes comparable to those at which the aircraft would overfly homes near New York's (then) Idlewild Airport (now JFK) were intolerably noisy, and that the B-707 would be not be permitted to operate at Port Authority airports. It was estimated that jet noise would have to be reduced by 15 dB to be judged no more annoying than the noise of large, four engine propeller aircraft. This early research provided the impetus for many subsequent technical and regulatory developments.

The U.S. Air Force began development of the "NOISEMAP" computer software in the late 1960s. This software permitted the first routine construction of aircraft noise exposure contours. NOISEMAP inspired FAA to develop its own Integrated Noise Model ("INM") in the 1970s. Independent analyses were also conducted in the late 1960s by the California Department of Aeronautics (Wyle, 1971), leading to development of a system of integrated energy units (including SENEL and CNEL, later modified by EPA/ONAC into today's SEL and DNL noise metrics).

One of the more systematic approaches to quantifying aircraft noise during this era was adopted for California's airport noise regulations (Wyle, 1971). California's "Community Noise Equivalent Level" (CNEL) noise metric was based on a 24-hour summation of individual equivalent energy measures of individual aircraft noise events during day, evening, and night time periods. Noise events occurring during these three periods were characterized by their total acoustic energy, normalized to one second durations as Single Event Noise Exposure Level (SENEL) values. Before summing to yield a CNEL value, these SENEL values were assigned arbitrary "penalties" of 0, 5, and 10 dB, respectively, depending on their time of occurrence.

The Office of Noise Abatement and Control ("ONAC") of the U.S. Environmental Protection Agency explicitly recognized the California system:

> *"...one of the most important measures of environmental noise in terms of the effects of noise on man is the Energy Mean Noise Level, L_{eq}, which by definition is the level of the steady state continuous noise having the same energy as the actual time-varying noise" (von Gierke, 1973).*

In the same EPA report, von Gierke also noted that "to achieve an environment in which no more than 20%, of the population are expected to be highly annoyed and no more than 2% actually to complain of noise, the outdoor day-night average sound level should be less than 60 decibels.[21] Higher noise levels must be considered to be annoying to an appreciable part of the population, and consequently to interfere directly with their health and welfare."

[21] von Gierke's estimate of the prevalence of annoyance with aircraft noise at L_{dn} = 65 dB is within about one decibel of the ISO 1996-1 estimate (see Table 2). It was remarkably prescient for its time, and at odds with the later 1992 FICON dosage-response relationship, on which FAA continues to rely today.

9.1.3 *Noise Control Act of 1972 – 1979 Airport Safety and Noise Act*

Passage of the Noise Control Act of 1972 (Public Law 92-574), and creation of EPA's Office of Noise Abatement and Control, was the catalyst for much progress in the analysis and understanding of transportation noise effects. Two of ONAC's better-known publications were von Gierke's 1973 report on characterizing noise impact criteria in units of cumulative noise exposure, and EPA's 1974 "Levels of Noise Exposure Requisite to Protect Public Health and Safety with an Adequate Margin of Safety."

These early 1970s documents were followed by FAA's 1976 noise policy publication, which acknowledged the nationwide severity of the aircraft noise problem: "…aircraft noise adversely affects a significant portion of the nation's population." The prevalence of a consequential degree of noise-induced annoyance in a community eventually became the standard measure of transportation noise impact several years after Schultz's (1978) synthesis of a relationship between noise exposure and annoyance.

9.1.4 *Airport Safety and Noise Act – FICUN Report*

The 1979 Airport Safety and Noise Act ("ASNA") was the first federal legislation specifically addressing airport noise compatibility. ASNA required the Secretary of Transportation to "establish a single system for measuring noise that… has a highly reliable relationship between projected noise exposure and surveyed reactions of individuals to noise." Congressional mandates can direct executive branch agencies, but do not create objective facts or statistical relationships. If factors in addition to noise exposure are required to reliably predict the "surveyed reactions of individuals to noise," it is not within either Congress's or FAA's powers to mandate or create a relationship based on noise exposure alone.

In response to ASNA, FAA adopted the family of integrated energy noise metrics described in EPA's 1974 "Levels Document": sound exposure level (SEL) for single events, L_{eq} for cumulative exposure over arbitrary time periods, and Day-Night Average Sound Level (DNL) for 24 hour periods. As explained in Sections 3.1.1 and 3.1.2 and Appendix D, pre-existing interpretive criteria for aircraft noise impacts, originally expressed in units of CNR and NEF, were then transformed into units of DNL (Galloway, 2015).

Six years after the passage of ASNA, FAA implemented its provisions in FAR Part 150. FAR Part 150 contains no detailed information about the origins of FAA's land use compatibility recommendations, nor any rationale for defining the significance of noise impacts, in support of the DNL values displayed in Table 1 in Appendix A.

FICUN (the Federal Interagency Committee on Urban Noise), a self-organized group of federal agencies with interests in transportation noise but no explicit congressional charter to coordinate their policies, published a report in 1980 containing guidelines for land use planning and control. The FICUN (1980) report warned readers that unspecified federal agencies "have published policies and/or guidance on noise and land use" for purposes such as carrying out "public law mandates to protect the public health and welfare" and "to serve as the basis for grant approvals." Although the report noted that the guidelines did not consider the needs of communities for development, local zoning officials could be forgiven for mistaking the federal "recommendations" as all but compulsory. The language unambiguously suggests that federal authorities strongly discouraged certain land uses in neighborhoods near airports, and required building features such as noise insulation in some noise-exposed neighborhoods. The FICUN report provided no systematic rationale whatsoever for its recommendations.

FAR Part 150, published in final form in 1985, consolidated essentially all of the land use compatibility recommendations of the FICUN (1980) report into Table 1 of its Appendix A. A footnote to the table,[22] however, indicated that FAA's recommendations are subordinate to those of local authorities' judgments about the appropriateness of land uses. Part 150 elaborated further on FICUN's recommendations in several ways. For example, it was more specific than FICUN about the annualization of noise exposure criteria. Aircraft noise exposure modeling for civil airports was to be accomplished on an annual average day basis, not (as is still customary in Department of Defense noise modeling) on an average busy day basis. This specification minimizes the influence on predicted exposure levels of weekly and seasonal peaks in airport activity and prevailing wind directions, and of weather-related changes in aircraft performance.[23]

Part 150 also exempted from classification as "incompatible" any land use which generated more noise than aircraft overflights: "No land use has to be identified as noncompatible if the self-generated noise from that use and/or the ambient noise from other nonairacraft and nonairport uses is equal to or greater than the noise from aircraft and airport sources." In other words, Part 150 insists that aircraft noise exposure must exceed all other sources of environmental noise in a neighborhood, even if, decibel-for-decibel, aircraft noise is more annoying than other forms of noise exposure. In combination with the annualization of aircraft noise quantification, this exemption can be problematic in residential areas of moderate population density that are intermittently exposed to overflights.

According to Suter (1991), the Airport Noise and Capacity Act of 1990 (ANCA) was intended "to remove the issue of airport noise … as the principal barrier to airport expansion by "increasing federal control over local airports, and by doing away with the favorite whipping boy of the airlines, the 'patchwork quilt' of local noise rules." The aviation industry (and in particular, night air cargo operators)[24] were deeply concerned in the late 1980s by the agreement made by the proprietor of Stapleton Airport in Denver to facilitate construction of a new airport in adjacent Adams County. The City and County of Denver had to annex 45 square miles of the adjoining county, and agree to pay Adams County half a million dollars if DNL values in the future at any of 100 noise measurement points identified in an Inter-Governmental Agreement exceeded aircraft noise levels hitherto produced by Stapleton Airport.[25]

[22] "The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses."

[23] Aircraft departing airports in hot summer weather may overfly communities at lower altitudes than in cold winter weather.

[24] Recall that DNL penalizes noise generated between 10 PM and 7 AM by 10 dB with respect to noise generated during the day, as shown in Figure 11.

[25] Following lengthy rounds of litigation in which Denver repeatedly lost appeals of judicial rulings against it, the Colorado Supreme Court confirmed Denver's obligation to pay Adams county tens of millions of dollars in fees for its subsequent violations of the Inter-Governmental Agreement.

ANCA's provisions were designed to forestall any further impediments of this sort on airport expansion. Suter (1991) notes that the bill was passed without the benefit of any public hearings; that public input was not sought; and that industry lobbyists were closely involved in drafting and approving its language. FAR Part 161, the implementing regulation for ANCA, imposes Kafka-esque requirements on airports seeking FAA approval for operational restrictions.

9.1.5 *FICON Report*

FICUN disbanded shortly after producing its 1980 report. FICON, the Federal Interagency Committee on Noise, was formed in December of 1990 to review the manner in which noise impacts are determined and described and the extent of impacts outside of DNL 65 dB that should be reviewed in a NEPA document. Additional information about community response to aircraft noise had been collected, and dosage-response analysis of the sort pioneered by Schultz (1978) had gained increasing acceptance in the decade since publication of the FICUN report.

FICON's August, 1992 report broke little new ground. The dosage-response relationship that FICON endorsed again failed to recognize any form of source specificity in community response to transportation noise. FICON re-confirmed and extended the land use recommendations of the FICUN report, again without supplying any systematic rationale for them. FICON did recognize circumstances in which transportation noise impacts at levels below $L_{dn} = 65$ dB could be examined for NEPA-related purposes, but did not modify its definition of significant noise impact.[26]

FICON also rejected the use of complaints as a basis for assessing noise impacts, on the curious grounds that "Annoyance can exist without complaints and, conversely, complaints may exist without high levels of annoyance."[27] As noted by Fidell (2003), however, "…it is equally true that high levels of annoyance can exist at low levels of noise exposure, and low levels of annoyance can exist at high levels of noise exposure. The lack of a strong or simple relationship between noise exposure and its effects is neither a consistent nor a persuasive rationale for ignoring noise complaints in policy analyses." For purposes of predicting community response to aircraft noise, a variable (such as complaint rates) that lacks a strong correlation with annoyance is in fact desirable, because it may explain variability in relationships between noise exposure and adverse community response apart from that which can be attributed to annoyance prevalence rates.

9.1.6 *Post-FICON – present*

FAA regulatory policy has not substantively changed since the FICON report. A new embodiment of the FICUN and FICON groups, the Federal Interagency Committee on Aircraft

[26] Pages 3-5 and 3-6 of the FICON report identify these circumstances as increases of 3 dB in aircraft noise exposure at levels below $L_{dn} = 65$ dB, and of 1.5 dB in aircraft noise exposure at levels in excess of $L_{dn} = 65$ dB.

[27] More recently, the U.S. Court of Appeals in Washington, D.C. has ruled that FAA does, in fact, have the authority to regulate aircraft noise and flight paths on the basis of documented complaints.

Noise, was formed in 1993. Like its predecessors, FICAN is self-organized, and lacks any Congressional charter.

Major advances in prediction of community response to transportation noise have continued, however, with little regard for policy positions taken by U.S. regulatory agencies. European interest in assessing transportation noise impacts, which had lagged U.S. interest in earlier decades, increased considerably in the 1990s. Miedema and Vos (1998), for example, published persuasive arguments for greater annoyance prevalence rates at similar exposure levels for aircraft noise than for that of road and rail noise. By 2002, the European Union had adopted a European Noise Directive that recognized major differences in community response to aircraft and other transportation noise.

FAA published a draft 2000 policy statement in the Federal Register which included observations that "Based upon local factors, local jurisdictions may take a more comprehensive approach to aviation noise exposure below DNL 65" and that "Some communities are more noise sensitive than others." These observations do not seem to have affected subsequent FAA noise regulatory policy, however.

Working Group 45 of the International Standards Organization's Technical Committee 43 began a lengthy review of its 1996-1 standard ("Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures") about five years ago.[28] As part of its updating and revision of the standard, ISO has adopted several positions concerning the prediction of community response to transportation noise which conflict with those of FICON (1992).

More specifically, the revised 1996-1 standard indicates that community response to aircraft noise exposure differs from community response to road and rail noise. Whereas the dosage-response relationship in the FICON report did not distinguish between the annoyance of aircraft and other transportation noise sources, the ISO standard now indicates that decibel-for-decibel, aircraft noise is more annoying than road and rail noise (see Chapter 4). The dosage-response relationship for aircraft noise endorsed by ISO is now essentially identical to that of the European Union's Environmental Noise Directive.

The ISO standard also endorsed Community Tolerance Level (CTL) analysis, as described by Fidell *et al.* (2011). The research on which CTL analysis is based was funded by FAA through DOT's Volpe Transportation Systems Center. CTL analysis explains half again as much variance in the relationship between cumulative noise exposure (as measured by DNL) and the prevalence of aircraft noise-induced high annoyance in communities. It does so by explicitly accounting for community-specific differences in response to noise exposure, as described in Appendix B.

FAA's reliance on the dosage-response relationship in the FICON report for predicting community response to aircraft noise exposure is now in conflict with the international scientific consensus. FAA will very likely be compelled to modify its technical position on the prediction of community response to aircraft noise. Whether it will also modify its policy judgments remains to be seen.

[28] The revised standard is currently in the final stage of editorial proofreading, and is to be published shortly without any further technical changes.

10 APPENDIX B: SOME BASICS OF DECIBEL NOTATION AND RELATIONSHIPS AMONG NOISE METRICS

10.1 Linear vs. Logarithmic Measurement Scales

Measurement scales can make it convenient to express measured quantities in either absolute units, or as ratios. The former type of scale is usually referred to as "additive" or "linear"; the latter type of scale is usually referred to as "multiplicative" or "ratio." The type of measurement scale used to express quantities of interest depends in part on the range of measurements to be made. Consider how *in*convenient it would be for traffic signs to warn drivers that the next highway exit is 126,720 inches (2 miles) ahead, or that their destination city is 6,336,000 inches (100 miles) distant.

Familiar sounds can vary simultaneously and enormously in frequency and sound level. The sound pressure of a sound that is barely audible can be 1,000,000,000,000 – twelve orders of magnitude – smaller than that of a sound that is painfully loud. A measurement scale that preserve *ratios* of sound pressures, rather than absolute units, is much more convenient for aircraft noise measurement over the enormous range of sounds levels to be expressed. For purposes of measuring aircraft noise, it is much more convenient to express sound pressures as ratios; for example, by indicating that an overflight creates a million or a billion times more acoustic energy than a very faint sound.

Measurement scales with which the public is most familiar preserve absolute differences in magnitude, rather than *ratios* of differences. Because ratios are conveniently expressed in logarithmic notation, a brief review of the basics of logarithms is helpful. The notation $\log_{10}(100) = 2$ is simply a way to say that raising 10 (the base of the logarithm, shown as a subscript) to the second power (10^2) yields 100. Likewise, $\log_{10}(1{,}000{,}000) = 6$ means that 10 raised to the sixth power (10^6) is 1,000,000, and so forth. Figure 8 illustrates the relationships among ratios, powers of ten, and decibel notation.

Measuring quantities in units of ratios implies a comparison between a sound of interest (in the numerator of the comparison) and a reference sound of a known magnitude (in the denominator). The sound pressure of the reference in the denominator is by convention extremely small.[29] Even this much pressure is too big for many purposes, and so is divided by ten to yield a "*deci*bel." A decibel is just 10 times the $\log_{10}$ of a ratio, of the form 10 $\log_{10}$ (sound pressure of interest/reference sound pressure).

Logarithmic arithmetic differs from linear arithmetic because exponents are not additive. Adding one million (one followed by six zeroes) to one million yields two million, not a million million (a trillion, or 1 followed by twelve zeroes; that is, 1,000,000,000,000), just as adding 10^6 and 10^6 yields $2*10^6$, *not* 10^{12}. Similarly, adding 60 dB to 80 dB does not yield 140 dB, but only little more than 80 dB – just as the sum of a million and a billion (1,000,000 and 100,000,000) is a number only slightly greater than a billion.

[29] The reference pressure for sounds measured in air is 20 μPa – twenty millionths of a Pascal. A Pascal is defined as a Newton per square meter, and a Newton is the force required to accelerate one kilogram by one meter per second.) In English units, the reference sound pressure is about twenty *millionths* of a pound per square inch.

Ratio	Example	Power of 10	10 log (decibel) Notation
1:1		0	0 dB
10:1		1	10 dB
100:1		2	20 dB
1,000:1		3	30 dB
10,000:1		4	40 dB

Figure 8: Illustration of relationships among ratios, powers of ten, and decibels. (Recall that any number raised to the zero power, such as 10^0 is, by definition 1.)

Likewise, adding 60 dB and 60 dB yields only 63 dB, *not* 120 dB. This is because $\log_{10}(2) = 0.3$ (ten raised to the 0.3 power, or $10^{0.3}$, is 2.) By extension, two doublings of 3 dB, such as the addition of (60 dB + 60 dB = 63 dB) to (60 dB + 60 dB = 63 dB) = 66 dB. In other words, the decibel sum of four identical noises, each at a level of 60 dB, yields only 66 dB, *not* 240 dB.

10.2 Summation of Sound Exposure Levels to Calculate DNL values

A DNL value for aircraft noise exposure may be thought of as a summation of the sound exposure levels of multiple individual aircraft overflights. The concept of a sound exposure level (SEL) is illustrated Figure 9. Like a DNL value, an SEL value is sensitive to all of the acoustic energy occurring over a specified time period.[30] In effect, an SEL measurement "squeezes" all of the aircraft noise measured over the course of an overflight into a one second time period. This means that SEL values for overflights lasting more than one second are greater numerically than the maximum level actually observed during the course of the overflight.

[30] In the case of an SEL value, the time period is one second. In the case of a DNL value, the time period is 24 hours, further divided into 15 hour "daytime" and 9 hour "nighttime" time periods.

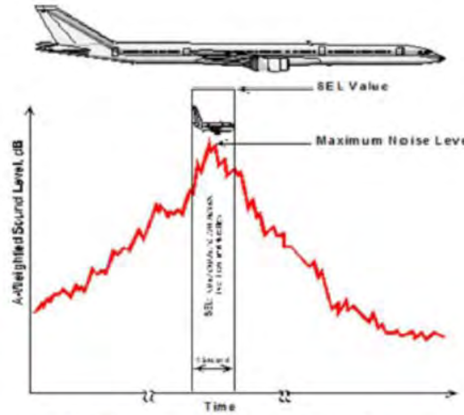


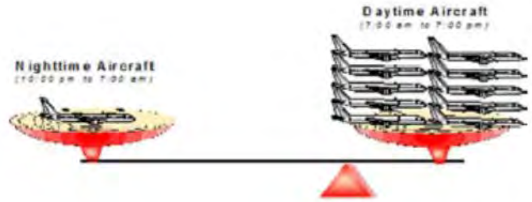
Figure 9: Illustration of concept of a sound exposure level

Sums of SEL values follow the rules for logarithmic addition described above. Thus, the SEL created by two identical aircraft overflights occurring at precisely the same time will result in an SEL value measured at the same point on the ground that is 3 dB greater than that created by a single overflight. The SEL created by four identical aircraft overflights occurring at precisely the same time will result in an SEL value 6 dB greater than that of a single overflight; and so forth. The sum of multiple SEL values yields an "equivalent energy" metric, represented symbolically in mathematical expressions as L_{eq}.

Because DNL is normalized to a 24 hour time period, the simple sum of SELs (which are normalized to a one second time period) must be adjusted by the number of seconds in a day. The number of seconds in a day (86,400, or 60 seconds x 60 minutes x 24 hours) equals 49.4 dB when represented in logarithmic notation as $10 \log_{10} (86{,}400)$. This value must therefore be subtracted from a day's summation of SEL values. Thus, a single daytime noise event with an SEL of 100 dB creates a DNL value of 50.6 dB. The sum of the SELs of two noise events, each of 100 dB, is 3 dB greater, so two such noise events in the course of a day create a DNL of 53.6 dB, and so forth.

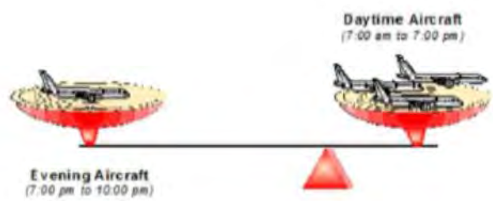
If a noise event occurs during night time (10 pm to 7 AM) hours, 10 dB is added to its SEL. Thus, a single night time noise event with an actual SEL of 100 dB creates a DNL of 60.6 dB, not 50.6 dB. Two night time noise events would likewise sum to a DNL value of 63.6 dB.

A simple summation of SEL values of multiple overflights over the course of a day therefore yields a 24 hour equivalent level, typically represented symbolically as $L_{eq(24)}$. $L_{eq(24)}$ values differ from DNL and CNEL values, however, because various weighting factors are added to numbers of noise events occurring at various times of day. The notion is illustrated in Figure 10 and Figure 11.



(DNL and CNEL)

Figure 10: For calculations of DNL and CNEL values, a single nighttime aircraft operation is assumed to produce ten times as much noise energy as ten daytime aircraft operations.



(CNEL only)

Figure 11: For calculation of CNEL values, a single evening aircraft operation is assumed to produce five times as much noise energy as three daytime aircraft operations.

In practice, DNL and CNEL values for aircraft noise exposure differ little – typically by 2 dB or less – because numbers of night time aircraft operations are a small fraction of daytime operations at most airports. (A European noise metric, known as L_{den} with slightly different definitions of penalties for noise created during some hours of the day, also differs slightly from both CNEL and DNL.) Numeric values of CNEL, DNEL, and DNL measures of aircraft noise are typically negligible for most practical purposes.

11 APPENDIX C: MODERN PREDICTION OF ANNOYANCE PREVALENCE RATES IN AIRPORT COMMUNITIES

The body of this report omits certain technical detail to facilitate general understanding of its contents. This Appendix contains additional detail. Portions of the text of the Appendix paraphrase that of Mestre *et al.* (2012) and of Fidell *et al.* (2014).

Fidell *et al.* (2011) and Schomer *et al.* (2012) have recently shown that a first-principles approach to explaining differences in community response to noise accounts for appreciably more variance in the association between transportation noise exposure and annoyance prevalence rates than purely descriptive (univariate regression-based) analyses (Wilson *et al.*, 2013). The additional variance is explained by a second independent variable, the Community Tolerance Level (abbreviated CTL, and represented symbolically in equations as L_{ct}).

The CTL approach follows from the observation that the rate of growth of community annoyance with transportation noise exposure closely resembles the rate of growth of loudness with sound level. A CTL value is an estimate of the DNL value at which half of a community describes itself as highly annoyed by transportation noise exposure. The range of CTL values derived from social survey measurements of reactions to aircraft noise in 44 communities extends over three orders of magnitude (from roughly 55 dB $\leq L_{ct} \leq$ 85 dB), equivalent to a factor of about 1000:1 in community-specific tolerance for aircraft noise exposure. - if one considers road (69 dB $\leq L_{ct} \leq$ 92 dB) and rail (61 dB $\leq L_{ct} \leq$ 92 dB) studies as well (Schomer *et al.*, 2012) The range of CTL values for all transportation sources extends over a range of 37 dB - a factor of about 5000:1 in energy (55 dB < All L_{CT} < 92 dB).

Annoyance prevalence rates in CTL analyses are predicted as

$$\text{Percent (Highly Annoyed)} = e^{-(A/m)}, \qquad \text{(Eq. C-1)}$$

where A is a scalar, non-acoustic decision criterion originally described by Fidell et al. (1988),

m is an estimated noise dose, calculated as

$$m = (10^{(DNL/10)})^{0.3} \qquad \text{(Eq. C- 2)}$$

and CTL is calculated from A as follows:

$$CTL = 33.3 \log_{10} A + 5.32 \qquad \text{(Eq. C-3)}$$

The value of A, a non-acoustic decision criterion, and hence of CTL, reflects the non-dose-related factors which influence annoyance prevalence rates in a community.

The value of A in a given community is that which minimizes the root-mean-square error between predicted (per Eq. 1) and empirically measured annoyance prevalence rates (Green and Fidell, 1991; Fidell *et al.*, 2011). Since m is just a transform of DNL, a quantitative estimate of the tolerance parameter, A, can be derived from knowledge of %HA and DNL at an interviewing site. The algebraic derivation of A from Eqs. C-1 and C-2 is straightforward. It begins by taking the natural logarithm of both sides of Eq. C-1, and substituting the definition of m (from Eq. C-2), yielding

$$-\ln [p(HA] = A/(10^{(DNL/10)})^{0.3} \quad \text{(Eq. C-4)}$$

Taking 10 log10 of both sides of the equation produces

$$10 \log_{10} \{-\ln[p(HA]\} = 10 \log_{10} A - 0.3 \text{ DNL} \quad \text{(Eq. C-5)}$$

Adding 0.3 DNL to both sides and rearranging terms then yields

$$10 \log_{10} A = 10 \log_{10} \{-\ln[p(HA]\} + 0.3 \text{ DNL} \quad \text{(Eq. C-6)}$$

The empirical distribution of community-specific A values can be determined by means of these equations directly from databases of community-specific social survey findings, such as those published by Fidell *et al.*, 2011 (for aircraft). The distribution of A values is shown in Figure 12, from Fidell *et al.*, 2014.

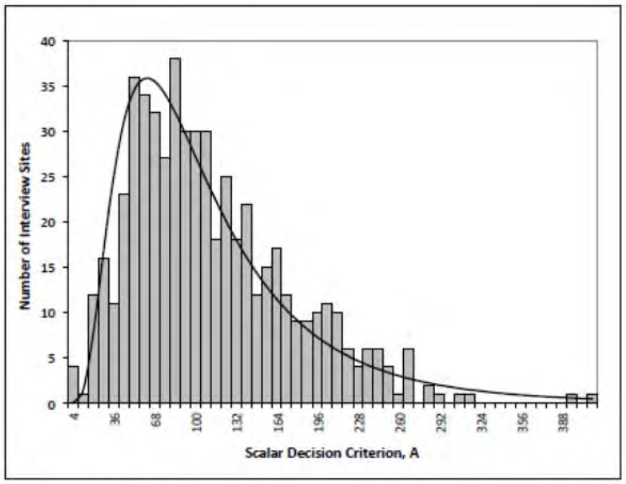


Figure 12: Histogram of scalar quantity, A, in 44 communities exposed to aircraft noise.

Figure 12 shows that the distribution of tolerance for aircraft noise exposure among communities is highly skewed. A few communities are highly tolerant of aircraft noise exposure, but that most are relatively intolerant. Predictions of community response to aircraft noise exposure which fail to take the shape of this distribution into account – *i.e.*, those which apply only to a hypothetical community of average tolerance for aircraft noise – are likely to be

appreciably in error in most communities. Conversely, regulatory policy that ignores *bona fide* differences across communities in tolerance for noise exposure cannot have uniform effect nationwide.

Table 3, from Fidell *et al.* (2014), illustrates this point for three communities: one that is one standard deviation *less* tolerant of aircraft noise than average ("-1σ"); one of average tolerance for aircraft noise ("mean"), and one that is one standard deviation *more* tolerant of aircraft noise than average ("+1σ"). According to ISO 1996-1, FAA's current definition of significant noise impact (L_{dn} = 65 dB) protects only 53% of the residents of the first community from exposure to highly annoying aircraft noise, but 86% of the residents of the latter community from exposure to highly annoying aircraft noise.

Table 3. Percentages of residential populations of communities of varying tolerance for noise exposure protected from exposure to highly annoying aircraft noise for various definitions of significant noise impact

	% OF POPULATION PROTECTED FROM HIGH ANNOYANCE		
DNL	CTL = 66.3 (-1σ)	CTL=73.3 (mean)	CTL=80.3 (+1σ)
65	53	71	86
60	66	80	94
55	78	91	98
50	88	97	100
45	95	99	100

12 APPENDIX D: RATIONALE FOR FAA LAND USE COMPATIBILITY RECOMMENDATIONS

All regulation is intended to balance conflicting societal interests. In the case of aircraft noise regulation, the conflicting interests include satisfying demand for air transportation services, maintaining the habitability of residential neighborhoods near airports and the integrity of local government tax bases, and protecting both public investment in airport infrastructure and private residential property values.

Figure 13 depicts FAA's view of the proper balance between these interests. FAA places the fulcrum – the level of noise exposure which it believes strikes the appropriate balance between aviation-related and community interests – at L_{dn} = 65 dB. At this level of noise exposure, FAA (erroneously, as explained in Chapter 4) believes that 12.3% of the residential population is highly annoyed by *all* transportation noise exposure.

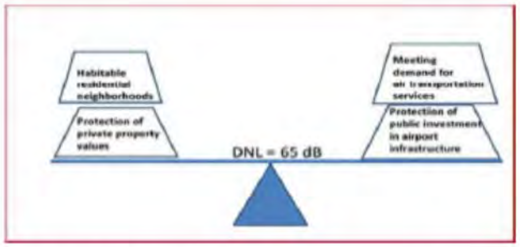


Figure 13: FAA view of the correct balance between community and airport interests.

FAA routinely expresses the significance of noise impacts indirectly, as a magnitude of noise exposure, rather than as a magnitude of noise effect (for example, as a prevalence of high annoyance). Fidell *et al.* (2014) note that this practice is a form of shorthand that focuses attention on noise exposure *per se*, rather than on its effects – even though the plain object of regulation of aircraft noise is to identify and control noise impacts. Indirect expression of noise impacts is also an impediment to public understanding of FAA definitions of their significance. While few members of the public fully understand decibel notation and decibel arithmetic, a great many appreciate what it means to be annoyed by aircraft noise.

The primary goal of FAA land use compatibility recommendations is to protect public investment in airport infrastructure. FAA's "compatibility" guidelines suggest land uses that do not threaten the continued operation and expansion of airports, not land uses that preserve neighborhood amenities and residential quality of life. FAA has never had a legislative charter to protect the habitability of residential neighborhoods, nor to balance aviation industry interests against community interests.

As used by FAA, the concept of land use compatibility is not a reciprocal one. The one-way nature of FAA's land use compatibility guidance is readily apparent from official statements such as the following:

> *"Many [local officials] are not clearly aware of their responsibility to protect the local airport from adjacent non-compatible development that can slow or even halt airport growth. All too often, in jurisdictions around the nation, we see residential development around airports that is not compatible with current or projected noise impacts." (Dykeman, 1997)*

> *"State and local governments and planning agencies must [emphasis added] provide for land use planning and development, zoning, and housing regulation that will limit the uses of land near airports to purposes compatible with airport operations." (Dykeman, 1997)*

In other words, even though FAA has no authority over local land use decisions, the agency subordinates community interests to those of airports. FAA policy even asserts that it is the responsibility of local governments to actively restrict community development in order to facilitate unfettered airport operations and potential airport growth. This is a remarkably broad reading of the original 1958 Federal Aviation Act, let alone the post-Public Law 104-264 amendment which relieved the agency of responsibility for promoting civil aeronautics.

FAA's land use compatibility recommendations are set forth, among other places, in the 1985 publication of FAR Part 150 – the implementing regulation for ASNA. Table 1 in Appendix A of FAR Part 150 lists FAA's recommendations for land uses that do not threaten or impede airport operations or future growth of airports. The most relevant part of the table for the current discussion is that no residential land uses are considered to threaten continued operation and expansion of airports at noise exposure levels less than L_{dn} = 65 dB. (The table also recommends noise exposure levels considered suitable for non-residential land uses, such as commercial, industrial and recreational uses).

FAR Part 150 provides no systematic rationale, nor any objective analysis, nor documented evidentiary basis, nor technical justification, nor any other explanation of its recommendations. Instead, FAA typically characterizes its land use compatibility recommendations as "widely recognized" and "generally accepted," without documenting why or by whom the agency believes that they are recognized and accepted.

The lack of a systematic rationale in FAR Part 150 for land use compatibility recommendations is traceable to their wholesale adoption from prior practice and publications. Identification of DNL at 65 dB as the level of cumulative aircraft noise considered significant can be traced to the FAA's Aviation Noise Abatement Policy of 1976 and to the FICUN (1980) report. The Part 150 land use compatibility recommendations differ only in minor detail from those of FICUN's 1980 report, for example.

The recommendations in the FICUN report, in turn, are based on little more than custom and common practice, professional judgment, anecdotal military experience in the 1950s, and the opinions and intuitions of the World War II generation of acoustical consultants, first expressed in the 1950s and 1960s. These traditional value judgments lack meaningful scientific content.

Eagen and Gardner (2009) further note that:

"Review of the actions leading to adoption of DNL 65 land use compatibility guideline demonstrates that it was intended to be adjusted as industry needs changed (in particular, as technology improvements resulted in quieter aircraft). In addition, adoption of the DNL 65 guideline in the 1970s and 1980s reflected a compromise between what was environmentally desirable and what was economically and technologically feasible at the time."

As noted above, even though regulation of aircraft noise exposure is intended to manage and control aircraft noise effects, cell entries in Table 1 of FAR Part 150 quantify "compatibility" indirectly; that is, in units of noise exposure, rather than in units of noise effects. (As discussed in Section 2.5.3, conversion from noise exposure units to the prevalence of noise exposure in communities is accomplished by means of a dosage-response relationship that transforms noise exposure into the prevalence of a consequential degree of annoyance in communities.)

The table entries indicate that FAA considers residential land uses as "compatible" with airports at noise exposure levels as high as L_{dn} = 65 dB. Having been released by the U.S. Supreme Court of liability for aircraft noise damages in the 1962 Griggs v. Allegheny County[31] litigation, the Federal government has since been at pains to avoid incurring further liability. A footnote accompanying Table 1 in Appendix A of FAR Part 150 therefore states that:

"The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses."

The language of this footnote indicates that FAA recognizes that local land use decisions are the exclusive domain of local governments.

[31] Griggs v. Allegheny County established that the U.S. Government (which controls the movements of aircraft in flight) and airlines (which own airplanes) have *no* liability for aircraft noise damages. The Supreme Court ruling established that this liability belongs exclusively to airport proprietors.

13 APPENDIX E: DERIVATION OF NOISE EXPOSURE FORECAST EQUATIONS

This appendix provides the assumptions and constants used in the equation relating Noise Exposure Forecast (NEF) to Effective Perceived Noise Level (EPNL) and the number of daytime and nighttime operations producing identical EPNLs. This process is documented in Bishop & Horonjeff (1969). The basic equation relating these variables

$$NEF = EPNL + 10\ Log10\left[\frac{N(day)}{K(day)} + \frac{N(night)}{K(night)}\right] - C$$

Eqn. E-1

where: *NEF* = Noise Exposure Forecast, in dB
EPNL = Effective Perceived Noise Level, in EPNdB

K (day) was chosen so that for 20 movements of a given aircraft per daytime period (0700 to 2200), the adjustment for number of operations would be zero. Hence,

$$10\ Log\left[\frac{20}{K(day)}\right] = 0$$

Eqn. E-2

Therefore,

$$K(day) = 20$$

K (night) was chosen such that for the same average number of operations per hour during daytime or nighttime (2200-0700) periods the NEF value for nighttime operations would be 10 units higher than for daytime operation. Hence,

$$10 = 10\ Log\left[\frac{K(day)}{K(night)} \cdot \frac{9}{15}\right]$$

Eqn. E-3

Where: 9 and 15 are the number of hours in the nighttime and daytime periods respectively.

Therefore,

$$K(night) = 1.2$$

The value assigned to C was 75. Choice of this value was based upon two considerations.
First, it was desirable that the number assigned to the NEF values be distinctly different in magnitude from the effective perceived noise level so that there would be little likelihood of confusing effective perceived noise levels with NEF values. Second was the desirability of selecting a normalization factor that would roughly indicate the size of the NEF value above

some threshold value, indicating the emergence of the noise exposure levels which would have little or no influence on most types of land usage.

Substituting these three constants into Equation E-1 yields the following:

$$NEF = EPNL + 10\ Log\left[\frac{N(day)}{20} + \frac{N(night)}{1.2}\right] - 75$$

Eqn. E-4

Multiplying the terms inside the brackets by 20 and compensating for the multiplication outside the brackets produces:

$$NEF = EPNL + 10\ Log\ [\ N(day) + 16.67 \cdot N(night)\ ] - 10\ Log\ [20] - 75$$

Eqn. E-5

And:

$$NEF = EPNL + 10\ Log\ [\ N(day) + 16.67 \cdot N(night)\ ] - 13 - 75$$

Eqn. E-6

Resulting in:

$$NEF = EPNL + 10\ Log\ [\ N(day) + 16.67 \cdot N(night)\ ] - 88$$

Eqn. E-7

By comparison:

$$DNL = SEL + 10\ Log\ [N(day) + 10\ N(night)] - 49.4$$

Eqn. E-8

JDA Aviation Technology Solutions

O'HARE CROSSWIND/DIAGONAL RUNWAY LAYOUT AND USAGE

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3 June 2015

Contents

O'Hare Airport Crosswind/Diagonal Runway Layout and Usage

1. Background

Chicago designed its airport layout plan for the O'Hare Modernization Program (OMP) to ultimately include eight runways and three major new terminals (Terminals 4, 6, and 7)[1]. The OMP Master Plan called for the construction of four new runways[2], the extension of two existing runways[3] and the retention of two existing runways[4]. (See Exhibit 2 attached hereto).

In addition, as part of its OMP Master Plan, Chicago calls for the closure of existing Runways 14L/32R and 14R/32L. (See Exhibit 1 attached hereto).

This paper examines the question of whether Runways 14L/32R and 14R/32L should be closed.

While significant portions of the runway construction proposed in the OMP Master Plan have been built[5], serious questions have been raised as to whether the remaining proposed runway construction (the proposed construction of 9C/27C and the extension of 9R/27L) – as well as the construction of terminals 4, 6 and 7 – should proceed. FAA's current forecasts of long-term demand (years 2015-2040) are far lower than the forecasts that were used as the justification for the scope of the runway and terminal components of the OMP Master Plan. 1

Further, no progress has been made on the proposed construction of more than two million square feet of new terminal capacity (including Terminals 4, 6, and 7) that was a key component of the OMP Master Plan, tied to the justification for the new runway system. The central logic of the extensive OMP's proposed runway construction was to balance the added runway capacity with comparable terminal and gate capacity. If traffic growth on which the OMP is based is allowed to grow with the addition of even more runway capacity – without construction of terminal and gate capacity -- congestion and delay will simply be transferred from the runway system to the airport taxiways, ramps, terminals and gates. 2

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1. A graphic depiction of Chicago's Master Plan for the OMP – also known by the FAA and Chicago in FAA's EIS analysis as "Alternative C" – shows the ultimate proposed build-out of the new runways and the new terminals and is shown in Exhibit 2 attached hereto.
2. The new runways are 10R/28L, 10C/28C, 9C/27C, and 9L/27R.
3. The extensions of existing runways are at 9L/27R and at the runway originally designated as 9R/27L (now re-designated as 10L/28R).
4. Runways 4L/22R and 4R/22L.
5. New Runways 9L/27R and 10C/28C have been completed. Runway 10L/28R (formerly 9R/27L) has been extended; and Runway10R/28L is under construction and will be completed in 2015.

Comment	Response
1	Total annual operations is not the correct metric for evaluating the need for airfield capacity. Rather, peak period (e.g. peak hour and/or bank) operations and Instrument Flight Rules (IFR) weather conditions dictate the requirement for airfield capacity. The full parallel runway system, including Runway 9C-27C and the Runway 9R extension, is needed to efficiently and safely process demand. Construction of new runways takes many years to complete. The CDA cannot wait until peak hour delays become intolerable to begin construction. Therefore, it is prudent to construct in advance of rising delays and take advantage of a period of relatively low interest rates and favorable construction pricing by avoiding escalating construction costs. The CDA remains committed to the agreed schedule which is to complete Runway 9C-27C in 2020. Please also refer to response to Comment No. 3 in Section 3.
2	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.

Fortunately, the current FAA long-term forecast demand (2015-2040) is so far below the forecast demand on which the OMP runway and terminal design is based that the Runway system in place at the end of 2015 should be more than adequate to accommodate the FAA forecast demand. In a companion analysis[6], the JDA aviation team (Trani, Voss, Burzych and Del Balzo contributing) conclude that the year-end 2015 runway system – with the exceptions discussed below – is more than adequate to accommodate forecast demand for decades to come (until the mid 2030s). Indeed, the JDA team's analysis of data on current delays experienced at O'Hare concludes that a principal cause of current delays is the lack of gate capacity – not lack of runway capacity. In the near term, O'Hare's delays would be better addressed with a modest increase in gates than by adding more new runway capacity.

2

However, the proposed closings of Runways 14L/32R and 14R/32L raise separate but related concerns about capacity, safety and environmental impacts of the OMP runway design. This paper questions the wisdom of closing the 14/32 runways – either under the prospective year-end 2015 runway configuration or the full-build "end state" runway configuration. Specifically, the removal of the northwest/southeast diagonal runways (14L/32R, 14R/32L):

- Could negatively affect the safety of flight operations under adverse crosswind, tailwind and contaminated runway conditions;
- Would increase the potential for increased delays, arrival go-arounds, in-flight diversions to other airports and cancellations during a small but significant number of days where weather conditions make crosswind operations imprudent or undesirable. There will be significantly less flexibility to provide runways aligned with high wind, and
- Would prevent the distribution of operations to provide periodic noise relief to those communities now facing concentrated noise exposure under the operation of the east-west runways. From an environmental perspective, additional noise impacts will be shifted away from areas to the northwest and southeast of ORD and more heavily concentrated into areas directly to the west and east of ORD-areas already impacted with additional aircraft over flights, noise and emissions following the last two runway openings (10C/28C and 9L/27L).

3

The goal of the ORD OMP plan was to improve efficiency, namely runway capacity, throughput and delay reduction. Mayor Daley announced the OMP Master Plan, as depicted in Exhibit 2, in June 2001 and the runway layout continues to be developed as he first described. Some feel that if the local air traffic staff and other user groups had been afforded greater initial input, a more efficient design might have resulted. Dallas Ft. Worth Airport (DFW) has been cited as proof of concept for the OMP layout. DFW utilizes five parallel runways and two diagonal runways, with high operational efficiency. However, wind and other critical meteorological conditions are unique from airport to

6. *An Analysis of the Need and Justification for the Additional Runway (9C/27C) and the Runway Extension of 9R/27L at O'Hare*]

Comment	Response
3	As Runway 10R-28L and other new east-west parallel runways open, the use of Runways 14L-32R and 14R-32L will continue to decrease due to safety issues such as CRO, intersecting runway operations, and complex/irregular geometry. Retaining these runways provides construction challenges for the new east-west parallel runways and also increases operating and maintenance costs. Historical weather data, included as part of the EIS, show that the parallel runway system provides runway coverage on par with that of other large hub airports. Please also refer to response to Comment No. 6 in Section 3.

airport, as is the air traffic. O'Hare's air traffic volume is 25% greater than at DFW7. With its northern climate, close proximity to Lake Michigan and location within the jet stream, ORD is unusually susceptible to rapidly changing weather, strong, sustained crosswinds, frequent wind gusts, rain showers, snow events, icing conditions, thunderstorms and contaminated runways.

2. Changes Pending and Problems with Next New Runway

The closure of Runway 14L/32R is scheduled to begin in August 2015. Navigation equipment from Runway 14L/32R (i.e., ILS) is scheduled for relocation to the newly built Runway 10R/28L. The October 2015 Runway 10R/28L commissioning will likely preclude any serious reconsideration of the Runway 14L/32R closure.

There has been some uncertainty expressed within air traffic how they will actually use the new Runway 10R/28L in October 2015, that essentially replaces Runway 14L/32R. Its short length, remote distance from the terminals and close proximity to Runway 10C/28C will somewhat limit its practicality. An offset arrival approach is being evaluated for Runway 10R during east flow, which could accommodate additional arrivals over the Bensenville area. This may reduce or eliminate the need for departing traffic to share Runway 9R with arrivals, improving the surface issue that requires extra arrival spacing[8]. However, the practicality of using an offset approach, if needed, while conducting triple simultaneous approaches could be limited in poor weather. Also, some operations on Runway 10R/28L may intensify airspace conflicts with traffic operating at nearby Midway Airport. 4

Starting in October, Runway 28L will be assigned to some westbound departures in west flow operations, requiring those flights to make an unusually lengthy taxi, often stopping to cross two longer active runways on the way. Many pilots will likely decline its use, knowing instead they will be issued a shorter taxi and takeoff from a longer runway (22L or 28R). The line of sight problem with Runway 10R/28L will require a dedicated (third) air traffic control tower to operate it, increasing controller and supervisory staff by adding approximately fifteen new air traffic controllers. This has already added $30 Million to taxpayer facility costs for the new tower, with additional federal payroll and benefits costs of approximately $3 Million annually, and in practice, will only be useable for at most a few hundred aircraft for a maximum of 16 hours each day. 5

3. Impact of Winds and Weather on Runway Layout and Selection

Surface winds are a key issue in airport flight operations. As wind velocity increases, aircraft must operate into the wind. Light winds (i.e., less than 5 knots or 5.7539mph) are usually insignificant and provide maximum flexibility; higher velocity crosswinds or

7. Total airport operations, 2012 through 2014. Source: FAA Aviation System Performance Metrics.
8. During east flow, there are difficulties crossing aircraft near the approach end of Runway 9R, especially arrivals from Runway 9L, as they conduct the lengthy taxi inbound from the north runway to the terminals.

Comment	Response
4	The use of Runway 10R-28L was evaluated in the FAA's on-going EIS Written Re-Evaluation and discussed in materials published by the FAA on its website on July 17, 2015. In east flow configurations, Runway 10R will be utilized as a primary arrival runway. Due to the proximity of Runway 10R to existing Runway 10C, it will be necessary for aircraft landing on Runway 10R to utilize an offset approach rather than a straight-in approach. It is expected that in west flow configurations Runway 28L will serve as a supplemental arrival runway. Utilizing Runway 28L as a primary arrival runway would severely limit the departure throughput on primary departure Runway 22L. Therefore, it is expected that while Runway 22L departure operations are in effect, Runway 28L arrivals will be minimized. Completing the rest of the full parallel runway system, in addition to the benefits previously noted, allows the arrival restrictions on Runway 28L to be minimized by shifting departures from Runway 22L to Runways 27L and 28R. Please also refer to response to Comment No. 13 in Section 3.
5	The use of Runway 10R-28L was evaluated in the FAA's on-going EIS Written Re-Evaluation and discussed in materials published by the FAA on its website on July 17, 2015. Per those documents, Runway 28L is not expected to serve as a departure runway under normal operating conditions. Please also refer to response to Comment No. 13 in Section 3.

tailwinds are significant and can constrain operations. Defining the optimal airport design, dynamic runway configuration and actual pilot or aircraft limits is complex. Flight safety is often stated as aviation's primary priority, but in reality some risk is absorbed in the interest of practicality, control of costs and operational efficiency.

There are several key policies and factors guiding the actual limits of adverse crosswinds or tailwinds that combine to determine whether an acceptable level of safety is achieved. Winds are rarely a direct headwind (blowing from the runway heading) or a direct crosswind (blowing perpendicular to, or 90 degrees from runway heading). Decreasing the angular distance between a direct crosswind and runway heading reduces the effective crosswind, or if behind the aircraft and its direction of flight, increases the effective tailwind[9].

Aircraft manufacturers do not prescribe maximum crosswind limits for the aircraft they build. Instead, they conduct certification testing on new aircraft models and publish the maximum crosswind in which test pilots have demonstrated a successful landing. In ideal conditions, most transport category aircraft can "demonstrate" or tolerate crosswinds from 27 to 40 knots, and tailwinds of as much as 15 knots. (1 knot = 1.15078 miles per hour, or 30 knots = 34.5 mph). It is important to note that intermittent wind gusts are often higher than the reported airport (centerfield) wind value and must be used by air carriers to determine aircraft performance limits dictated to their pilots.

O'Hare Airport wind analysis has been conducted by Dr. Toni Trani on the JDA Aviation Technology Solutions team, in accordance with FAA Advisory Circular AC-150/5300-13A. Dr. Trani studied 14 years of data and evaluated whether FAA design criteria would be met with the removal of Runways 14/32. The airport runway design criteria for ORD (D-VI) shows that without Runways 14/32, historic wind rose crosswinds (for single directional runways) of less than 20 knots at ORD occur at least 95% of time, which appears to satisfy the minimum criteria specified in the Advisory Circular guidance. Dr. Trani found that crosswind coverage, with existing runways, including Runways 14/32, meets the design criteria 100% of the time. Without Runways 14/32, crosswind coverage drops to 99.92%.

While lack of crosswind coverage .08% of the time (7 hours annually) might seem insignificant, this does not include wind gusts or other conditions, which sometimes renders certain runways unusable. There are a multitude of factors, including aircraft weight, loading (center of gravity), runway slope and grooving, equipment outages, wet runways, standing water or accumulated snow, low visibility, pilot restrictions (i.e., new to the aircraft) and other carrier specific regulations. While building a runway layout incapable of accommodating crosswind landings may be acceptable at smaller airports, one must question the wisdom of assuming such risk at the world's busiest airfield. For example, if using Runway 28C (heading 273) at ORD, with wind from 320 degrees at 30 knots, the crosswind component is reduced to 19 knots. While 19 knots appears within tolerance according to the FAA's minimum standards, the maximum crosswind

9. Though light tailwinds are not necessarily dangerous, aircraft performance decreases and operational risk increases, especially when other conditions exist such as a short or contaminated runway.

component for many airliners decreases to just 15 knots (or a 10 knot tailwind) when combined with low visibility (i.e., ¾ mile) or with wet runways. If Runways 14/32 are closed, during certain circumstances, it will be insufficient to have relied upon the FAA's minimum design criteria and unreasonable to consider O'Hare an "all weather airport."

FAA's National Safety and Operational Criteria For Runway Selection and Noise Abatement Runway Use Programs (Order 8400.9, pending in draft for implementation later this year) will soon limit Control Towers runway selection (assigning runway use) with crosswinds greater than 25 knots, including gusts- and just 15 knots if the runway is wet, in some locations even less. However, until then, it does not appear that historical wind analysis or tower runway selection included gusts. If so, this is a serious omission. Worse, there is sometimes a tendency for Control towers to issue inexact winds or continue utilizing the highest capacity runway configuration in borderline wind situations, until multiple pilots begin refusing to use the misaligned runways.

Pilots are the final authority to determine whether the winds are within their own limits and can refuse runway assignments that appear within the FAA's design, ATC or individual airline limiting criteria. Air Traffic Controllers suddenly trying to accommodate airborne pilot refusals with an approach to another runway can be difficult, especially if the only alternative is to land in opposite direction to the flow of other traffic. All involved know that refusals can force an untimely runway configuration change, causing the air traffic situation both in the air and on the surface to become complex, even hazardous. Unfortunately, this can cause pilots to be hesitant refusing a runway they'd prefer not to use, instead landing on a runway misaligned with strong prevailing wind conditions. Runway excursions (accidents) have sometimes resulted.

At Chicago Midway Airport, an aircraft accident occurred on December 8, 2005 involving a Boeing 737 landing on a runway not aligned into the wind. The winds were found as a contributing cause of that crash, in which there was one fatality. There was low visibility with snow, a contaminated runway and a tailwind component of 9 knots. The aircraft overran the runway and crashed through the airport perimeter fence and onto a public roadway adjacent to the airport.

A recent example of questionable runway usage occurred at O'Hare on May 17th, 2015. Runway 14R/32L was temporarily closed. In the late morning (i.e., 1130am), winds were strong from the southeast, reported as 160 degrees at 19 knots, gusting to 26 knots. The runway configuration was west flow, landing Runways 27R/L and 28C, departing Runways 22L and 28R (intersection departures). If Runway 14R/32L were available, the use of Runways 14R/14L would have been preferable from a flight safety standpoint[10]. Instead, aircraft were continually assigned runways with a 9 knot tailwind and at peak, a crosswind/quartering tailwind in excess of 30 knots. Even the use of an east flow

10. ATC is often hesitant to use a runway configuration most aligned with the wind, as a reduction in airport throughput (capacity) occurs when using fewer runways, such as when landing and departing Runways 14R/L. Switching from west to east flow drops arrival capacity by approximately 14 aircraft an hour in good weather and by 32 aircraft an hour in instrument (weather) conditions.

configuration would have upgraded operational safety. Fortunately, no mishaps were reported.

It is difficult to forecast the precise frequency in which ORD's planned runway layout will be inadequate. While there is extensive historic weather data available, there are limitations to its usefulness. The duration of precipitation, contaminated runways and wind gusts are either not recorded or not specifically correlated to wind data within hourly or special weather observations. However, Dr. Trani's historical analysis shows that strong winds (above 17 knots) favoring Runways 14/32 (140 to 160 degrees and 320 to 340 degrees) are likely to occur 69.94 hours annually (nearly 3 days each year, though not all at once). Without extensive additional analysis, one can only speculate the frequency within that time when the other constraints might eliminate the ability of aircraft to land or depart. It will almost certainly occur, as will pilots attempting to land with aircraft performance limitations pushed to their limits.

This is not insignificant. As the airport with the highest volume of aircraft operations in the entire world, the impact of not having usable runways for hours (or even days) on end is substantial. Such restrictions to capacity, albeit temporary can quickly escalate to hundreds or thousands of hours of lengthy flight delays, mass cancellations and the inability to promptly transport people or cargo through O'Hare. If sustained, the ability of smaller alternate airports to accommodate and service diversions, such as Rockford, Milwaukee, Madison and Indianapolis, becomes impractical. The airspace and air traffic system can become strained, particularly if occurring simultaneously with other complex conditions, such as thunderstorms or snowstorms. The FAA has an efficient traffic management system in place that can force arriving aircraft to be held or metered before departing for ORD. But if the runways available are not adequately oriented into the wind, all aircraft could be held, waiting for more favorable winds or conditions.

4. Converging Runway Operations Rule Changes Suddenly Constrain ORD Departures

Runway 32L historically has been used as a primary departure runway (especially Runway 32L from Intersection T10). In April 2014, following the nationwide implementation of a procedure known as converging runway operations (CRO), departures from Runway 32L were dramatically reduced. Though there was considerable debate and disagreement, FAA Headquarters chose to implement a modified interpretation of separation requirements that adversely affects the simultaneous usage of Runway 32L, Runway 27L and 27R. This also impacts departures from Runway 4L, though not significant in this discussion.

These changes were made by the FAA following a recommendation from the National Transportation Safety Board, concerned with separation incidents at several other airports involving rare but unexpected arrival go-arounds to one runway, not being

6

Comment	Response
6	The FAA has also severely limited the operational use of Runway 14L-32R since Runway 9L-27R was commissioned and therefore, if use of the runway was limited to periods of low activity, the runway provides minimal, if any, noise benefits to the surrounding communities. The industrial corridor to the northwest of the airport is not dependent on the use of this runway and can be utilized by the north parallel runways. In order to utilize Runway 32L for departures, air traffic control must severely limit the number of operations the parallel runways on the north airfield can handle, eliminating gains in airfield efficiency that the parallel runway system provides. Please also refer to response to Comment No. 6 in Section 3.

positively controlled and separated from departures on another runway[11]. This impacted operations on runway ends within 6,000' of one another. The end of Runway 32L and 27R were affected, since these are 5898.4' apart, or within just 102' of being exempt from this restrictive procedure. The FAA has stated that reducing runway length to circumvent this restriction is not an option.

6

Runway 14R/32L does not intersect any other runway, meaning that it was an independent, or "free roll" operation until CRO. Runways 32L, 27L and 27R must now be operated as if they actually intersect. The intersecting runway rule requires a Runway 32L departure to be past both Runway 27R and 27L extended centerlines prior to a 27L or 27R arrival reaching the approach end threshold of those runways. This is almost impossible to manage during busier arrival traffic periods. In response, O'Hare Air Traffic Control Tower has essentially abandoned the routine use of Runway 32L. Now, more than 90% of aircraft departures in west flow are directed to Runways 28R and 22L.

Since the opening of runway 27R (the far north runway) the usage of Runways 14L/32R has also diminished. Runway 14L/32R intersects two other runways (9L/27R and 9R/27L- see Exhibit 1). This precludes use of Runway 14L/32R simultaneously with those runways in either a full west or east flow operation, unless traffic on the other two runways are held. Occasionally during light traffic periods, it is feasible to briefly slow traffic to the other runways to allow an isolated operation on Runway 14L or 32R, such as with an emergency or for a VIP operation.

5. Additional Benefits if Runways 14/32 are kept open

Even though current usage is infrequent as measured by duration or traffic volume, having use of these runways is operationally advantageous and provides a viable option that otherwise would not exist. For instance, there are situations in which a few flights that cannot accept a borderline crosswind or tailwind can easily be segregated and the primary runway configuration kept in place. Another beneficial option during west flow operations is to carefully manage the use of Runway 27R (the far north runway), which is already used as an "overflow" arrival runway. Many times during the day- such as during slower arrival traffic periods- it is unused. Chicago TRACON (Elgin, IL) Controllers favor assigning arrivals to the "inboard" runways, closest to the terminal, when only two arrival runways are needed. During these times the tower can use runway 32R for departures, which relieves pressure off of Runways 22L and 28R. Even

7

11. In response to NTSB recommendation A-13-024, the FAA initially circulated proposed CRO rulemaking to include runway ends within *two* nautical miles. Following significant opposition from airports, airport users and local air traffic facilities, the FAA revised that criteria and reduced affected runways to those converging within *one* nautical mile (6000').

Comment	Response
7	As Runway 10R-28L and other new east-west parallel runways open, the use of Runways 14L-32R and 14R-32L will continue to decrease due to safety issues such as CRO, intersecting runway operations, and complex/irregular geometry. Retaining these runways provides construction challenges for the new east-west parallel runways and also increases operating and maintenance costs. For these reasons, it is not feasible or prudent to retain the use of these runways. Please also refer to response to Comment No. 6 in Section 3.

though Runway 32R intersects with Runway 27L, it is manageable with careful timing of Runway 32R departures.

Use of Runway 32L for departures (with Runway 27R inactive) is also an option, though still affected by CRO. There is existing technology that would enhance this operation, the most common of which is known as the Arrival/Departure Window. This assists controllers to optimize the timing of departures using a technological enhancement to the tower radars, minimizing losses in efficiency while still precluding potential conflict with converging arrivals that might go-around. If Runway 14R/32L is kept open, it could then be used for some departures during periods of light arrival traffic, providing a shorter taxi for most aircraft. It is not uncommon for air traffic at many locations to alternate configurations based upon traffic volume patterns for the best efficiency. 8

Having "extra" runways can enhance air traffic operations in other ways. For example, Runways 14/32 can be used during snow events to stage the large contingents of equipment needed to keep the runways and taxiways open, without blocking ramps or taxiways. ORD now has limited ability to efficiently manage traffic with a runway closure (i.e., pavement failure or disabled aircraft on Runway 28R or 22L). Runways 14/32 can be used to land emergency aircraft that sometimes have mechanical issues preventing them from clearing a runway after landing, or contaminating a busier runway with hydraulic fluid, reducing the urgency of the subsequent cleanup. Even if a runway is not being used for arrivals or departures, it can still be used for taxiing aircraft or to park airplanes encountering weather delays or gate holds. The OMP plan includes closing many of the large hold pads on the existing airport. Leaving each of the diagonal runways open provides excellent alternatives as these hold pads close. 9

It is important to note that preserving the 14/32 runways does not interfere with construction of the Western terminal.

6. Balance Noise Impacts

Without Runways 14/32, even during the "Fly Quiet" overnight hours, ORD will use a parallel east-west operation, which concentrates noise during this especially sensitive period entirely on the east and west sides of the field. Aggravating the noise balance is the fact that the far north and south side runways (Runways 9L/27R, pending 10R/28L) are not open during "Fly Quiet" hours. Portions of those runways are not visible from the center tower. If the tower cannot see any part of a runway, the runway is considered not usable. For this reason the FAA has built two separate, smaller towers to work these two runways and the surrounding taxiways. The two smaller towers are closed during the overnight hours. Most of the communications, lighting and other equipment are controlled from the center tower, which requires the overnight operations to be run from that facility. Although Runways 4L/22R and 4R/22L are often available, these runways are short (7500') and often not long enough for the wide body cargo traffic that is common overnight. 10

Comment	Response
8	Parallel runway configurations reduce the impacts of CRO. While opportunities may exist for short time periods in today's traffic demands and schedules, those periods of time will reduce as traffic grows. The full parallel runway system eliminates all CRO derived conflicts. Runway 9R-27L becomes the additional departure runway with the completion of OMP. Taxi time differences between Runway 32L and Runway 9R-27L would be negligible. Please also refer to response to Comment No. 6 in Section 3.
9	In the OMP final state, decommissioning of Runway 14R-32L provides additional taxiway structure. These taxiways provide the same storage availability for snow equipment with easier access other runways without the use of runways for other than intended purposes. Please also refer to response to Comment No. 6 in Section 3.
10	The CDA believes that evaluating runway utilization during Fly Quiet hours is an area of opportunity for beneficial noise relief, and will rigorously pursue it. Please also refer to response to Comment No. 8 in Section 3.

During overnight ("Fly Quiet" program hours, 10pm to 6am), normally only two runways are needed- one for arrivals and one for departures. During this time, either or both Runways 32R and 32L can be used without restriction, since most other runways are closed and CRO is not an issue. A typical overnight configuration with west winds is Runway 28C or 28R for arrivals and Runway 32R or 32L for departures. Runway 32R has extra value because it is 10,000' long, enough for wide-body, heavy jet departures, whereas several of the other runways are shorter. 10

7. Performance Metrics and Capacity

As expected, O'Hare's runway capacity initially increased following the opening of Runways 9L/27R, 10C/28C and the extension of Runway 10L/28R. Weather delays have trended downward, though certainly not by the 95% that Governor Ryan suggested when announcing his support for the OMP in October 2001 (see Exhibit 3, attached hereto)[12]. More recently, departure capacity gains have been sharply reduced by CRO, as has overall efficiency during east flow from the surface issues near the approach end of Runway 9R.

Average taxi-out times for departing traffic at ORD had generally been improving following the opening of Runway 9L/27R in 2006. But for the past several years, average taxi-out times have noticeably increased- from an average of 16.36' per aircraft in 2010 to 17.85' per aircraft in 2014, or in total, more than 10,950 additional hours of annual taxi-out time[13]. The current airport layout and CRO have constrained nearly all departures during West-flow to just two runways. (See Exhibit 4, attached hereto).

It has become apparent, however, that O'Hare's greatest capacity deficiency is not its lack of runways, but rather a shortage of available ramps, gates and terminals. This is frequently compounded by the airport's decision not to deice aircraft remotely, as practiced at nearly every other major airport. Delays for inbound aircraft often exceed 60 minutes while waiting for a gate to vacate. Clearly, this degrades customer satisfaction, adversely impacts airline operating costs, crew duty times, increases adverse environmental emissions and increases complexity for air traffic operations. 11

ORD arrivals are often subject to an extensive taxi-in after arrival, especially when landing on Runway 9L/27R. Worse, the average taxi-in times at ORD, which includes time spent waiting for occupied gates, has sharply increased- from 8.78 minutes per aircraft in 2010 to 12.24 minutes per aircraft in 2014, or in total, more than 25,400 annual hours of additional taxi-in time[14]. (See Exhibit 5, attached hereto). Other metrics measuring ORD's operational performance have shown similar trends. In the period

12. Annual comparisons of weather delays can be affected by such factors as overall traffic, scheduling, cancellations, construction, variances in severe weather and system performance.
13. Source: FAA, Air Traffic Activity System and Aviation System Performance Metrics.
14. Source: FAA, Air Traffic Activity System and Aviation System Performance Metrics.

Comment	Response
11	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.

4/1/14 to 3/31/15 vs. the same period in 2010-2011, cancellations at ORD increased by more than 21%[15].

In 2014, Runway 14R/32L was closed most of the year, due to a nearby taxiway construction project. This foretold some of the possible impact that may develop if Runways 14/32 are closed permanently. Diversions occur when an aircraft inbound to an airport instead diverts to another airport, typically because conditions at the intended destination are too adverse, including unfavorable wind or runway conditions. In the calendar years 2010 through 2013, O'Hare averaged a total of 998.5 arrival diversions annually. In 2014, there were 1,453 diversions, an increase of 45% over the previous four-year average[16]. The FAA does not record precisely how many of those diversions might have been affected by the closure of Runway 14R/32L, or by air traffic using runways or a configuration more favorably aligned with the wind. 12

8. Recommendations

13

- Immediately suspend and re-evaluate plans to close Runway 32R/14L and Runway 32L/14R, or to build Runway 27C/9C.
- Reevaluate runway alternatives considering major new issues not addressed in OMP planning including but not limited to:
  - Converging runway operations in collaboration with ORD Air Traffic Experts and FAA Headquarters; 14
  - Address surface operation limitations under active approaches in collaboration with ORD Air Traffic experts;
  - Capacity gains possible from NextGen precision navigation, and
  - Alternative analysis to determine the optimum runway configuration for safety, capacity and balancing noise impacts through collaborative community engagement.

15. Cancellations can vary based upon weather and unique situations, such as the October 2014 sabotage of a local air traffic control facility, as well as by operator (airline) business decisions.
16. Source: FAA, Air Traffic Activity System and Aviation System Performance Metrics.

Comment	Response
12	There is no evidence that the closure of Runway 14R-32L had any impact on deviations or cancellations at O'Hare. Those operations that would have requested Runway 14R-32L for operational needs would have had the option to request Runway 14L-32R. Please also refer to response to Comment No. 6 in Section 3.
13	As Runway 10R-28L and other new east-west parallel runways open, the use of Runways 14L-32R and 14R-32L will continue to decrease due to safety issues such as CRO, intersecting runway operations, and complex/irregular geometry. Retaining these runways provides construction challenges for the new east-west parallel runways and also increases operating and maintenance costs. For these reasons, it is not feasible or prudent to retain the use of these runways. Demand at the airport necessitates the construction of Runway 9C-27C, and the CDA remains committed to the agreed schedule in the EIS to complete the runway in 2020. Please also refer to responses to Summary Comment No. 6 in Section 3.
14	The CDA has been continuously evaluating the effects of CRO on the current airfield. However, one of the benefits of pursuing completion of the full parallel runway system is that the effects of CRO are minimized. Additionally, the CDA is evaluating alternatives to rotate runway configurations under the Fly Quiet program. These alternatives are discussed further in a separate document.

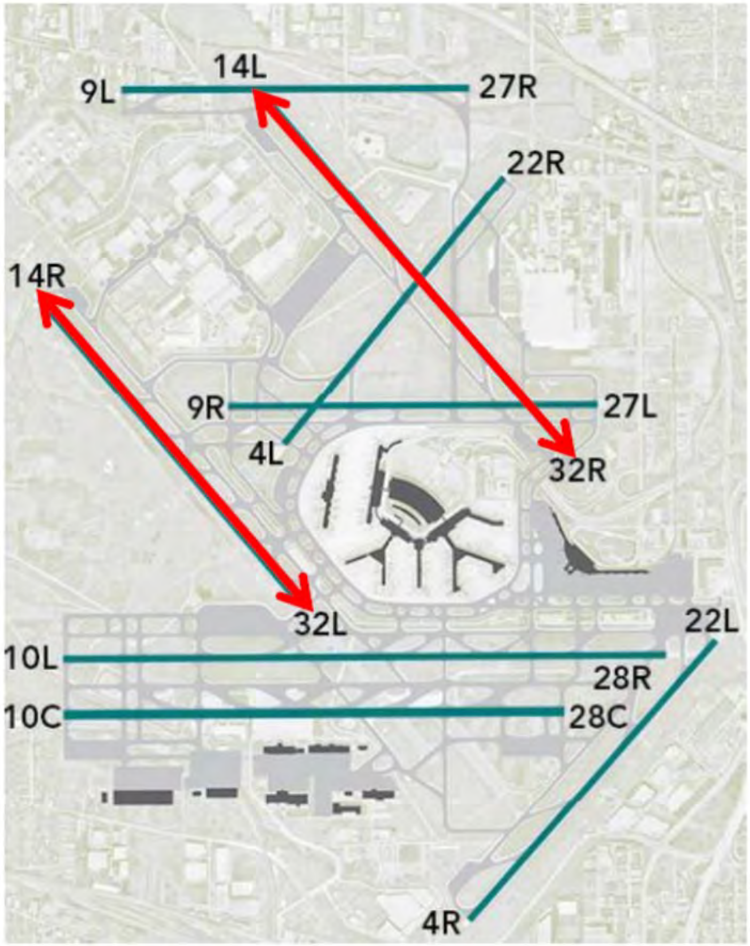

Exhibit 1: Existing ORD Runway Layout (May 2015), source: City of Chicago

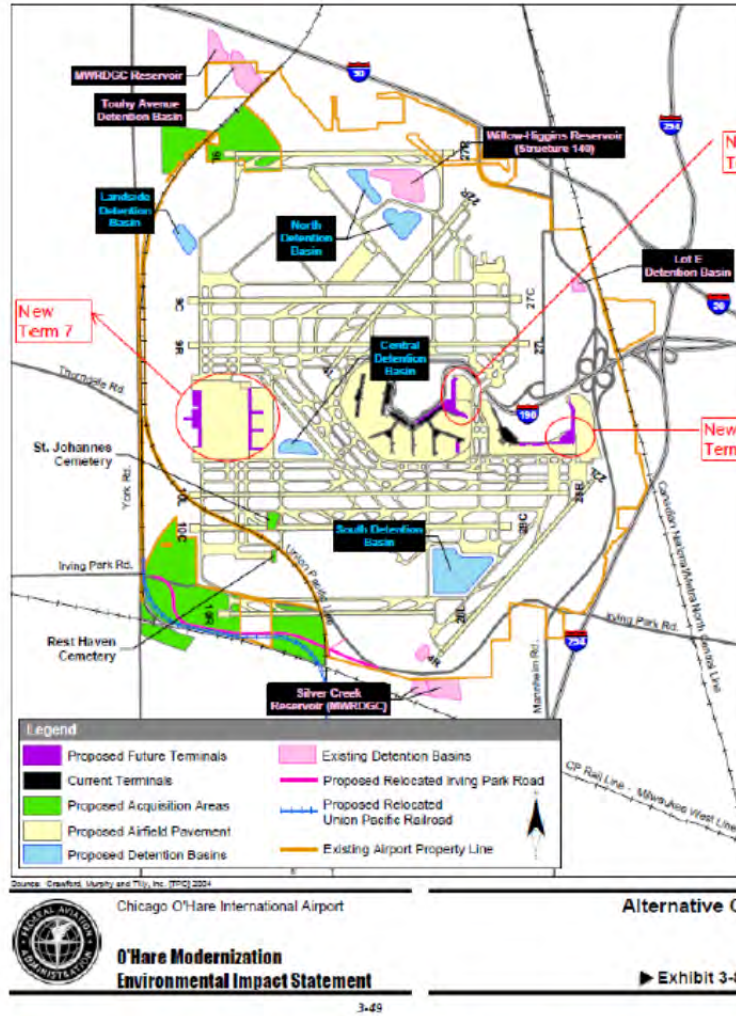

Exhibit 2: Proposed "end state" ORD runway layout (~2020), source: City of Chicago.

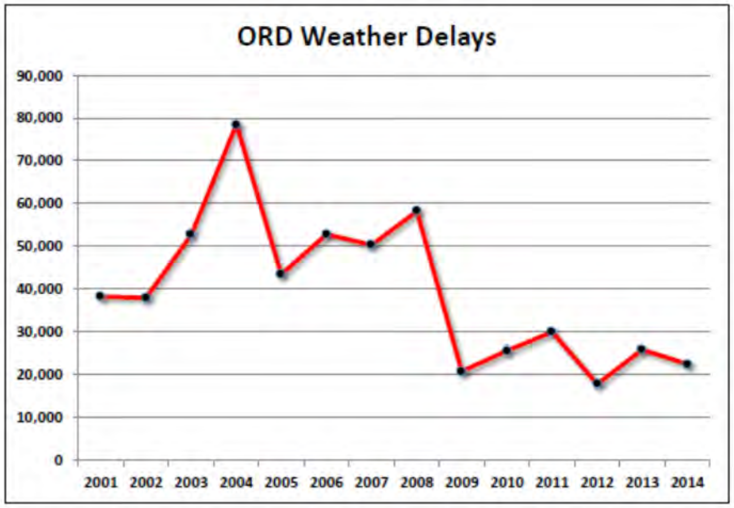

Exhibit 3: Total annual O'Hare weather delays. Source: FAA, Aviation System Performance Metrics (ASPM)

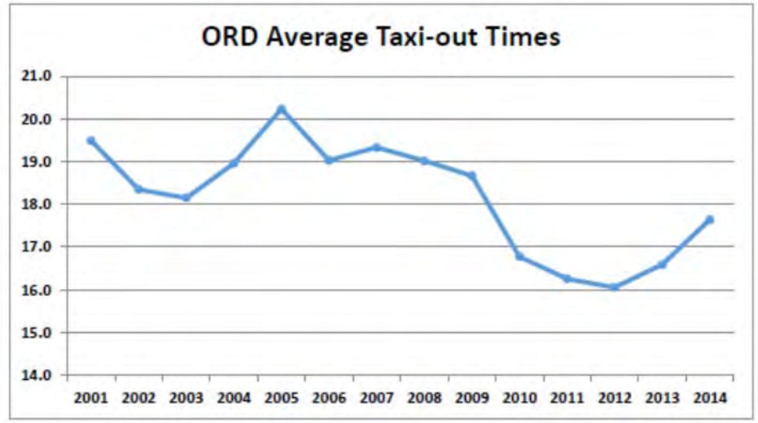

Exhibit 4: ORD Annual Average Taxi-out Times. Source: FAA, Aviation System Performance Metrics (ASPM)

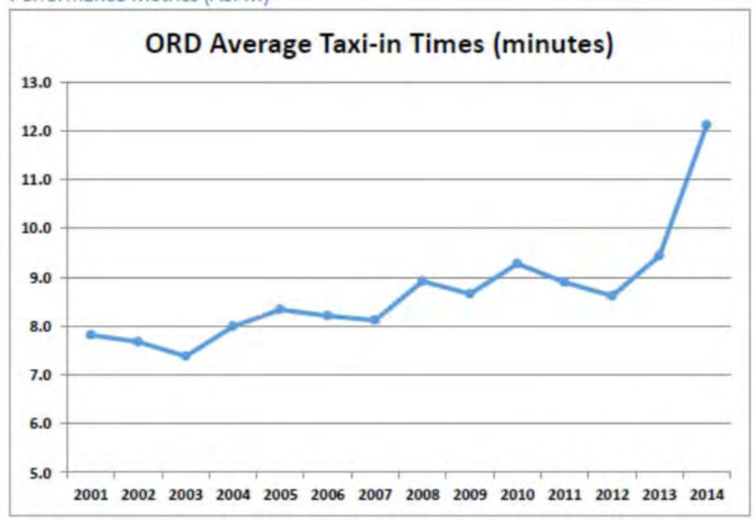

Exhibit 5: Annual Average Taxi-in Times. Source: FAA, Aviation System Performance Metrics (ASPM)

Exhibit 6: THE JDA TEAM

Author:

Rob Voss Senior Air Traffic Operations Subject Matter Expert (SME), is a JDA associated consultant and former career FAA Air Traffic Control Specialist, Operations Supervisor, Quality Assurance and Training Specialist, Plans and Procedures Specialist, Air Traffic Manager, Integration and Efficiency Specialist and finished his FAA career as a System Operations Senior Advisor. Rob spent more than 26 years with the FAA including assignments at Chicago Midway (MDW), San Francisco (SFO), Santa Rosa (STS), Scottsdale (SDL), San Carlos (SQL) and the Midwest Tactical Operations office. While working for several years outside of the FAA, Rob was an Air Traffic Consultant to the Deputy Airport Director (Noise Abatement) at SFO, where he provided analysis, advice and education involving aircraft noise and air traffic procedures and was the Project Manager for a FAR Part 150 noise exposure map update. He has also served as a contractor and Air Traffic Analyst at NASA-Ames Future Flight Central research and simulation facility.

Contributing:

Dr. Antonio A. Trani, is a JDA associated consultant and Professor with the Department of Civil and Environmental Engineering at Virginia Tech University and is Co-Director of the National Center of Excellence for Aviation Operations Research (NEXTOR). He has been the Principal or Co-Principal Investigator on 68 research projects sponsored by the National Science Foundation, Federal Aviation Administration, National Aeronautics and Space Administration, National Consortium for Aviation Mobility, Federal Highway Administration, and the Center for Naval Analyses. Dr. Trani has provided noise, capacity and safety consulting services to the Norman Manley International Airport, Punta Cana International, National Institute for Aerospace (NIA), Xcelar, Quanta Technologies, Los Angeles World Airport, Charles Rivers Associates, Boeing Phantom Works, Civil Aviation Administration of China (CAAC), British Airports Authority (BAA), SEATAC Airport Authority, Louisville International Airport, Delta Airport Consultants, Celanese, and the MITRE Corporation.

Dr. Sanford Fidell, is a JDA associated consultant and owner and President of Fidell Associates which provides consulting and research services and litigation assistance in environmental acoustics, transportation noise, and effects of noise on individuals and communities. He is the U.S. Representative to International Standards Organization (ISO) Technical Advisory Group on Community Response Questionnaire Standardization and to ISO Working Group 45 on Community Response to Noise. Dr. Fidell is member of the Acoustical Society of America and the Technical Committee on Noise. He was on the Design Review Group for the FAA's Integrated Noise Model software. Dr. Fidell has provided consulting services to community, airport and government agencies involved in aircraft noise controversies and assessments and disclosures of aircraft noise impacts and has consulted on land use planning related to

aircraft noise regulation. He is active in international standardization efforts for prediction of aircraft, rail and road noise impacts.

Dr. David Dubbink, is a JDA associated consultant and an Environmental Planning and Noise Management Specialist. He holds a PHD from UCLA in Urban Planning and Environmental Management. He is the designer and developer of ISIS (the Interactive Sound Information System). Dr. Dubbink is a member of the Acoustical Society of America, Institute of Noise Control Engineering, International Association for Impact Assessment and the Transportation Research Board, Committee A1F04, Transportation Related Noise and Vibration. He has provided training and consulting services on noise management to over 80 organizations worldwide.

Craig Burzych is an Air Traffic Operations Specialist, a JDA associated consultant and former career FAA Air Traffic Control Specialist. He spent 24 years working at the O'Hare Control Tower and 4 years working in the Chicago Midway Tower. He was detailed annually to lead the FAA Air Traffic Control support for the annual EAA Oshkosh "fly In" the single largest aviation show and exhibit held in the U.S. Chuck served as President of the National Air Traffic Control Association (NATCA) (Chicago ORD) 9 years and also was a NATCA Aviation Safety Inspector and a member of the FAA Runway Safety Action team for the Great lakes Region.

Cynthia Schultz PE, AAE is JDA's Vice President of Airports where she manages the airport line of business including, airport Safety Management System services, airport sustainability, airport strategic planning, airport security, facilitating new technology/products for airports, training for airports and airlines, airline negotiation and development of support services. Before joining JDA Cynthia was the Airport Director of Great Falls International Airport where she directed and led all airport operations, maintenance, administration, finances, security and support services including project management of engineering, architectural and construction, negotiation and administration of leases and concessions, safety, certification, design, construction and funding issues.

Joe Del Balzo, JDA Founder and President, served as the highest-ranking career professional (Acting Administrator) in the Federal Aviation Administration (FAA). Both in his long career with FAA (where he also served as FAA's Executive Director of System Operations, Executive Director for System Development, Director of the Eastern Region and Director of the FAA Technical Center) and in his subsequent private role as an aviation consultant, he has earned wide respect for his expertise in a wide range of aviation issues.

Aviation Technology Solutions

BEST PRACTICES AND TOOLS TO PROVIDE NOISE INFORMATION TO COMMUNITIES

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3 June 2015

Contents

List of Figures

1. Executive Summary

Our research found a very broad range of noise impact information sharing globally. It should be no surprise that best noise management practices recognized in the industry maximize information available to and collaboration with the public. The US aircraft noise management culture remains in a reactive state of measuring, reporting, defending and contesting while other countries have advanced to proactive and collaborative states. Gatwick Airport in England is recognized as a leader in collaborative noise management.

Noise Management System technology advancements have increased airports' ability to engage and empower communities that surround them. Airports that have evolved to a collaborative state of noise management, such as Gatwick, are tailoring noise reporting systems to meet community needs and even varying the reporting by community as required to address unique needs and community interests.

Aircraft noise reporting evolution can be voluntary or forced by community pressure. Either way, the outcome is the same. Aircraft noise is what it is and it can only be dealt with effectively when communities and airports assess the actual noise environment together and work together to identify rational solutions.

Two software systems stood out in our research – Casper's Noise Lab and Bruel and Kjaer's WebTrak. Noise Lab was unique in both quantity and quality of information and WebTrak appears to be dominant in the market with approximately 63 major airports globally utilizing the system to share noise information including the Port Authority of New York and New Jersey, Los Angeles International Airport, and Denver International Airport. Both systems have similar capabilities. They combine noise data collected through traditional noise monitoring systems with flight track data. The technology enables near real time display of noise monitor levels associated with each flight track. This data can be further compiled and analyzed to produce noise reporting tailored to specific needs and metrics.

Airports differ in their use of the systems with some showing flight tracks, some showing flight tracks and noise monitor measurements and some going as far as to display flight tracks, noise monitor measurements and current noise contours (Schiphol in the Netherlands). Quality and quantity of noise information is key to productive dialogue with communities to address and manage noise impacts.

Since our initial recommendation to SOC to explore WebTrak on April 1st of this year, Chicago O'Hare has implemented WebTrak and is now displaying flight tracks in near real time for public viewing.

SOC, other impacted O'Hare communities and neighborhoods, and the City of Chicago can benefit by expanding the use of ANOMS with either Noise Lab or WebTrak to collaborate on best management of ORD's current and future noise environment. Noise 1

Comment	Response
1	CDA is committed to increased distribution of data and reports to provide more accurate and timely access to information on aircraft operations and noise. Several tools and ideas are under evaluation, including: • Upgrading the CDA webpage to included expanded content on airport noise and operations. • Continuing to explore new noise software. • Improving the collection of stakeholder noise concerns. • Reviewing industry "Best Practices". • Maximizing the use of social media to update citizens on relevant noise topics. • Reporting single-event noise data. Please also refer to response to Comment No. 16 in Section 3.

impacts from current plans for infrastructure changes can be predicted, optimized to minimize noise impacts and monitored for accountability. The system can be utilized to improve transparency. Data that we believe can and should be provided include but are not limited to:

- Historic and current flight track data identifying aircraft type, airline, flight number XY coordinates, altitude and speed
- Map changing values of noise monitor measurements as aircraft fly over changing color with noise level
- Map gate locations relative to flight tracks to monitor aircraft to determine if aircraft followed various noise abatement procedures such as the Fly Quiet program
- Map INM annual DNL contours as compared to predicted contours for 55, 60, 65 and 70 DNL
- Map daily DNL contours for the purpose of understanding peak and off peak impacts
- Alternate metrics such as CNEL, N70, N60 and Time Above as determined necessary to tailor noise information to community concerns
- Map noise complaint locations relative to flight track data and current noise contours

Having taken the first step to empower community collaboration the City of Chicago is now positioned to become a world leader in collaborative noise management.

It is recommended that the noise impacted communities around O'Hare approach the City of Chicago, the O'Hare Noise Compatibility Commission, local, state and federal officials to request that ORD expand the use of ANOMs with either the Noise Lab or the WebTrak systems to incorporate the best features of both systems. Both the community and O'Hare stand to benefit by raising the noise management bar to world class standards in operations and sustainability. 2

Comment	Response
2	CDA is committed to increased distribution of data and reports to provide more accurate and timely access to information on aircraft operations and noise. Several tools and ideas are under evaluation, including: • Upgrading the CDA webpage to included expanded content on airport noise and operations. • Continuing to explore new noise software. • Improving the collection of stakeholder noise concerns. • Reviewing industry "Best Practices". • Maximizing the use of social media to update citizens on relevant noise topics. • Reporting single-event noise data. Please also refer to response to Comment No. 16 in Section 3.

2. Airport Noise and Community Impact Best Practices

Airports belong to the communities they serve. Maintaining a healthy balance between air transportation benefits and burdens is critical. The appropriate balance is community specific and noise is becoming a leading variable in determining that balance.

ACRP Report 15 Aircraft Noise: A Toolkit for Managing Community Expectations provides some insight to public sentiment regarding airport noise.

> **What Does the Public Really Want?**
> Based on dozens of interviews for this project, what the public wants from airports about noise conditions can be summarized in three basic concepts:
>
> - Promote communication: this includes working in an interactive way with one or more organized groups, involving them as partners in pursuit of mutual goals.
> - Present the facts clearly and honestly: this includes designing websites that can actually be used by the community to both learn and to do their own analysis.
> - Reduce the noise impacts: this may refer to an overall reduction of noise levels or the abatement of particularly offensive single events.

Airports' effectiveness at promoting communication, presenting facts clearly and honestly and reducing noise impacts determines their community dynamic. Websites can be a powerful tool to educate and involve the community.

ACRP Report 15 lists Gatwick Airport Interactive Aircraft Noise Website as an example of best practices for large airport noise websites.

> *"Gatwick Airport: Interactive Aircraft Noise Website. The purpose of the BAA's Gatwick Airport website is to provide the public useful and clear information about the aircraft noise they are hearing and why it occurs. This website's purpose is to explain some of the issues about airplane noise, answer the most common questions, and describe what the airport is doing about it.*
>
> *By using the website links, users can find information about areas where they live or work and understand how departing and arriving aircraft can affect them. The interactive website is extensive, informative, and user-friendly with many pages dedicated to communicating the effects of aircraft noise, education, and the airport's role in the community. Additionally, documents, leaflets and reports are available for download."*

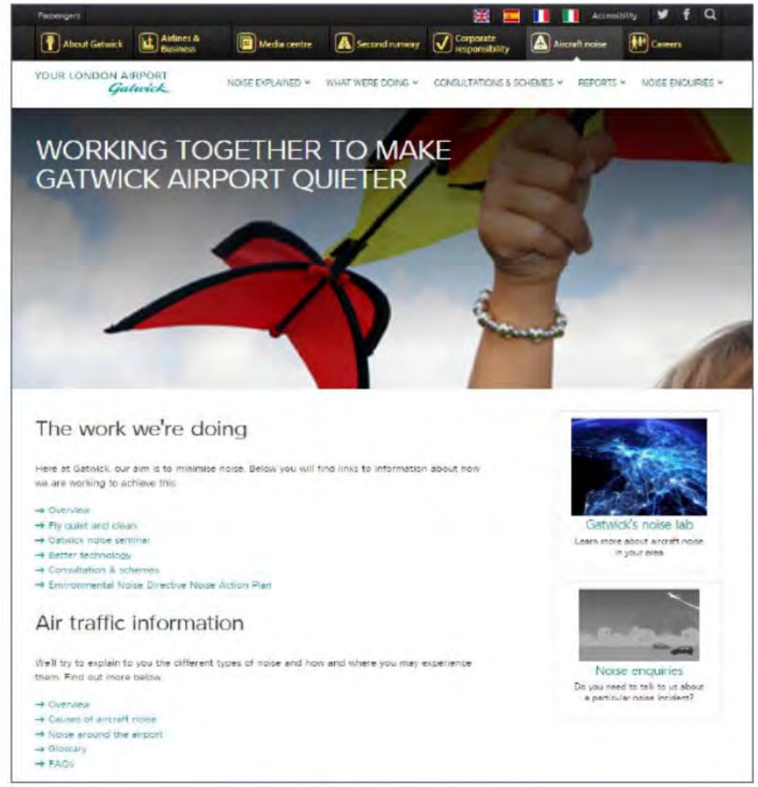


Figure 1 - Gatwick Noise Home Page

Gatwick utilizes their website as an effective tool to give the public what it wants regarding noise.

A. Promoting Communication and Presenting the Facts Clearly and Honestly

The noise homepage acts as a guide to the work that Gatwick is doing to minimize noise and explains:

- noise causes
- where noise occurs
- Gatwick's consultation schemes to engage the public and related reporting

Additionally, noise inquiries (complaints), performance reporting and noise committee meeting minutes are linked from homepage tabs.

Figure 2- Gatwick Noise Lab Link

The Gatwick Noise Lab is linked on the noise homepage. Noise Lab provides the public interface to noise data relative to location to increase public understanding of actual airport noise impacts.

Noise Lab provides interactive pages allowing the public to:

- Analyze noise specific to their location
- Understand causes of noise
- Understand the flight paths of aircraft of interest relative to their location
- See the flight paths of all aircraft that day
- Review historic data specific to a particular noise monitor
    - Departure and arrival distributions per runway
    - dB(A) value distribution
    - Altitude distribution
    - Number of noise events per day and hour
    - Number of flights per day and hour
    - Distribution of flights per region of origin/destination
    - Distribution of departures per corridor
- View actual 2011 57,60,63,66,69 & 72 db(A) noise contours
- Map user location an view relative to actual noise contours from 2011 with noise preferential routes, flight tracks and holding positions
- See a Video of airspace sector traffic to illustrate interaction of traffic passing over the UK
- Access a library of aircraft types


Figure 3 - Gatwick Noise Lab Causes of Noise

See Appendix 1 for examples from the Gatwick Noise Lab website.

Actual noise contours are routinely withheld from the public resulting in an impasse of constructive dialogue to address noise concerns. Predicted noise contours can also be withheld to further obstruct the public from understanding where noise boundaries are or where their property is relative to any specific DNL value.

Gatwick Airport utilizes the flight path and noise data collected to report the latest full year contour maps produced from actual noise readings to allow the public to see the actual noise impact versus previously predicted noise impacts. Additionally, the Noise Lab website plots 2011 contours on the interactive map to demonstrate homeowner location relative to the contours.

Schiphol Airport utilizes Noise Lab to map current contours relative to location. This was the only airport mapping current contours discovered in the research phase of this whitepaper.

Figure 4- Schiphol Amsterdam Airport Current Flight Track and Noise Contour

B. Reduce Noise Impacts

Gatwick has utilized the website and internet to engage the public in consultation on the Noise Insulation Scheme and the Airspace Modernization.

As a result of consultation with the public the current noise scheme was revised to:

- Extend the current noise insulation boundaries East and West to include an additional 985 homes
- Consider both the increased sensitivity people have towards noise levels as well as the frequency of overflights

- Apply boundary lines flexibly to ensure entire villages are included

Figure 5- Gatwick Noise Scheme Boundary

Gatwick Airspace Modernization employed two separate phases of public consultation to assist in designing the appropriate Performance Based Navigation approach and departure routes for Gatwick airspace. The consultations gathered feedback on the following design options:

- Departure routes and associated Noise Preferential Routes (NPRs) with options for realignment and respite
- Night-time respite options for arrivals
- Updating existing NPRs and associated corridors to account for flight path concentration as a result of PBN routes

As a result of the consultation, NATS (the national air navigation services provider) deferred any changes to the airspace so as to allow further planning and engagement of residents in this area.

Gatwick also utilizes the website and reporting to demonstrate their results in reducing noise through their fly quiet program as managed by their flight performance team.

Detailed reporting is provided on each fly quiet initiative relative to previous performance and performance goals.

Although there are no set routes for arriving aircraft there are long established procedures to mitigate the disturbance that they can cause on approach to the airfield. One of the most successful measures is a noise mitigation procedure called Continuous Descent Approach (CDA).

The figure below illustrates how this type of approach differs from the traditional stepped approach.

Figure 6- Continuous Decent Approach

Figure 7 illustrates the Continuous Descent Approach (CDA) noise procedure performance and Figure 8 illustrates performance of several parameters to key monitoring indices.

Figure 7- Gatwick 24 Hour CDA Performance 2002-2013

Parameter		12 month averages* Year to date	Previous year	2011	2006
Track keeping performance (% on track)	▲	99.29%	98.04%	97.47	98.17
24hr CDA (% achievement)	▲	91.06%	91.36%	90.49	80.79
Day/Shoulder CDA (% achievement)	▲	90.73%	88.72%	90.19	79.9
Core night CDA (% achievement)	▲	94.29%	94.04%	93.96	89.6
1000ft Infringements (No.)	▼	0	0	3	11
1000ft Infringements (No. below 900ft)	▼	0	0	1	6
Departure Noise Infringements (Day)	-	0	0	0	10
Departure Noise Infringements (Night/Shoulder)	-	0	0	4	2
Callers	▲	3459	533	343	587
Noise complaints	▲	21981	2296	2673	4791
Enquiry response performance target is 95% within 8 days (quarterly)	▼	74.01%	99.24%	KPI 95%	
West/East Runway Split (%)	-	67/33	63/37	67/33	68/32

Figure 8- Gatwick Key Monitoring Indicators 4th Quarter 2014

BEST PRACTICE AT GATWICK

PRECISION NAVIGATION

This year Gatwick Airport became the UK's first to introduce Precision Area Navigation (P-RNAV) into its airspace. We've been working with National Air Traffic Services (NATS) and airlines to develop technology which helps aircraft to fly more accurate routes from the airport.

WHY IS THIS SIGNIFICANT?

P-RNAV technology is a more precise navigation method that allows aircraft to navigate using GPS co-ordinates rather than traditional ground-based navigational aids. This will result in aircraft having a track keeping accuracy of ±1 nautical miles for 95% of its flight time.

- This will result in several important advantages:
- Greater certainty of what areas will be overflown, thereby reducing noise in certain areas
- Environmental benefits include reduced fuel burn and associated reduction in emissions
- Air traffic controllers and flight crew can plan their routes more easily and with greater precision
- Introduces the possibility of creating rotating respite for noise affected communities.

The advent of this technology makes it possible to design P-RNAV routes which more easily avoid areas where large numbers of people live.

Figure 9- Gatwick Precision Navigation

C. Precision Based Navigation (PBN) and Noise

Progress of PBN reduce noise impacts and concentrate flight operations over noise preferential routes is also demonstrated in much tighter adherence to a flight corridor in fourth quarter of 2014 versus 2013 as shown below in Figures 10 and 11. PBN is also used to provide respite periods to impacted areas alternating preferred noise routes weekly to provide relief for communities under PBN routes.

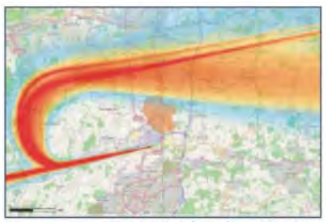


Figure 10 - PBN Flight Paths 2013

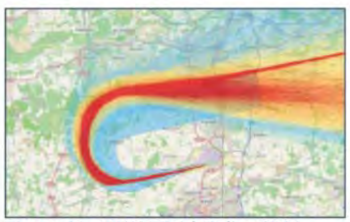


Figure 11 - PBN Flight Paths 2014

Gatwick also maximizes the value of technology to improve transparency regarding complaints. Mapping the location of complaints relative to flight paths as shown in Figure 12 demonstrates actual noise impact. This information then can be used to fine tune PBN or alter other mitigation strategies to improve performance.

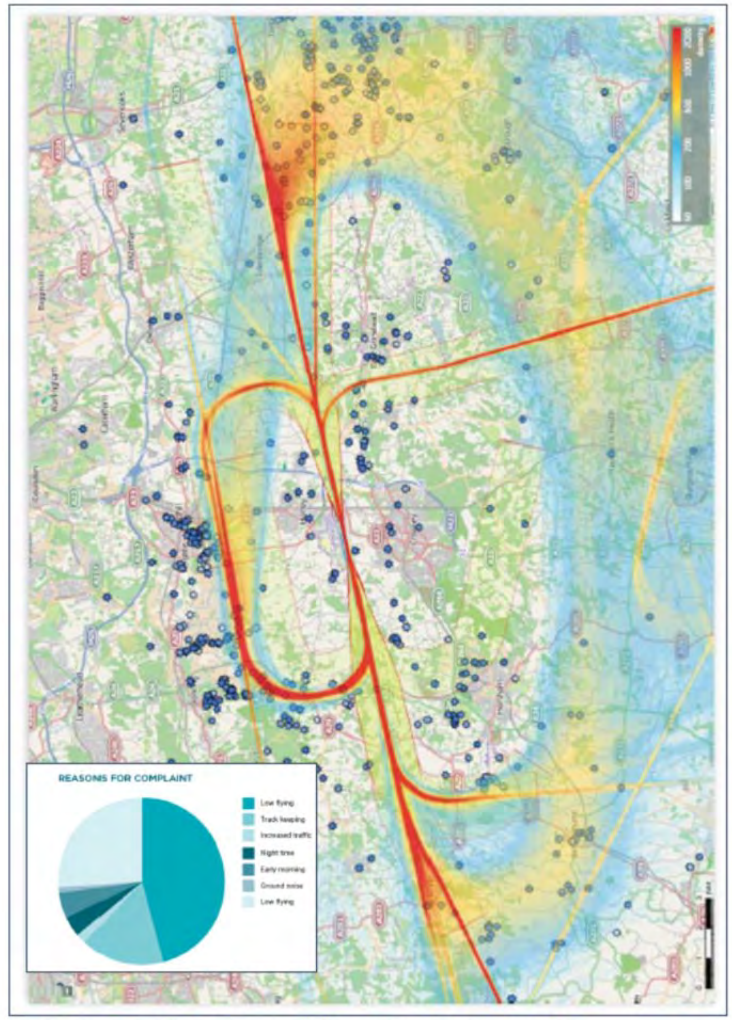


Figure 12 - Gatwick Noise Complaint Locations 4th Quarter 2014

Noise Communications Solutions Ltd (NCA) performed an independent assessment of Gatwick Airport's current and planned noise management practices and performance NCS observed additional best practice examples including:

- Noise Seminar, inviting 'no holds barred' face to face stakeholder questioning
- London Airspace Consultation ensuring stakeholders are involved in shaping the airspace around Gatwick Airport
- Fly Quiet and Clean program to promote the airport's noise initiatives and communications
- PRNAV implementation to provide respite options for the local community
- Regular and well communicated community noise monitoring and reporting
- Minutes of noise meetings and reports for consistent quality checking
- League tables of performance against peer airports/noise functions
- Track keeping trials to test best practice and implement coordinated and proven routings
- GATCOM Consultative Committee held in public session
- New Noise Insulation Scheme
- The Annual Monitoring Report ensuring longer term performance trending

3. Tools to Provide Noise Impact Information to Communities

Noise management culture is evolving with technology to enable public participation to a greater degree. Many examples around the world illustrate successful community and public influence altering major airport development and/or procedures to improve noise impacts including Sydney International Airport, Vancouver International Airport and Toronto Pearson International Airport. Several of these efforts have resulted in the acquisition of WebTrak a near-real time noise reporting system to give the public access to noise information that affects them. Like Noise Lab the WebTrak system is interactive, can be tailored to each airports reporting preference and is accessible to the public.

Our research found two commercially available systems that provide noise impact data in near real time to communities Noise Lab and WebTrak. Both Noise Lab and WebTrak integrate with traditional noise monitoring systems to combine noise data with flight track data to produce real time display of noise associated with each flight track.

Noise Lab, as demonstrated in Section 1 of this report, excels in quality and quantity of data accessible to the public. Noise Lab is a software module developed by Casper. Noise Lab and the Casper Noise Monitoring System are currently live at Gatwick http://noiselab.casper.aero/lgw/#page=home and Schiphol Amsterdam Airport http://noiselab.casper.aero/ams/ .

The WebTrak near real time reporting tool is used globally at more than sixty airports. WebTrak is a subscription product of Bruel and Kjaer. WebTrak and the Airport Noise and Operations Monitoring System (ANOMS) are live at 23 US airports and 41 international airports linked here http://webtrak5.bksv.com/. Additionally, the FAA recently implemented WebTrak to monitor and manage helicopter noise in http://heli-noise-la.com/webtrak/.

Because Chicago O'Hare current noise monitoring system is Bruel and Kjaer's ANOMS system, the balance of this report will focus on ANOMS and WebTrak's capability to support near real time noise reporting for the purpose of illustration.

A. WebTrak

ANOMS/WebTrak can similarly support all of the graphic reporting as demonstrated in Appendix 1 by Noise Lab. The service can be tailored to the airports specific noise management and reporting goals.

WebTrak functions supported include but are not limited to:

- Aircraft position, angle, range and height relative to specific GIS location
- Runway usage by aircraft

- Flight number, aircraft type, beacon code, origin and destination
- Near real time display of noise monitor Leq measurement data
- Collect and display weather data
- Noise event SEL, LMax Duration
- Historic replay capability through query by time period
- Fight tracking through predefined gates and corridors with compliance reporting
- Integration with INM for noise contour modeling DNL & CNEL
- Online complaint entry
- Reports library
- My Neighborhood

Figure 13 - San Francisco International Airport ANOMS

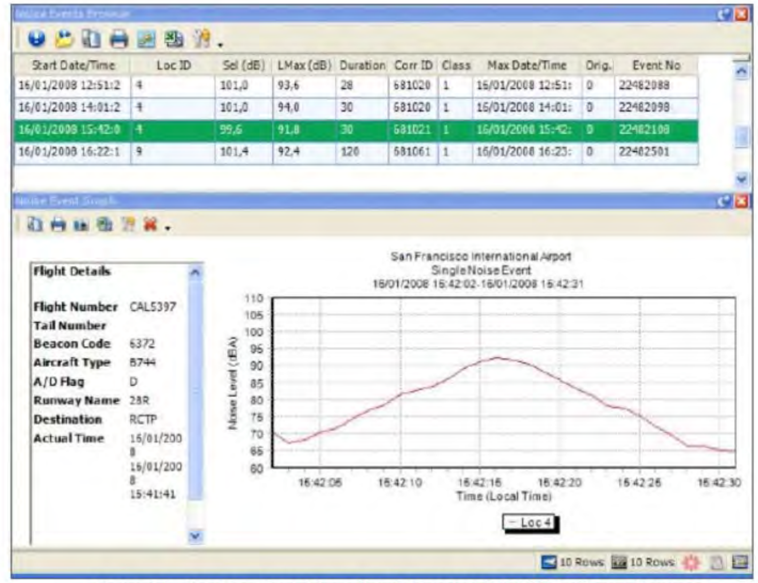


Figure 14 - San Francisco International Airport ANOMS Noise Event Browser

B. WebTrak FlyQuiet

- Identifies flights that don't comply with noise abatement procedures
- Promptly communicates to the aircraft operator
- Provides on online dashboard for airlines and pilots to investigate and explain deviations
- Delivers rapid feedback loop that drives improved compliance, resulting in a quieter airport

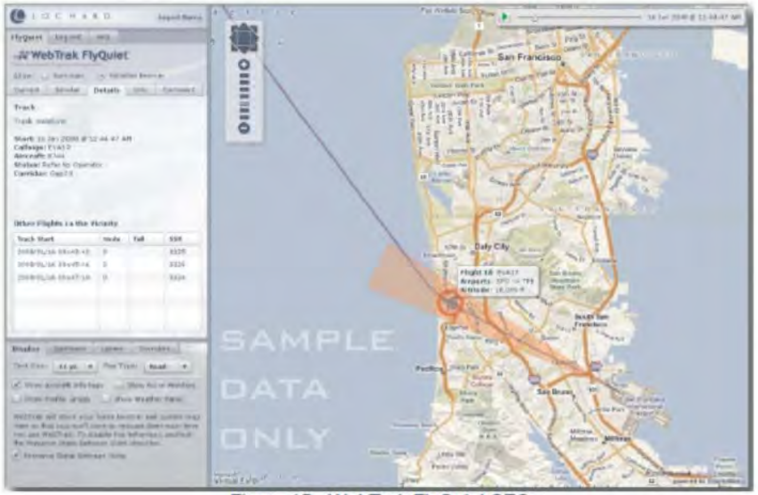


Figure 15 - WebTrak FlyQuiet SFO

The Dashboard information:

- Flight information
- Noise measurements
- Weather conditions
- ATC instructions
- Nearby flights

ANOMS and WebTrak are excellent tools to balance airspace design and management against noise impacts on the ground. Denver International Airport recently redesigned airspace precision navigation procedures. The airport engaged the surrounding communities in analyzing noise impacts and collaborative design to minimize and balance noise impacts of revised flight paths. These efforts included:

- Mapping of proposed route/corridor options
- Assessment of the noise impact of each proposed option with the communities
- Optimizing flight paths and narrowing corridors to minimize noise impacts
- Identify peak and off peak airspace strategies to balance noise impacts in partnership with the communities

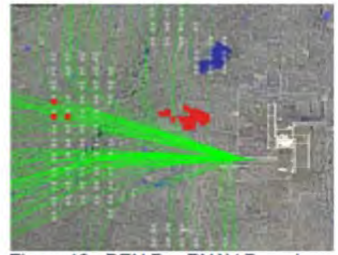


Figure 16 - DEN Pre-RNAV Departure

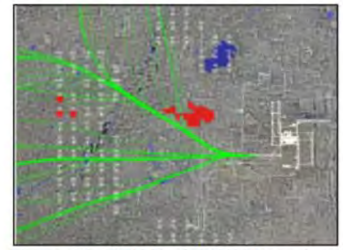


Figure 17 - DEN Post-RNAV Departure

The FAA utilized ANOMS/WebTrak Fly Quiet capability as flight tracking and compliance tool to demonstrate Next Gen precision aircraft navigation capability through predefined gates and corridors defined within the system in this video https://www.facebook.com/video.php?v=10151067714960757. The video provides a visual representation of the gate and corridor technology that can be used as a compliance management tool for fly quiet preferred noise routes.

Technology has evolved to enable transparency of sound information in near real time to partner with communities to balance airport economic benefit against noise impacts. Community collaboration empowered by adequate sharing of predicted noise impacts is becoming the standard for successful implementation of major airport changes. Implementation of PBN nationwide has illustrated both successful community engagement and implementation and struggling implementations that failed to involve the community.

HMMH presented an entire paper titled Implementing Performance Based Navigation Procedures at US Airports: Improving Community Noise Exposure in 2013 at Inter Noise. The paper concluded that:

"Successful Implementation of PBN procedures requires a collaborative team to develop procedures that take into consideration perspectives from multiple stakeholders, including air traffic controllers, operators and airport and community representatives. Detailed sophisticated noise modeling utilizing state of the art models provides transparency that allows for a robust discussion of the tradeoffs and challenges of implementation that ultimately results in a better outcome."

C. Aircraft Noise Management Evolution

Industry is recognizing that noise represents a significant threat to aviation growth and community tolerance can improve with transparent stakeholder engagement. Airport Council International Asia Pacific Airports published a recent article titled Brüel & Kjær's Mike Rikard-Bell discusses an emerging threat to airport growth in Asia – aircraft noise. Mike characterized the evolution of aircraft noise management as follows:

The four generations of noise management

Today's fourth generation noise management strategies go one step further, recognising that there is so much more to community annoyance than noise exposure alone.

It has become clear that annoyance is influenced by a much broader set of concerns including trust, fairness, health effects, property prices and quality of life to name but a few.

Best practice today is focused on building community tolerance through open and transparent stakeholder engagement to address these concerns.

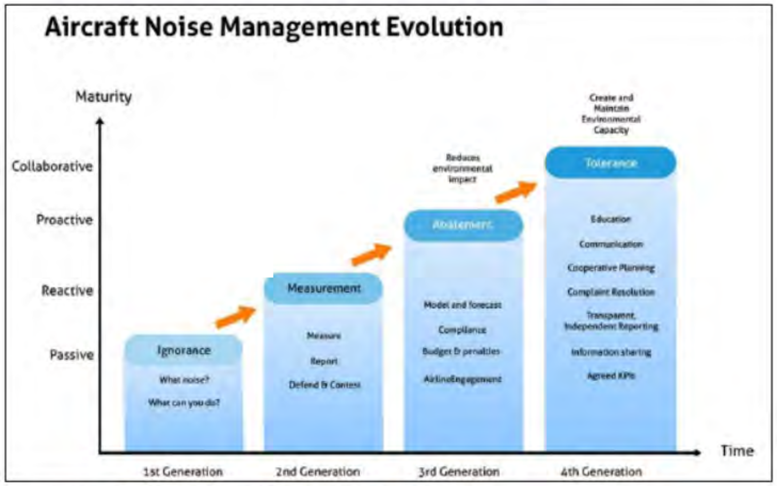


Figure 18 - Aircraft Noise Management Evolution

Leading airports are working hard to replace the silence and distrust of the past with an open and frank conversation where comprehensive information and facts are shared freely, and the wide range of stakeholder opinions and preferences can be debated on their merits.

Rich educational web portals build understanding and trust

Communications technology is playing a huge role with information rich community web portals being used to facilitate open and transparent information sharing.

3

Comment	Response
3	CDA is committed to increased distribution of data and reports to provide more accurate and timely access to information on aircraft operations and noise. Several tools and ideas are under evaluation, including: • Upgrading the CDA webpage to included expanded content on airport noise and operations. • Continuing to explore new noise software. • Improving the collection of stakeholder noise concerns. • Reviewing industry "Best Practices". • Maximizing the use of social media to update citizens on relevant noise topics. • Reporting single-event noise data. Please also refer to response to Comment No. 16 in Section 3.

4. Appendix 1: Gatwick Noise Lab Examples

Figure A 1. Gatwick Noise Lab Home Page

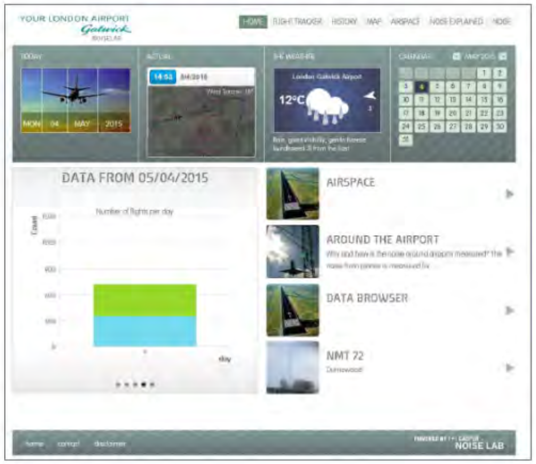


Figure A 2. Gatwick Noise Lab – Under the Flight Path

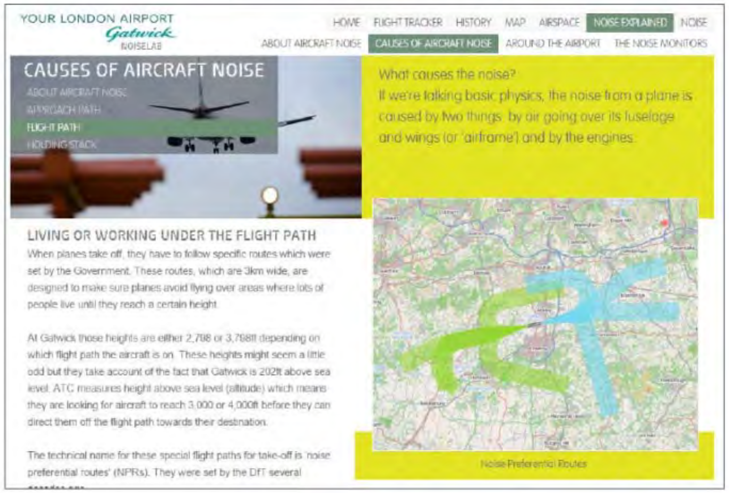


Figure A 3. Gatwick Noise Lab - Map

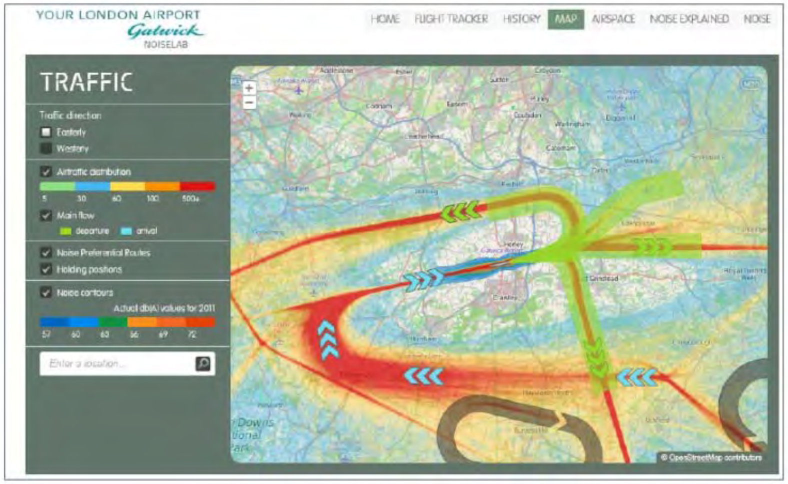


Figure A 4. Gatwick Noise Lab – Noise Around the Airport

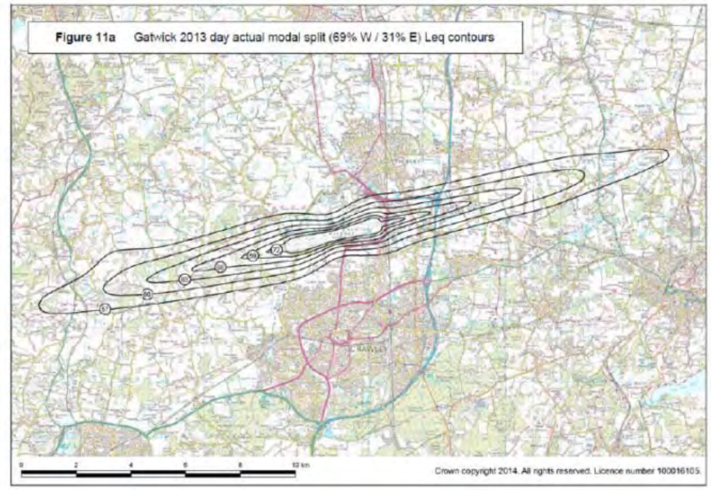


Figure A 5. Gatwick Noise Lab – Aircraft Noise Levels Through Time

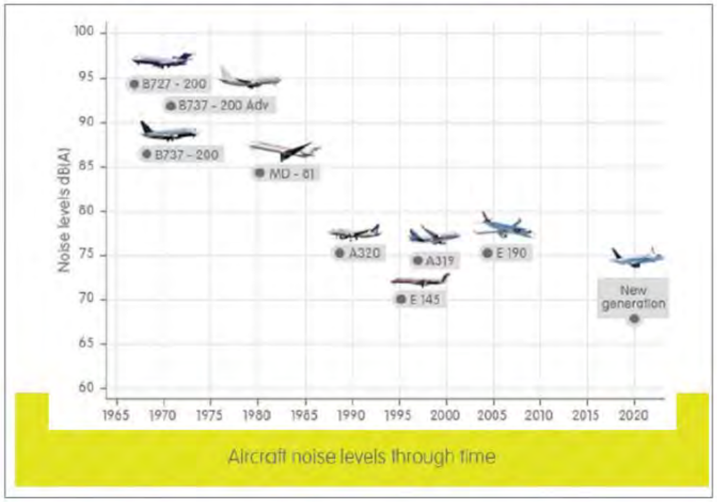


Figure A 6. Gatwick Noise Lab – Find Location

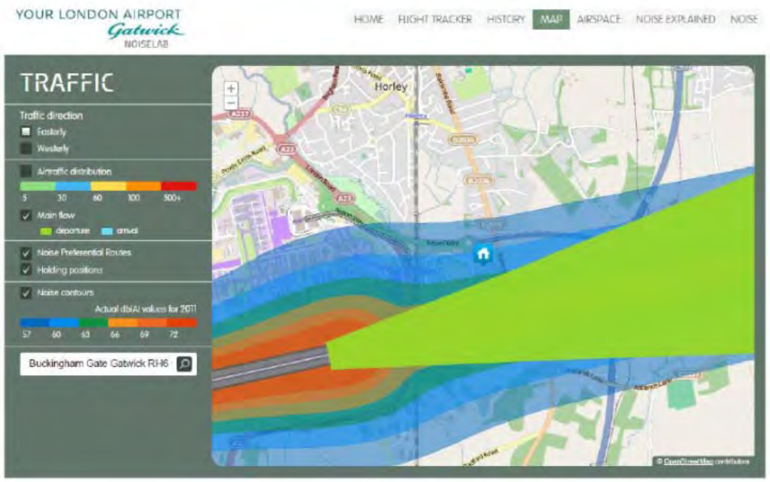


Figure A 7. Gatwick Noise Lab - Flight Tracker NMT Display

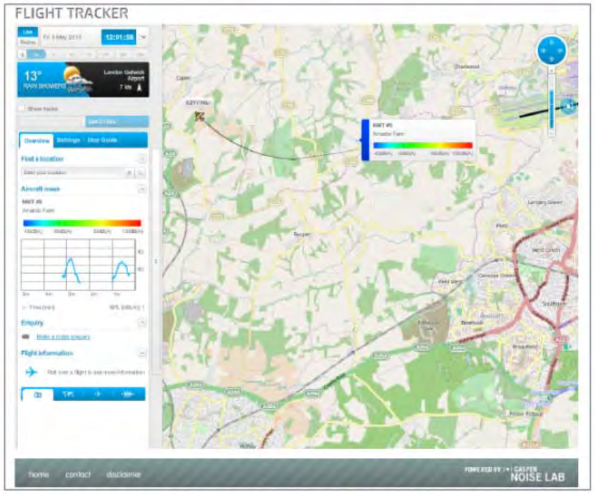
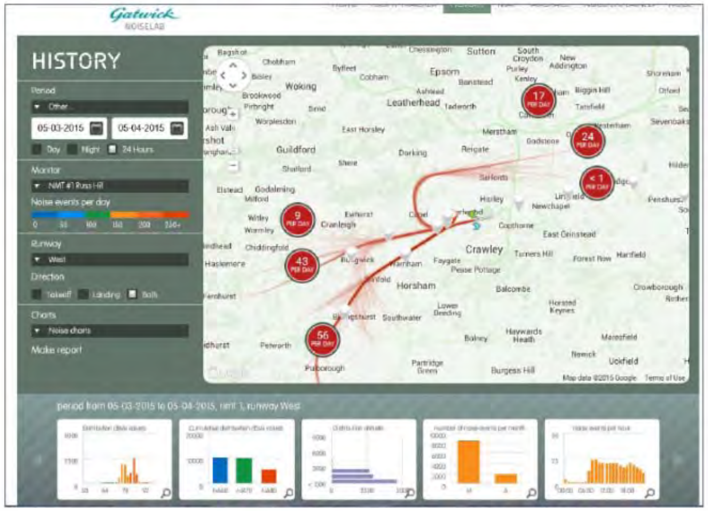


Figure A 8. Gatwick Noise Lab - Noise Monitor

Figure A 9. Gatwick Noise Lab - History



5. Appendix 2: JDA Team

Author:

Cynthia Schultz PE, AAE is JDA's Vice President of Airports where she manages the airport line of business including, airport Safety Management System services, sustainability, strategic planning, security, facilitating new technology/products for airports, training for airports and airlines, airline negotiation and development of support services. Before joining JDA Cynthia was the Airport Director of Great Falls International Airport where she directed and led all airport operations, maintenance, administration, finances, security and support services including project management of engineering, architectural and construction, negotiation and administration of leases and concessions, safety, certification, design, construction and funding issues.

Contributing:

Dr. Antonio A. Trani, is a JDA associated consultant and Professor with the Department of Civil and Environmental Engineering at Virginia Tech University and is Co-Director of the National Center of Excellence for Aviation Operations Research (NEXTOR). He has been the Principal or Co-Principal Investigator on 68 research projects sponsored by the National Science Foundation, Federal Aviation Administration, National Aeronautics and Space Administration, National Consortium for Aviation Mobility, Federal Highway Administration, and the Center for Naval Analyses. Dr. Trani has provided noise, capacity and safety consulting services to the Norman Manley International Airport, Punta Cana International, National Institute for Aerospace (NIA), Xcelar, Quanta Technologies, Los Angeles World Airport, Charles Rivers Associates, Boeing Phantom Works, Civil Aviation Administration of China (CAAC), British Airports Authority (BAA), SEATAC Airport Authority, Louisville International Airport, Delta Airport Consultants, Celanese, and the MITRE Corporation.

Dr. Sanford Fidell, is a JDA associated consultant and owner and President of Fidell Associates which provides consulting and research services and litigation assistance in environmental acoustics, transportation noise, and effects of noise on individuals and communities. He is the U.S. Representative to International Standards Organization (ISO) Technical Advisory Group on Community Response Questionnaire Standardization and to ISO Working Group 45 on Community Response to Noise. Dr. Fidell is member of the Acoustical Society of America and the Technical Committee on Noise. He was on the Design Review Group for the FAA's Integrated Noise Model software. Dr. Fidell has provided consulting services to community, airport and government agencies involved in aircraft noise controversies and assessments and disclosures of aircraft noise impacts and has consulted on land use planning related to aircraft noise regulation. He is active in international standardization efforts for prediction of aircraft, rail and road noise impacts.

Dr. David Dubbink, is a JDA associated consultant and an Environmental Planning and Noise Management Specialist. He holds a PHD from UCLA in Urban Planning and Environmental Management. He is the designer and developer of ISIS (the Interactive Sound Information System). Dr. Dubbink is a member of the Acoustical Society of America, Institute of Noise Control Engineering, International Association for Impact Assessment and the Transportation Research Board, Committee A1F04, Transportation Related Noise and Vibration. He has provided training and consulting services on noise management to over 80 organizations worldwide.

Craig Burzych is an Air Traffic Operations Specialist, a JDA associated consultant and former career FAA Air Traffic Control Specialist. He spent 24 years working at the O'Hare Control Tower and 4 years working in the Chicago Midway Tower. He was detailed annually to lead the FAA Air Traffic Control support for the annual EAA Oshkosh "fly In" the single largest aviation show and exhibit held in the U.S. Chuck served as President of the National Air Traffic Control Association (NATCA) (Chicago ORD) 9 years and also was a NATCA Aviation Safety Inspector and a member of the FAA Runway Safety Action team for the Great lakes Region.

Rob Voss Senior Air Traffic Operations Subject Matter Expert (SME), is a JDA associated consultant and former career FAA Air Traffic Control Specialist, Operations Supervisor, Quality Assurance and Training Specialist, Plans and Procedures Specialist, Air Traffic Manager, Integration and Efficiency Specialist and finished his FAA career as a System Operations Senior Advisor. Rob spent more than 26 years with the FAA including assignments at Chicago Midway (MDW), San Francisco (SFO), Santa Rosa (STS), Scottsdale (SDL), San Carlos (SQL) and the Midwest Tactical Operations office. While working for several years outside of the FAA, Rob was an Air Traffic Consultant to the Deputy Airport Director (Noise Abatement) at SFO, where he provided analysis, advice and education involving aircraft noise and air traffic procedures and was the Project Manager for a FAR Part 150 noise exposure map update. He has also served as a contractor and Air Traffic Analyst at NASA-Ames Future Flight Central research and simulation facility.

Joe Del Balzo, JDA Founder and President, served as the highest-ranking career professional (Acting Administrator) in the Federal Aviation Administration (FAA). Both in his long career with FAA (where he also served as FAA's Executive Director of System Operations, Executive Director for System Development, Director of the Eastern Region and Director of the FAA Technical Center) and in his subsequent private role as an aviation consultant, he has earned wide respect for his expertise in a wide range of aviation issues.

5. Other Comments

I. Overview

- Throughout the decades, O'Hare International Airport has served as both travel gateway and important source of economic vitality for the City of Chicago, its suburbs and the State of Illinois.

- Millions of passengers—over 65 million in 2014-- pass through O'Hare each year bringing billions of dollars in commerce and jobs to the region. In 2014, O'Hare reclaimed its crown as the world's busiest airport, with just under 900,000 flights.

- O'Hare has a big impact on the economy. O'Hare already generates 450,000 jobs and $38 billion in economic activity for the Chicago region and State of Illinois. A modernized O'Hare means the creation of 195,000 more jobs, and another $18 billion in annual economic activity.

- Nearly 13,000 badged O'Hare employees live in the 5th CD; over 400 businesses in the 5th CD do business at the airport.

II. O'Hare Modernization Promises

- The $10-15 billion O'Hare Modernization Program—or OMP—was heralded in 2001 as the panacea for Chicago's air traffic woes.

- Officials, at the time of the unveiling, promised that "a lot" of cargo flights would shift to the Gary airport, as well as massive infrastructure and transit improvements on the west side of O'Hare to appease suburban critics.

- Increases in capacity and efficiency. Delays would shrink dramatically. Capacity would increase to 1.6 million operations a year and foul weather delays—long the Achilles heel of O'Hare-- would be reduced by as much as **95 percent.**

- A portion of the cargo traffic would be diverted to Gary airport.

- Western access to O'Hare would ease congestion and spur growth on the west side of the airport.

III. Results so far

- The results of OMP thus far—with one runway yet to be funded and built and another runway scheduled for opening in October 2015—have been lackluster at best. Statistics reveal that the billions already spent on new runways have done little to improve to either capacity or efficiency at the airport.
- As the Tribune recently reported: "Construction of two new O'Hare runways since 2008 to ease flight congestion hasn't yet solved a chronic delay problem, even more troubling because the annual number of flights today is much lower than it was 10 years ago. Through November of last year, O'Hare was dead last for on-time arrivals among the busiest U.S. hub airports, and second to last (ahead of Midway Airport) for departures."
- In fact, O'Hare finished 2014 dead last for on-time arrival performance and second to last for on-time departure performance of all major airports. (U.S. Bureau of Transportation Statistics)
- On-time departures for the 12 months **after** the opening of latest runway in October 2013 were down 5 percent for the year preceding the new runway and attending airspace changes, according to U.S. Dept. of Transportation statistics. And newspapers have chronicled that while air travel time has decreased, the amount of time planes spend taxiing has increased.
- The promised on-time improvements in bad weather have yet to materialize. For example, on-time departures for January 2014 was 47%--a far cry from the rosy predictions. (In January 2013—pre-airspace realignment--the on-time departure rate was 71%).

1

- Once the flights have landed, the issue of too many planes and too few gates creates its own dilemma. As one air traffic controller told our staff, "we can get the planes on the ground quicker but there are not enough gates to handle the flights."

2

- Cargo flights are still flying into O'Hare—the promised diversion of noisy flights to Gary never materialized.

3

- Meanwhile, western access to the field—along with a western terminal—remains on hold.

4

Comment	Response
1	Prior to the OMP airfield improvements, the arrival rate in poor weather was usually limited to 56 flights per hour in east configurations or 72 flights per hour in west configurations. Currently, the arrival rate in poor weather reaches 84 flights per hour in east configurations and 106 flights per hour in west configurations. Upon completion of the full parallel runway system, arrival rates in both east and west configurations will reach 106 flights per hour. Additionally, the FAA System Impact Delays data indicates a delay reduction of 57 percent in the last six years due to improvements already made to the O'Hare airfield. Irrespective of individual airline performance and BTS data reporting, FAA data confirms that OMP improvements have significantly enhanced O'Hare's ability to process aircraft arrivals and departures once those flights have started their journey to/from O'Hare. Please also refer to response to Comment No. 9 in Section 3.
2	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.
3	The City continues to provide facilities at the Airport to allow cargo operations. Cargo activity provides jobs and economic growth opportunities. We are not aware of a commitment to divert cargo flights. Our FAA grant assurances do not allow us to restrict access to a federally funded airfield to any certified aircraft operation. The CDA has supported improvements at Gary Chicago International Airport, and we will continue to market services there for both cargo and general aviation. Please also refer to response to Comment No. 10 in Section 3.

- Noise complaints continue to reach new heights. For April 2015, 42,162 complainants filed more than 408,000 noise complaints. In April 2013—before the air space realignment—1,863 complaints were lodged.

III. Issues

A. Noise

- Residents living miles from the perimeter of the airport are being subjected to decibel levels from the sky they never before experienced. As they like to say, they didn't move near O'Hare; O'Hare has moved to them.

- 65DNL is flawed metric. In numerous studies noise experts framed the problem with DNL, as "an abstract concept removed from common experience. A quantity of noise exposure expressed in units of DNL cannot be directly experienced by casual observation in the same sense that the maximum sound level of a single noise event can be heard." (Vincent Mestre, et.al. Technical Support for Day/Night Average Sound Level (DNL) Replacement Metric Research, 2011) 5

- Noise has been linked in various scientific studied to health, and researchers have recently turned their attention to the correlation between airport noise and cardiovascular disease. "Despite limitations related to potential misclassification of exposure, we found a statistically significant association between exposure to aircraft noise and risk of hospitalization for cardiovascular diseases among older people living near airports." (Francesca Dominici et.al. **Residential exposure to aircraft noise and hospital admissions for cardiovascular diseases: multi-airport retrospective study** *BMJ* 2013; 347 doi: http://dx.doi.org/10.1136/bmj.f5561 (Published 08 October 2013) Cite this as: BMJ 2013;347:f5561)

- Researchers at Purdue University have reported "there have been arguments made against the use of DNL to predict impacts other than annoyance. The results of studies on sleep disturbance support the hypothesis that DNL is not a good predictor of noise induced awakenings, and that awakenings are better estimated when using the level of each individual noise event (Fidell, Pearsons, Tabachnick, Howe, Silvati, and Barber, 1995)."

- The authors, Sarah McGuire and Patricia Davies, further state: "there is evidence from studies that aircraft noise affects sleep and that these changes in sleep may lead to health effects. Because the current community impact metric DNL is not a measure of sleep disturbance even with the 10 dB night penalty, and existing awakening and sleep

Comment	Response
4	The City is committed to providing western access to the Airport. However, one of the barriers to western access is the conflict with Runway 14R-32L. Please also refer to response to Comment No. 11 in Section 3.
5	While the City is supportive of the FAA's re-evaluation of the DNL noise metric, DNL remains the FAA's standard for determining noise impacts and basis for sound insulation programs nationwide. Please also refer to response to Comment No. 5 in Section 3.

structure models all have limitations, there is a need to develop a new sleep model that could be used to create sleep and health effect contours, which are maps indicating noise impact in communities."

- But aircraft noise is not a theoretical construct suitable only for academic study. Constituents have repeatedly told us that aircraft noise has dramatically changed their lives.

Recommendations: We know the FAA is in the midst studying the efficacy of 65DNL. We support that study insofar that is leads to a more useful and practical metric.

Meanwhile, we believe that CDA and FAA should consider a new round of noise measurements and modeling that could lead to pairing runways with specific aircraft types to minimize noise pollution.

Such an effort might prove particularly effective in bringing relief to residents during the so-called Fly Quiet hours, when fewer operations afford air traffic controller more flexibility.

6

B. Efficiency

- While OMP—as originally envisioned by the City--is not yet complete, the results after the completion of two—and soon to be three—runways raises serious questions about the efficacy of the overall project.
- In 2014—a full year after the latest runway was commissioned and the new airspace plan implemented--O'Hare ranked last in on time arrivals and second to last on on-time departures, according to U.S. Department of Transportation statistics. http://www.rita.dot.gov/bts/subject_areas/airline_information/airline_ontime_tables/2014_12/
- The percentage of flights delayed—both arrivals and departures—has climbed from about 22 percent in 2005 to 27 percent in 2014—despite the fact that there were 100,000 more operations in 2005. Meanwhile, the percentage of on-time arrivals has dropped over that same nine year period from about 75 percent in 2005 to 68 percent in 2014, according to Bureau of Transportation statistics.
- Despite the promise of better performance in foul weather, weather delays have grown, as have cancellations. Cancellation grew to nearly 5 percent of flights in 2014, the first full year of the new airspace configuration, versus around 2 percent for 2012, the last full year of the old runway pattern.

7

Comment	Response
6	While the City is supportive of the FAA's re-evaluation of the DNL noise metric, DNL remains the FAA's standard for determining noise impacts and basis for sound insulation programs nationwide. Please also refer to response to Comment No. 5 in Section 3.
7	Prior to the OMP airfield improvements, the arrival rate in poor weather was usually limited to 56 flights per hour in east configurations or 72 flights per hour in west configurations. Currently, the arrival rate in poor weather reaches 84 flights per hour in east configurations and 106 flights per hour in west configurations. Upon completion of the full parallel runway system, arrival rates in both east and west configurations will reach 106 flights per hour. Additionally, the FAA System Impact Delays data indicates a delay reduction of 57 percent in the last six years due to improvements already made to the O'Hare airfield. Irrespective of individual airline performance and BTS data reporting, FAA data confirms that OMP improvements have significantly enhanced O'Hare's ability to process aircraft arrivals and departures once those flights have started their journey to/from O'Hare. Please also refer to response to Comment No. 9 in Section 3.

- By almost every metric, post-October 2013 performance at O'Hare is down or, at best, flat. In a recent conversation with top regional FAA officials, my staff asked why O'Hare performance was not showing any improvements—despite billions spent on concrete and the new east-west flow. FAA said they, too, were stumped. 7

- New runway, 28L/10R is about to be commissioned. Neither the FAA nor CDA can explain exactly how this $500 million project will be used. 8

- Meanwhile, current plans call for decommissioning of the 14/32 runways, despite calls by air traffic controllers to retain them as valuable cross wind and foul weather options. 9

- Despite airline opposition, O'Hare is in desperate need of more and newer gates. Experts agree that this deficit contributes significantly to O'Hare poor performance. 10

Recommendations: CDA must keep the diagonal runways operational. Additional runways mean additional options and greater efficiency. It also provides air traffic controllers and CDA with potential means for dispersing the tidal wave of noise, which has drowned our neighborhoods. 11

CDA, FAA and airlines need revisit airspace design to explore methods to minimize noise intrusion—at night as well as during the day. We need to explore rotating runways—when safety and efficiency permit—to bring relief to noise-afflicted areas, perhaps designing routes or runway usage that best minimizes the impact of arriving and departing aircraft. 12

Longer, higher approaches. Airlines need to take modest operational steps to ease the impact of their operations on the City and suburbs. Airlines should explore flying ILS approaches, which will keep planes at higher altitudes when approaching the field and diminish the short-cuts across neighborhoods that pilots fly visual approaches to the field. 13

C. Terminal inefficiency

- In a 2014 ranking of the world's top 100 airports, O'Hare ranked 96th—down from 84th in 2013.

- As the Chicago Tribune illustrated in its recent story that highlighted the world's most regarded airport—Changi Airport in Singapore—O'Hare "is feeling its age. Built for a different era of air travel, O'Hare bulges with congestion on the tarmac and in its terminals, where 70 million passengers passed through last year. A new terminal hasn't been built since 1993, and the city and the airlines disagree over how to proceed with more aircraft gates and amenities for fliers."

Comment	Response
8	The FAA's EIS Re-Evaluation documents released July 17, 2015, indicate that Runway 10R-28L is anticipated to be a primary arrival runway utilized by approximately five percent of total operations on an annual basis. Please also refer to response to Comment No. 13 in Section 3.
9	With almost two years of operations under the East/West configurations, time periods of alternate configurations have been minimal. Alternate configurations exist with or without Runways 32R and 32L with varying levels of operational throughput. In 2010, Runway 32L was shortened, closing the runway to arrivals for more than 5 years. When operating on northwest configurations, only Runway 32R is available for arrivals.
10	The CDA agrees with this comment and is actively and continuously working with the airlines to more efficiently utilize the existing gates and aircraft parking positions. Additionally, the airlines are pursuing technology and operational changes intended to maximize gate utilization and efficiency. As envisioned by the modernization program, the CDA remains committed to the need for additional terminal/gate availability. Please also refer to response to Comment No. 4 in Section 3.
11	As Runway 10R-28L and other new east-west parallel runways open, the use of Runways 14L-32R and 14R-32L will continue to decrease due to safety issues such as CRO, intersecting runway operations, and complex/irregular geometry. Retaining these runways provides construction challenges for the new east-west parallel runways and also increases operating and maintenance costs. For these reasons, it is not feasible or prudent to retain the use of these runways. Please also refer to response to Comment No. 6 in Section 3.

- The Tribune noted that retail sales at the upscale Changi, with its indoor waterfall and 350 retail stores, totaled roughly $1.5 billion. In comparison, concessions sales at O'Hare in 2014 totaled $432.6 million, up from $389 million in 2013, according to the Chicago Department of Aviation. At O'Hare, there are 84 retail outlets and 122 food and beverage locations."

- As noted above, O'Hare needs new gates among other improvements.

Recommendations: I agree with your recent statements that O'Hare needs new gates. I also applaud your call for improved public transit to and from the airport. And I agree that deicing and other airport procedures need streamlining and modernizing.

But these improvements need to be part of broader context that addresses the issues of noise pollution and air traffic efficiency. Improving only one aspect of O'Hare operation—while ignoring other key elements—will continue to cripple our collective efforts to make O'Hare the transportation gem—and good neighbor—it can be.

Comment	Response
12	The CDA is confident that the FAA has designed the airspace in the most efficient and safe configuration possible. The existing airspace design has undergone thousands of hours of programming, evaluation, and training. It is possible that upon completion of the parallel runway system, opportunities may emerge to improve airspace configuration and/or procedures as a result of technologies, evolving regulations, or other factors. To the extent that those opportunities arise, the CDA will work with the FAA, airlines, and other stakeholders to identify and evaluate those options. Please also refer to response to Comment No. 7 in Section 3.
13	Use of ILS approaches during Fly Quiet hours would enable more consistency of arrival paths. While use of ILS procedures on arrival may bring potential noise benefits (perhaps reducing overall noise impacts), flight paths would be more concentrated, potentially increasing noise impacts for certain residential areas. ILS procedures could potentially create additional operational delays, increased fuel burn, and other environmental concerns. As noted, air traffic control procedures are the responsibility of the FAA and often the individual airlines. The requirements for visual approaches and Fly Quiet procedures are not mutually exclusive. This matter can be provided to the Air Traffic Manager at Chicago Terminal Radar Approach Control (TRACON) for review. Please also refer to response to Comment No. 1 in Section 3.

6. FAiR Agenda for Community Conversation #2

FAiR
Allocation in Runways

Use all existing and new runways
Neighborhood-based air traffic plan
Mandatory Fly Quiet
Noise monitoring and abatement
Environmental Impact Statement

FAiR gathers democratically as a citizen led initiative to build community

Agenda for Community Conversation #2

July 20, 2015

6-8pm

1. Introductions - FAiR, CDA, SOC, FAA, Elected Officials, ONCC
2. FAiR Briefing Packet (available online at www.fairchicago.org)
3. Purpose of Community Conversations - *To Find Solutions to Make O'Hare a Good Neighbor*
4. SOC Statement in Support of Solutions
5. Chicago Department of Aviation Responses to FAiR Questions
6. Community Conversation on Solutions
    a. Fly Quiet
    b. Equitable distribution of traffic
    c. Diagonals
7. Close and Next Meeting

FAiR is a coalition of community organizations dedicated to the equitable distribution of O'Hare aircraft traffic

Contact: Jac Charlier • (773) 266-1420 • info@fairchicago.org

FAiR
Allocation in Runways

FAiR Solutions:
Use all existing and new runways
Neighborhood-based air traffic plan
Mandatory Fly Quiet
Noise monitoring and abatement
Environmental Impact Statement

FAiR gathers democratically as a citizen led initiative to build community

Summer 2015

FAiR Coalition Policy and Solutions Statement

The O'Hare Modernization Plan (OMP) Project includes Federal Aviation Administration (FAA) changes to landing and takeoff patterns that took effect October 17, 2013. The OMP drastically increases air traffic over both North and Northwest (NW) Chicago and the near NW suburbs by shifting airplane traffic that formerly arrived and departed from many directions, into landings and takeoffs from mainly two directions: East and West, directly over the densely populated areas of North/NW Chicago and the near NW suburbs. In its current phase, roughly 55% of nighttime departures are on routes directly over the near NW suburbs, and roughly 70% of nighttime arrival routes are directly over the N/NW side of Chicago (source: Chicago Department of Aviation ANMS Report 12/2014).[1]

This massive shift in airplane traffic has put the burden of noise, fuel, air and visual pollution almost solely on the residents of North/NW side Chicago neighborhoods and near NW suburbs. Nearly all these communities predate O'Hare's conversion to a commercial airport in the 1950s and this shift is neither necessary nor desirable. This concentrated increase in airplane traffic has negatively impacted the health and quality of life for residents and businesses on the North/NW side of Chicago and near NW suburbs.

The Fair Allocation in Runways (FAiR) Coalition (www.fairchicago.org) proposes the following solutions:

1. **Maintain and utilize all existing and new runways, including both sets of diagonal runways.**
2. Immediately halt the October 2013 landing and takeoff plan. Devise, instead, a neighborhood-based plan, working with community groups, businesses, the CDA, FAA, SOC and ONCC for **an equitable distribution of air traffic among existing and new runways: north/south, east/west, day/night, city/suburb.**
3. **Make the Fly Quiet program the official mandatory policy for O'Hare.**[2]
4. **Expand noise monitoring and abatement programs** to ensure specific communities are not unduly burdened.
5. **Conduct a Supplemental Environmental Impact Study (SEIS) to verify what the actual, lived impacts since October 17, 2013 are from the new plan.** Significant changes have occurred since the original EIS was done in 2005 and this must be addressed.[3]

Sign the FAiR Online Petition to halt the current takeoff and landing plan and more fairly allocate air traffic among new and existing runways.

www.fairchicago.org
(Scroll down to the "Sign Petition" button)

FAiR is a coalition of community organizations dedicated to the equitable distribution of O'Hare aircraft traffic

Contact: Jac Charlier • (773) 266-1420 • info@fairchicago.org

FAiR
Allocation in Runways

FAiR Solutions:
Use all existing and new runways
Neighborhood-based air traffic plan
Mandatory Fly Quiet
Noise monitoring and abatement
Environmental Impact Statement

FAiR gathers democratically as a citizen led initiative to build community

[1] The new OMP condenses O'Hare air traffic to three main runways: 9R/27L (Thorndale), 10L/28R (Lawrence), and 10C/28C (Wilson). In addition, the project intends to ultimately shift 85% of all nighttime landings to routes directly over the North/Northwest side of Chicago.

[2] A SEIS is needed for the following reasons:

- The current method for determining if sound level from planes is high enough to qualify for soundproofing is based on averaging sound over a 24-hour period (DNL--Day-Night Level), which does not accurately reflect the stress of noise to area residents.
- The noise contour has not been updates since the 2005 EIS "Record of Decision" (ROD) for O'Hare modernization. An update is required at the end of the modernization plan plus five years, which tentatively puts this update at 2025. Homes outside the current EIS contour that are experiencing greatly increased levels of noise and frequency of flights, will not be offered soundproofing until that time.
- The loss of hundreds of thousands of ash trees since 2005 was not addressed in the 2005 EIS, which cited suburban, urban and Cook County Forest Preserve District trees as a component of the air and noise pollution mitigation. The loss of these trees is significant. According to a study completed by the U.S. Department of Agriculture, Chicago trees alone save taxpayers millions of dollars in energy savings as well as reducing pollution. (Gen. Tech. Rep. NE_186, 1994)
- Carbon dioxide emissions from jet aircraft are not included in the 2005 EIS and are not regulated.
- Ozone and particulate matter measured and reported in the 2005 EIS are now well above current EPS standards.
- The FAA's NextGen technology will allow for more planes to land and take off on each runway, concentrating noise into a virtual railroad track in the sky from approaching or departing runways.

[3] Fly Quiet is currently a voluntary program that encourages pilots and air traffic controllers to use designated nighttime preferential runways and flight tracks that direct aircraft over less populated areas, such as forest preserves, highways, and industrial areas. (source: Chicago Department of Aviation [CDA])

Register aircraft noise complaints with the CDA in 1-click!
Find the FAiR-created noise complaint 1-click app at
www.fairchicago.org
and bookmark it on your computer.

(City residents can also call 311, suburban residents can call 800-435-9569)

JOIN FAiR! Get involved! Make your voice heard over the roar of the planes!

Click the "Join Us" button at www.fairchicago.org

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Allocation in Runways

Use all existing and new runways
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Mandatory Fly Quiet
Noise monitoring and abatement
Environmental Impact Statement

Saving and Maintaining O'Hare's Diagonal Runways:
An Existing Solution with Potential for Immediate, Positive Impacts on Communities

1. **The diagonal runways provide the ideal solution for the Fly Quiet program:**
   - Most compatible land use, with flight paths over large areas of industrial parks, commercial property, I-90 corridor and Busse Woods: the least residential areas.
   - 14/32s are capable of handling larger 4-engine passenger and cargo aircraft (9686' x 200' and 10005' x 150') and are controlled by a 24-hour ATC tower.
   - Because the South Runway 10R/28L will have minimal utilization, arrivals from the west, will not handle any overnight traffic and will not therefore provide any substantial relief, the 14/32 diagonals could be used, at a minimum, for overnight air traffic to alleviate noise over impacted communities.

2. **Each diagonal runway is optimally positioned to improve performance and efficiency:**
   - The 14/32 diagonal runways provide a competitive advantage to O'Hare:
     - another method to handle operations other than the East/West flow - the efficiency of using the corners versus the far sides.
   - Both 14/32s are well positioned near the passenger terminals at the center of the airport which would reduce taxi time (currently a significant issue.)
   - 14L/32R is well positioned for cargo flights:
     - To the north - the newly constructed DHL Cargo Facility.
     - To the south - the under-construction Aeroterm Cargo Facility.

3. **The diagonal runways solve the problem of equitable distribution of air traffic east, west, north, south, day and night:**
   - Communities historically in flight paths or in new OMP paths would all see reduced quantities of flights during non-peak operations (weekends, nighttime) instead of the current heavy and constant stream of planes for multiple days in a row at all hours.

4. **The diagonal runways provide the solutions for maximum safety in a variety of situations:**
   - Departures in crosswinds or tailwinds (and until May 2010 was ideal for arrivals in NW winds).
   - Options for multi-directional landings and departures.

5. **Money used to replace each modern, efficient 14/32 diagonal runway and related taxiways could be used on other airport improvements such as additional gates, de-icing pads, runway resurfacing and equipment upgrades.**

6. **The diagonal runways are a built-in mechanism to more widely disperse the Ultrafine Particle (UFP) pollution from aircraft.**
   - While complaints are mostly related to noise, many new studies show air pollution around airports is causing chronic illnesses and premature deaths. The EPA has regulations on Fine Particle pollution, but some aircraft emit ultrafine particles which are much more harmful.
   - The diagonals give O'Hare an edge in meeting this challenge of the future by providing an existing ability to disperse operations, therefore dispersing air pollution.
   - Under the current OMP plan, 85% or more of airplane emissions will be concentrated over the four east/west flight paths with unmeasured and yet untold ill-health effects on citizens.

July 9, 2015

Dear Commissioner Evans,

As we work with the Mayor's office to settle on a date and time for our second Community Conversation, know that FAiR is looking forward to meeting with you again and is coming to this process in the spirit of true dialogue, and a real back-and-forth among the parties. Because we do want this to be a genuine conversation, we want and need to hear more from you before the next community conversation, as well as the FAA, so that we can have the most productive conversations possible and work toward the goal shared by all parties gathered at the table: providing meaningful solutions that will improve the quality of life for O'Hare's neighbors.

On our end, we are doing the same for you and providing feedback to your responses to the 5 questions we asked you in the first community conversation.

Referencing question 1, ***What do you see as the starting point for moving forward toward solutions?***

- FAiR asks that we receive responses to the following list of technical questions (see below).
- FAiR supports making the airport more efficient with such improvements as de-icing pads and more gates to existing terminals, as SOC suggested, but more gates would create more capacity/operations which would create more noise/pollution. This would need to be offset by an equitable distribution of air traffic.
- FAiR asks that the FAA be at the table and participate in the 2nd and 3rd community conversations.

Referencing question 2, ***How will you continue to work with FAiR to ensure citizens have a viable seat at the table for decisions about O'Hare?***

CDA, FAiR, SOC, ONCC and Legislators are presently at the table, but not the FAA. The FAA is a co-decision maker in this process and we will be inviting them to participate in the next conversation.

Referencing question 3, ***What have you done to successfully address noise impacts to the satisfaction of impacted residents?***

FAiR supports the importance of noise mitigation programs and quieter aircraft. Acknowledging that adjusting flight tracks involves many facets, doing so would alleviate noise/pollution and the top issue for complaints: the <u>frequency</u> of flights over homes for many consecutive hours, many days in a row. Allocating air traffic in all directions: north/south, east/west, day/night would provide immediate relief. If nighttime noise weighs more heavily, then that would point to utilizing the most conducive Fly Quiet runways: the 14/32 diagonals.

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Referencing question 4, ***With everything FAiR has presented and submitted today, when can we have a written response to our proposed solutions, including your ideas for moving the conversation forward?***

FAiR expects responses to the technical questions submitted below prior to the second scheduled community conversation so that we can have a meaningful and productive discussion. We expect that the experts at the FAA and CDA, with their experience and familiarity of operations at O'Hare, can have ready and give an idea of what alternatives might be pursued in both the short-term and long-term so we have a starting point for how O'Hare can become a good neighbor.

Referencing question 5 (To Ms. Watkins), ***When will you be speaking directly with Mayor Emanuel about his expected attendance at the remaining meetings?***

FAiR reiterates its demand, now for the sixteenth time, for Mayor Emanuel's attendance at the community conversations. The Mayor opened the door to the possibility of keeping the 14/32 diagonals in use in his comments made during the mayoral debate at WTTW on March 31, 2015. As the "owner" of O'Hare, his presence and contribution to the discussion about a solution he himself raised is essential. We welcome the Mayor to the table that has been set for the airport he owns, and want to see him standing together with us as we present solutions.

Additional Technical Questions--kindly respond by Thursday, July 16. Thank you.

1. SB-636, which would raise the number of operational runways from eight to ten, is on the Governor's desk awaiting his signature. Passage of SB-636 would provide the mechanism to extend our current timeframe to explore, test and analyze the maximum number of potential solutions without impeding the OMP. How do you see SB-636 playing a role in our shared goal of finding solutions? 1
2. Why have the 14/32 diagonals not been fully utilized for arrivals in the last year? 2
3. What specific Navaids equipment has already been removed from each of the 14/32 diagonals, and because nothing irreparable has been done, how easily can that equipment be replaced? 3
4. How has the removal of the Navaids Equipment limited the current and future use of the 14/32s? 4
5. Is there any correlation/conflict between 14L/32R and the new 10R/28L with regard to operations and safety, other than the present state law that limits ORD to eight operational runways? 5
6. According to the CDA/FAA's own data, from May 2014 to April 2015, there were 14,632 **departures to the north** from diagonal runways. The departure numbers are: 6
    a. 32R - 6,831 - The most amount of departures. Runway is scheduled to be decommissioned.
    b. 32L - 4,433 - Runway is scheduled to be decommissioned.
    c. 04L - 3,358 - The least amount of departures. Runway is scheduled to remain commissioned.

    There were 11,264 combined operations from the 14/32 diagonal runways, both due to be decommissioned. Where would those operations be reconfigured?

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Contact: Jac Charlier • (773) 266-1420 • info@fairchicago.org

Comment	Response
1	SB-636 increases the number of runways allowed at ORD from eight to ten. As previously discussed, CDA intends to close Runway 14L-32R on August 20, 2015, in conjunction with the opening of new Runway 10R-28L. Therefore, ORD will only have eight operational runways at the commissioning of Runway 10R-28L in October 2015, making SB-636 unnecessary. CDA is committed to continue working with airport neighbors to find solutions that minimize noise impacts without negatively impacting safety and efficiency at ORD. These solutions are discussed in a separate document. Please also refer to response to Comment No. 18 in Section 3.
2	Current airfield configurations do not include a provision for utilizing Runways 14L-32R and 14R-32L as primary arrival runways, due in part to efficiency and safety concerns stemming from intersecting runway operations. The implementation of CRO rules in April 2014, along with the closure of Runway 14R-32L for a significant portion of last year due to ongoing construction projects at the airport, have also been a factor in the decreased overall use of these runways. Please also refer to response to Comment No. 19 in Section 3.
3	The FAA shut down the ILS glideslope and localizer antennas for Runway 14L-32R in May 2015. Please also refer to response to Comment No. 20 in Section 3.
4	Although the ILS system was removed from Runway 14L-32R, each runway end still maintains GPS-based approach capability. However, not all aircrew and aircraft have the training and equipment necessary to utilize this type of approach. Please also refer to response to Comment No. 21 in Section 3.

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7. Usage of 32R since the October 2013 reconfiguration has demonstrated it is a viable option and is necessary for the safety and efficiency of airport operations. In the 12 month period from May 2014 to April 2015, Runway 32R was utilized for departures ranging from 10 to 55 per hour on 100 separate days. The most significant usage of 32R was in conjunction with 28R and 22L at peak departure times or when strong crosswinds limit the use of 22L. On 8 days strong winds from the NW and NNW shifted more than 100 departures to 32R for a total of 2,004 operations, 29% of the total operations of the runway over the past 12 months. The most severe weather occurred on 10-31-14 in which 32R was the primary departure runway with 514 of the 725 departures. Given the current usage of 32R, particularly in severe weather, what justification can provided for the decommissioning? 7

8. The new Aeroterm Cargo Facility under construction is projected to increase cargo capacity by at least 50 percent. Where would those additional operations be configured? 8

9. How will the new East/West runway 10R/28L to be commissioned this October be utilized: Departures? Arrivals? How many projected operations? 9

10. FAiR was briefed that the new SATCT will not be a 24 hour tower and the new south runway 10R/28L that is scheduled to be commissioned in October 2015 will not handle overnight operations. Because this new runway will not absorb any current nighttime traffic, what suggestions can you make to help alleviate nighttime air traffic over currently impacted communities? 10

Thank you for your responses and consideration as we work together toward solutions.

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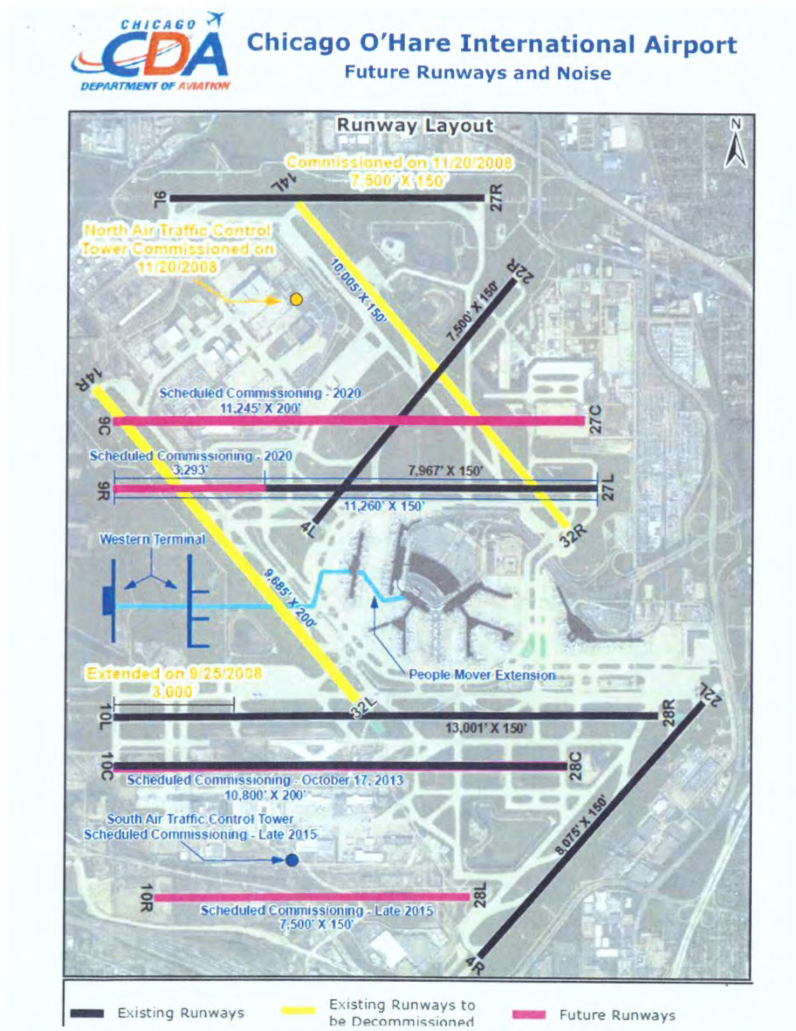
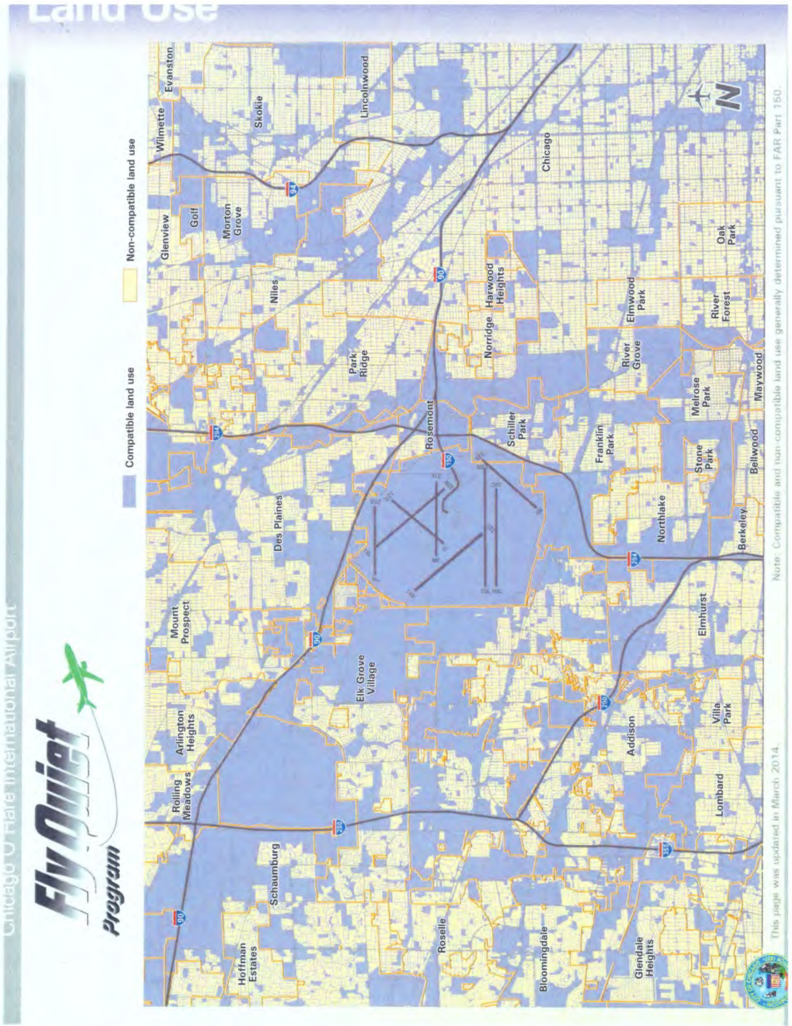
Comment	Response
5	As Runway 10R-28L and other new east-west parallel runways open, the use of Runways 14L-32R and 14R-32L will decrease due to safety issues such as CRO, intersecting runway operations, and complex/irregular geometry. Retaining these runways provides construction challenges for the new east-west parallel runways and also increases operating and maintenance costs. Please also refer to response to Comment No. 22 in Section 3.
6	The number of average daily operations on these runways over the last year, particularly during the periods in which they generally occur, can be managed by the departure runways planned to remain as part of the full parallel runway system as analyzed in the OMP EIS. Please also refer to response to Comment No. 23 in Section 3.
7	Runway 14R-32L was closed for a substantial amount of time during the period from May 2014 to April 2015, including the above referenced date of October 31, 2014, due to ongoing construction projects at the airport. Had Runway 14R-32L been open and available during this period, it is likely that it would have been utilized substantially more than Runway 14L-32R. Please also refer to response to Comment No. 24 in Section 3.



Comment	Response
8	The Aeroterm cargo and associated collateral development under construction at ORD, as shown on the Future ALP, is similar in size and scope to the cargo facility evaluated by the 2008 Environmental Assessment. Additionally, cargo operations associated with this facility remain consistent with what was evaluated as part of the 2005 OMP EIS. As air cargo operations tend to occur during off-peak demand periods of the day, cargo operations associated with this cargo facility could be efficiently managed by the full parallel runway system. Please also refer to response to Comment No. 25 in Section 3.
9	The FAA's EIS Re-Evaluation documents released July 17, 2015, indicate that Runway 10R-28L is anticipated to be a primary arrival runway utilized by approximately five percent of total operations on an annual basis. Please also refer to response to Comment No. 26 in Section 3.
10	As previously noted, the CDA is committed to continuing analysis and mitigation on noise issues. Please also refer to response to Comment No. 27 in Section 3.



FAiR
Allocation in Runways

Airplane Noise Complaints
as per CDA and chicagonoisecomplaint.com

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Sept. 2013

Map data © Google, DigitalGlobe

Red dots represent the number of individuals complaining about aircraft noise in a location. Larger dots reflect more individual complainants.

In September 2013 - before the arrival and departure configuration changes - 548 complainants were distributed across 36 communities.

Planes are now flying over more populated areas, in a concentrated pattern, resulting in surging complainants and complaints. (See below)

TODAY

Map data © Google, DigitalGlobe

In April 2015 there were 42,162 individual complainants recorded by the CDA.

Flights are now tightly aligned over the neighborhoods directly east and west of O'Hare. The widest points of the OMP-predicted contour (seen at left) extend approx. 5 miles east and 3.5 miles west. Complaints today extend well beyond that, including 13 miles east at the lakefront and 10 miles west of O'Hare.

These areas have always had airplane noise, but now the volume and frequency has dramatically increased, with frequency being the top problem identified by 90% of survey takers.

O'Hare Noise Contours Graphic: Courtesy of Chicago Department of Aviation

Comparing periods before and after the October 2013 runway changes, we see:

5,070% increase in complainants since 2013.
17,722% increase in complaints since 2013.

30,401 complainants were recorded by the CDA in May 2015 alone.
By contrast, 588 complainants were logged in May 2013.

April 2015 has been the top month ever with 42,162 complainants logged by the CDA.

Over 1.3 million complaints were recorded by the CDA over January to May 2015.
By contrast 7,469 complaints were logged over January to May 2013.

Over 2.3 million complaints have been filed through chicagonoisecomplaint.com since 2/1/2015. We are now averaging over half a million complaints a month.

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FAiR Data Analysis for 14/32 Diagonal Use, May 2014 - April 2015

The 14/32 diagonal runways are already being used safely and efficiently now, with the parallels. FAiR maintains that continued use of the 14/32 diagonal runways is possible and presents an existing, immediate solution with the potential to have an immediate impact in more equitably distributing flights around O'Hare.

Page 2

The chart "O'Hare Diagonal Departures to the North" shows the departure totals of the three available diagonals in the North airfield May 2014 - April 2015 and the time of day these departures occurred. 11,264 departures occurred on the diagonals during this period.

- Runways were viable at all hours
- 32R had significantly more daytime use than the others
- 32R had significantly more total departures
- 4L was least utilized

Pages 3-5

The tables on pages 3-5 drill down into how 32R was used for its 6,831 departures. Page 3 shows that there were 100 total days on which more than 10 departures (green) occurred in an hour. We can see that the overall activity tracks the time of day of the first chart, often occurring during peak morning and evening departure times. In addition, ***a number of days have more than 100 departures (red)***. Comparing to weather data, the common trait on eight of these days was strong winds from the NNW to WNW.

Pages 4-5

These charts illustrate the interaction between the wind and departures on 32R for those eight days with more than 100 departures. 32R was used either to supplement or completely replace departures on 22L when 22L was under a strong crosswind. This specific role accounted for 2,004 of the 6,831 operations, or 29 percent of the usage for the year. On 10/31/14, 32R was the primary runway, accounting for more departures than 28R. This would seem to indicate that 32R was in fact THE safest choice given the weather conditions, since so many other runways were available and unused.

Pages 6-7

The charts on pages 6-7 examine current versus projected arrival demand. Current arrival demand seldom requires the 3 independent runways. Referring to the April 2015 tables, the diagonals used were: 14R for arrivals, and 14L, 14R, 32L, and 32R for departures, **mostly during fly quiet hours**. Given that demand is lowest overnight, and that disrupted sleep is a top complaint of residents, the 14/32 diagonals are the ideal Fly Quiet runways. Until demand requires it, the diagonal runways can and should be part of the solution for dispersing air traffic more equitably.

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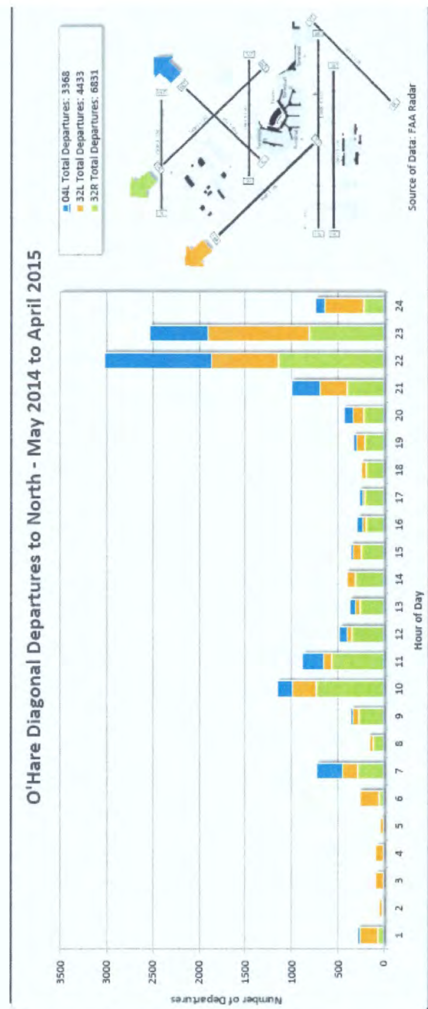


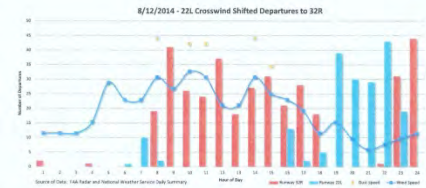
Runway 32R Departure Operations May 2014 to April 2015

Source of Data: FAA Radar (Only days with 10+ operations per hour are displayed)

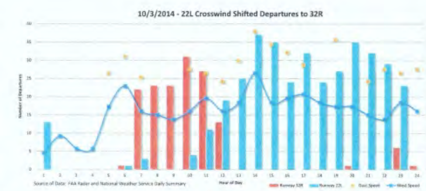
Table Legend: 10+ Departures per Hour; 100+ Departures per Day with 22L Crosswind

Tables and Charts - Days with 100+ Departures with 22L Crosswind

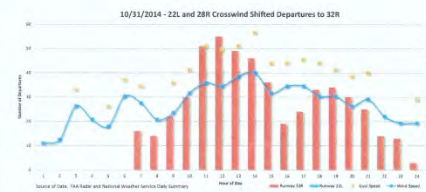
8/12/2014 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	0	5	2	WNW	6.9	
01:00-02:00	0	2	0	NNW	6.9	
02:00-03:00	0	3	0	NW	6.9	
03:00-04:00	0	0	1	NNW	9.2	
04:00-05:00	0	0	0	NNW	17.3	
05:00-06:00	1	5	0	NNW	13.8	
06:00-07:00	10	16	0	NNW	13.8	
07:00-08:00	2	41	19	NNW	18.4	26.5
08:00-09:00	0	53	41	NW	16.1	
09:00-10:00	0	38	26	NW	19.6	25.3
10:00-11:00	0	47	24	NW	18.4	25.3
11:00-12:00	0	40	37	NNW	12.7	
12:00-13:00	0	49	18	NW	12.7	
13:00-14:00	0	30	27	NNW	18.4	26.5
14:00-15:00	0	34	31	NW	15	20.7
15:00-16:00	13	33	21	NNW	13.8	
16:00-17:00	2	31	28	North	11.5	
17:00-18:00	5	36	18	NNW	6.9	
18:00-19:00	39	51	0	NW	9.2	
19:00-20:00	30	45	0	West	5.8	
20:00-21:00	29	48	0	WSW	3.5	
21:00-22:00	43	52	1	WSW	4.6	
22:00-23:00	19	20	31	West	5.8	
23:00-24:00	0	0	44	West	6.9	
Runway Total	193	699	389			



10/3/2014 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	13	31	0	South	4.6	
01:00-02:00	9	4	0	South	9.2	
02:00-03:00	0	0	0	SSW	5.8	
03:00-04:00	0	2	0	SSW	5.8	
04:00-05:00	0	3	0	West	17.3	26.5
05:00-06:00	1	1	1	NW	23	31.1
06:00-07:00	3	13	22	NW	16.1	25.3
07:00-08:00	0	32	23	WNW	15	
08:00-09:00	0	42	23	West	13.8	
09:00-10:00	4	45	31	WNW	16.1	27.6
10:00-11:00	11	40	27	WNW	19.6	26.5
11:00-12:00	19	26	13	WNW	16.1	24.2
12:00-13:00	25	38	0	WNW	18.4	29.9
13:00-14:00	37	45	0	West	26.5	38
14:00-15:00	35	41	0	West	18.4	34.5
15:00-16:00	24	51	0	West	19.6	32.2
16:00-17:00	32	39	0	West	20.7	28.8
17:00-18:00	24	36	0	West	18.4	
18:00-19:00	27	47	0	West	17.3	35.7
19:00-20:00	35	40	1	West	17.3	
20:00-21:00	32	48	0	West	15	24.2
21:00-22:00	29	49	0	West	13.8	27.6
22:00-23:00	23	16	6	West	18.4	26.5
23:00-24:00	0	27	1	West	16.1	27.6
Runway Total	374	738	148			

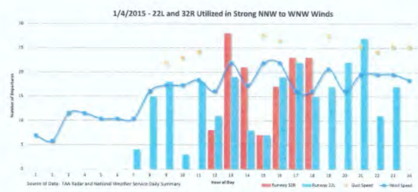


10/31/2014 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	0	3	0	West	9.2	
01:00-02:00	0	1	0	NW	10.4	
02:00-03:00	0	2	0	NNW	21.9	27.6
03:00-04:00	0	0	0	NNW	17.3	
04:00-05:00	0	1	0	NNW	15	21.9
05:00-06:00	0	9	0	NNW	25.3	31.1
06:00-07:00	0	15	16	NNW	23	28.8
07:00-08:00	0	17	14	NNW	17.3	
08:00-09:00	0	39	22	NNW	19.6	29.9
09:00-10:00	0	11	30	NNW	26.5	34.5
10:00-11:00	0	0	51	North	29.9	42.6
11:00-12:00	0	0	55	NNW	28.8	41.4
12:00-13:00	0	1	49	North	32.2	42.6
13:00-14:00	0	0	46	North	33.4	47.2
14:00-15:00	0	0	36	North	26.5	36.8
15:00-16:00	0	0	19	NNW	28.8	36.8
16:00-17:00	0	0	24	North	28.8	38
17:00-18:00	0	0	33	North	25.3	36.8
18:00-19:00	0	0	34	North	25.3	34.5
19:00-20:00	0	0	30	North	21.9	32.2
20:00-21:00	0	8	25	North	24.2	33.4
21:00-22:00	0	17	14	North	18.4	
22:00-23:00	0	12	13	North	16.1	
23:00-24:00	0	28	3	North	16.1	24.2
Runway Total	0	164	514			

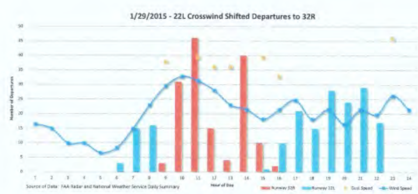


11/6/2014 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	0	3	0	SW	11.5	19.6
01:00-02:00	0	3	0	WSW	9.2	
02:00-03:00	0	2	0	WSW	10.4	
03:00-04:00	0	0	0	West	9.2	
04:00-05:00	0	1	0	West	13.8	
05:00-06:00	2	5	0	WNW	12.7	
06:00-07:00	18	28	0	NW	16.1	26.5
07:00-08:00	22	40	0	NW	24.2	31.1
08:00-09:00	31	48	0	NW	23	33.4
09:00-10:00	12	56	15	NNW	21.9	31.1
10:00-11:00	0	40	29	NNW	23	31.1
11:00-12:00	0	42	29	NW	23	33.4
12:00-13:00	0	37	19	NNW	23	34.5
13:00-14:00	0	52	32	NNW	20.7	31.1
14:00-15:00	0	38	14	NNW	19.6	34.5
15:00-16:00	0	38	23	NNW	24.2	31.1
16:00-17:00	0	38	19	NNW	17.3	32.2
17:00-18:00	0	37	36	North	18.4	28.8
18:00-19:00	0	44	25	North	18.4	
19:00-20:00	0	45	20	NNW	18.4	
20:00-21:00	21	46	7	North	16.1	26.5
21:00-22:00	25	49	0	North	10.4	
22:00-23:00	0	44	35	North	11.5	
23:00-24:00	0	15	0	North	11.5	
Runway Total	131	751	303			

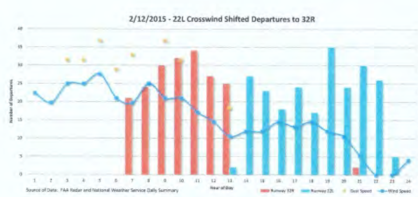
1/4/2015 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	0	7	0	North	6.9	
01:00-02:00	0	3	0	North	5.8	
02:00-03:00	0	4	0	NNW	11.5	
03:00-04:00	0	2	0	NNW	11.5	
04:00-05:00	0	0	0	NW	10.4	
05:00-06:00	0	2	0	NW	10.4	
06:00-07:00	4	11	0	NW	10.4	
07:00-08:00	15	29	0	NW	16.1	
08:00-09:00	18	44	0	NW	17.3	21.9
09:00-10:00	3	39	0	NW	17.3	23
10:00-11:00	18	48	0	NW	18.4	24.2
11:00-12:00	11	19	8	NW	16.1	
12:00-13:00	19	0	28	NNW	21.9	
13:00-14:00	8	27	21	NW	17.3	
14:00-15:00	7	30	7	NW	21.9	27.6
15:00-16:00	19	20	17	NW	21.9	26.5
16:00-17:00	22	1	23	WNW	16.1	
17:00-18:00	15	4	23	WNW	16.1	
18:00-19:00	17	37	0	WNW	20.7	27.6
19:00-20:00	22	34	0	WNW	16.1	
20:00-21:00	27	47	0	WNW	19.6	25.3
21:00-22:00	11	39	0	WNW	19.6	24.2
22:00-23:00	17	37	0	NW	19.6	25.3
23:00-24:00	0	46	0	NW	18.4	25.3
Runway Total	253	530	127			



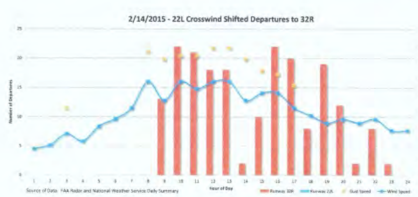
1/29/2015 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
01:00-02:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
02:00-03:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
03:00-04:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
04:00-05:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
05:00-06:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
06:00-07:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
07:00-08:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
08:00-09:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
09:00-10:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10:00-11:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11:00-12:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12:00-13:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13:00-14:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14:00-15:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15:00-16:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16:00-17:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17:00-18:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18:00-19:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19:00-20:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20:00-21:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21:00-22:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22:00-23:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23:00-24:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Runway Total	[illegible]	[illegible]	[illegible]			



2/12/2015 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
01:00-02:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
02:00-03:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
03:00-04:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
04:00-05:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
05:00-06:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
06:00-07:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
07:00-08:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
08:00-09:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
09:00-10:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10:00-11:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11:00-12:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12:00-13:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13:00-14:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14:00-15:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15:00-16:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16:00-17:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17:00-18:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18:00-19:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19:00-20:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20:00-21:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21:00-22:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22:00-23:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23:00-24:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Runway Total	[illegible]	[illegible]	[illegible]			



2/14/2015 Time	Runway 22L	Runway 28R	Runway 32R	Wind Direction	Wind Speed	Gust Speed
00:00-01:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
01:00-02:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
02:00-03:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
03:00-04:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
04:00-05:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
05:00-06:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
06:00-07:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
07:00-08:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
08:00-09:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
09:00-10:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10:00-11:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11:00-12:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12:00-13:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13:00-14:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14:00-15:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15:00-16:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16:00-17:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17:00-18:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18:00-19:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19:00-20:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20:00-21:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21:00-22:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22:00-23:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23:00-24:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Runway Total	[illegible]	[illegible]	[illegible]			

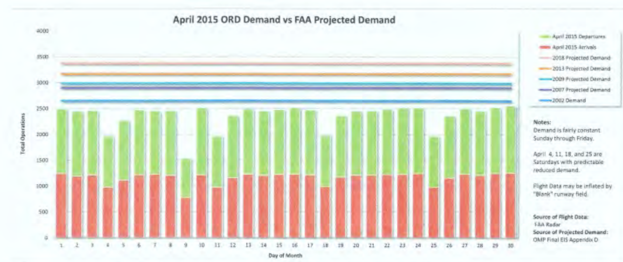


April 2015 ORD Arrivals by Day

Day/Runway	4L	4R	9L	9R	10C	10L	14L	14R	22L	22R	27L	27R	28C	28R	32L	32R	Blank		Day Total
1	0	0	0	0	0	0	0	0	0	0	585	309	339	1	0	0	1		1235
2	0	0	0	0	0	0	0	0	0	1	534	380	266	4	0	0	2		1187
3	0	1	337	218	306	42	1	0	0	0	154	54	97	15	0	0	4		1209
4	0	0	0	0	0	2	0	23	0	0	421	262	243	22	0	0	0		972
5	0	0	0	1	0	31	0	22	0	0	468	254	312	23	0	0	0		1111
6	0	0	176	91	262	9	0	0	0	0	320	199	151	3	0	0	0		1211
7	0	0	476	158	561	0	0	26	0	0	0	0	0	0	0	0	2		1223
8	0	29	485	146	330	182	0	28	0	0	0	0	0	0	0	0	0		1203
9	0	10	0	8	93	3	0	0	0	0	277	96	218	69	0	0	2		774
10	0	0	0	0	0	0	0	0	0	1	555	281	344	32	0	0	0		1213
11	0	0	0	0	0	0	0	0	0	0	508	219	231	15	0	0	1		974
12	0	0	0	0	1	0	0	62	0	2	490	302	290	10	0	0	0		1257
13	0	0	0	0	0	0	0	7	0	0	551	382	235	1	0	0	0		1229
14	0	0	309	103	22	354	0	24	0	0	188	94	107	1	0	0	0		1202
15	0	0	467	155	538	62	0	1	0	0	0	0	0	0	0	0	1		1224
16	0	0	0	0	31	0	0	4	0	0	519	358	311	5	0	0	0		1228
17	0	0	0	0	0	0	0	19	0	0	554	316	310	15	0	0	1		1215
18	0	0	328	54	421	0	1	12	0	0	91	44	37	0	0	0	0		988
19	1	0	436	149	553	24	0	2	0	0	0	0	0	0	0	0	3		1168
20	0	0	0	0	0	5	0	1	0	0	542	374	279	8	0	0	0		1209
21	0	0	0	0	0	0	0	0	0	1	526	356	329	0	0	0	0		1211
22	0	0	0	1	0	0	0	0	0	0	533	326	357	3	0	0	0		1220
23	0	0	128	44	153	31	0	0	0	1	381	387	181	0	0	0	0		1226
24	0	0	354	116	261	213	0	3	0	0	129	80	60	10	0	0	2		1239
25	0	0	336	54	521	0	0	0	0	1	0	0	0	1	0	0	0		977
26	0	31	397	168	555	0	0	0	0	0	0	0	3	0	0	0	0		1154
27	0	7	428	174	530	5	0	1	0	0	39	10	33	0	0	0	0		1227
28	1	0	173	78	276	0	0	0	0	0	335	204	137	1	0	0	1		1206
29	1	0	279	98	346	3	0	0	0	0	221	144	149	0	0	0	1		1242
30	0	0	396	235	593	1	0	0	0	0	0	0	24	0	0	3	2		1254
																			Total Ops
Runway Total	3	78	5568	1955	6433	965	2	235	3	4	8921	5361	5092	239	0	3	23		34885

April 2015 ORD Departures by Day

Day/Runway	4L	4R	9L	9R	10C	10L	14L	14R	22L	22R	27L	27R	28C	28R	32L	32R	Blank		Day Total
1	0	0	0	0	0	0	5	2	472	0	2	1	51	667	6	40	12		1258
2	0	0	0	0	0	0	0	1	411	0	4	0	19	786	0	9	28		1258
3	12	0	0	397	4	420	0	0	81	0	0	0	0	202	41	26	66		1249
4	0	0	1	0	0	1	1	1	230	1	2	0	4	695	2	11	44		993
5	0	0	0	0	0	0	5	2	341	2	5	1	7	719	27	40	13		1162
6	66	0	0	194	5	296	0	2	255	0	0	0	1	395	6	1	35		1256
7	39	0	0	531	12	600	0	0	0	0	0	0	0	0	7	0	39		1228
8	41	0	1	571	17	349	1	0	225	0	0	0	0	0	33	0	15		1253
9	9	0	0	52	1	16	0	0	288	1	0	0	2	354	11	13	11		758
10	0	0	0	0	0	0	1	1	364	0	2	0	2	771	0	100	56		1297
11	0	0	0	0	0	0	0	1	182	0	3	0	0	757	23	3	21		990
12	0	0	0	18	0	0	0	0	421	0	2	0	21	734	0	3	7		1206
13	0	0	0	0	2	0	0	2	442	1	2	0	61	724	1	0	25		1260
14	11	0	0	403	30	20	0	1	517	0	3	0	7	236	1	9	10		1248
15	1	0	1	539	8	542	0	0	77	0	0	0	0	0	45	0	38		1251
16	0	0	0	0	6	0	0	0	472	0	2	0	1	778	14	3	11		1287
17	0	0	0	40	2	0	3	0	445	0	2	0	20	717	3	4	21		1257
18	0	0	0	411	47	330	0	0	43	1	1	0	43	0	76	10	33		995
19	0	1	0	540	14	553	0	0	1	0	0	0	0	0	64	4	21		1198
20	0	0	0	2	0	0	0	0	462	1	0	0	8	683	5	64	18		1243
21	0	0	0	0	0	0	7	1	394	0	5	0	44	743	1	4	47		1246
22	0	0	0	0	0	0	1	0	374	0	2	0	35	741	62	3	51		1269
23	0	0	0	175	1	200	1	1	273	1	0	0	11	533	45	0	44		1285
24	4	0	0	459	6	280	0	1	304	0	0	0	14	156	40	0	9		1273
25	6	0	0	504	18	425	0	0	0	0	0	0	0	0	0	0	37		990
26	50	0	0	449	6	610	1	0	0	0	0	0	4	0	30	0	54		1204
27	65	0	0	501	8	519	1	0	88	0	0	0	6	17	14	9	49		1277
28	65	0	0	199	12	165	0	2	400	0	0	1	9	370	0	2	19		1244
29	14	0	0	286	6	357	0	2	233	1	0	0	8	296	0	38	37		1278
30	109	0	0	425	2	674	1	0	3	0	0	0	11	0	0	7	68		1300
																			Total Ops
Runway Total	492	1	3	6696	207	6357	28	20	7798	9	37	3	389	12074	557	403	939		36013



April 2015 Arrivals per Hour - Preliminary

0-38 Arrivals per Hour - One Runway Needed

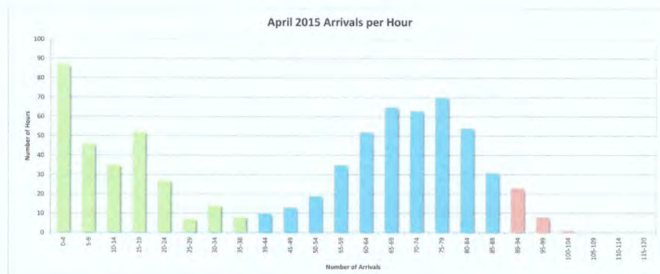
39-88 Arrivals per Hour - Under 2004 to 2008 Flight Cap

89+ Arrivals per Hour

Hour/Date	04-01-15	04-02-15	04-03-15	04-04-15	04-05-15	04-06-15	04-07-15	04-08-15	04-09-15	04-10-15	04-11-15	04-12-15	04-13-15	04-14-15	04-15-15
00:00-01:00	6	7	9	10	12	3	8	7	9	16	9	10	7	7	3
01:00-02:00	4	2	6	5	2	4	1	2	3	8	7	1	3	2	2
02:00-03:00	1	1	1	1	2	3	1	2	0	3	2	1	2	3	1
03:00-04:00	2	5	1	0	3	1	1	2	3	4	1	2	2	1	2
04:00-05:00	10	10	14	7	11	10	13	15	13	13	4	6	8	13	9
05:00-06:00	20	23	21	21	12	24	15	12	12	9	17	15	12	14	19
06:00-07:00	65	54	58	48	42	52	65	48	24	50	51	50	58	69	70
07:00-08:00	99	59	84	86	73	95	72	62	2	59	80	76	75	85	71
08:00-09:00	49	60	46	35	34	45	65	50	16	61	45	36	56	52	67
09:00-10:00	76	67	68	61	62	75	72	57	31	71	58	60	77	73	79
10:00-11:00	63	72	64	61	64	76	52	77	38	67	56	67	71	63	59
11:00-12:00	69	68	75	55	57	60	78	81	32	71	64	65	74	63	69
12:00-13:00	99	70	93	76	87	94	79	88	40	79	75	83	95	79	84
13:00-14:00	54	83	59	48	51	55	80	75	56	65	55	62	72	71	69
14:00-15:00	77	83	79	63	77	82	78	75	51	80	68	70	71	77	79
15:00-16:00	79	88	84	71	84	73	66	76	49	85	66	77	77	79	79
16:00-17:00	80	70	74	60	66	76	75	64	58	80	59	75	71	71	69
17:00-18:00	91	85	73	77	83	83	78	59	61	75	69	87	65	79	84
18:00-19:00	73	70	84	60	88	82	77	76	65	68	64	83	100	90	87
19:00-20:00	92	85	92	57	88	98	80	72	50	72	57	89	86	91	78
20:00-21:00	66	64	62	36	55	55	81	81	40	98	30	74	73	63	76
21:00-22:00	24	24	25	12	23	31	47	69	32	43	12	27	32	23	26
22:00-23:00	15	20	16	8	16	18	21	29	46	21	9	24	22	22	19
23:00-24:00	21	17	21	15	19	16	18	24	43	15	16	17	17	12	23
Daily Total	1235	1187	1209	973	1111	1211	1223	1203	774	1213	974	1157	1226	1202	1224

Hour/Date	04-16-15	04-17-15	04-18-15	04-19-15	04-20-15	04-21-15	04-22-15	04-23-15	04-24-15	04-25-15	04-26-15	04-27-15	04-28-15	04-29-15	04-30-15
00:00-01:00	8	7	12	7	5	6	3	4	6	9	7	7	8	6	5
01:00-02:00	2	2	3	5	5	3	1	2	5	6	0	3	1	0	4
02:00-03:00	2	3	4	1	1	0	0	1	1	0	1	4	1	1	1
03:00-04:00	3	4	2	0	1	2	2	2	3	3	3	1	2	2	3
04:00-05:00	14	13	8	9	6	10	8	16	16	10	9	8	15	15	14
05:00-06:00	17	17	14	15	20	21	17	15	18	11	12	18	18	15	19
06:00-07:00	66	66	51	48	65	62	73	71	64	50	52	66	73	65	73
07:00-08:00	81	88	83	78	77	90	86	79	79	61	76	80	83	89	80
08:00-09:00	54	62	36	41	63	46	56	55	54	56	41	62	56	60	60
09:00-10:00	73	68	71	63	74	75	68	79	79	61	56	68	66	71	69
10:00-11:00	63	65	48	68	54	58	68	60	55	56	60	55	71	69	64
11:00-12:00	67	67	67	64	69	71	69	77	72	63	66	80	60	67	71
12:00-13:00	97	91	83	87	86	83	95	88	82	78	84	88	92	89	90
13:00-14:00	61	60	55	61	67	74	65	57	69	55	69	78	67	66	72
14:00-15:00	85	74	66	74	68	70	75	82	74	64	65	79	75	87	74
15:00-16:00	72	82	67	75	75	76	70	73	79	62	81	74	75	75	82
16:00-17:00	71	67	55	63	83	73	72	81	75	62	72	64	71	72	68
17:00-18:00	88	87	73	81	79	80	80	68	89	61	83	88	82	83	85
18:00-19:00	83	89	70	84	86	94	92	90	91	67	90	92	82	87	89
19:00-20:00	86	79	51	80	77	86	81	82	76	62	79	82	84	86	85
20:00-21:00	66	75	34	84	73	67	66	71	76	43	76	61	67	74	78
21:00-22:00	34	31	10	40	33	30	34	37	43	12	36	38	25	29	30
22:00-23:00	19	13	9	25	21	22	18	18	17	9	19	18	18	17	15
23:00-24:00	16	5	16	15	21	12	21	18	15	16	17	13	14	17	23
Daily Total	1228	1215	988	1168	1209	1211	1220	1226	1238	977	1154	1227	1206	1242	1254

Arrivals per Hour	Number of Hours
0-4	87
5-9	46
10-14	35
15-19	52
20-24	27
25-29	7
30-34	14
35-38	8
39-44	10
45-49	13
50-54	19
55-59	35
60-64	52
65-69	65
70-74	63
75-79	70
80-84	54
85-88	31
89-94	23
95-99	8
100-104	1
105-109	0
110-114	0
115-120	0
Total Hours	720



7. Southwest Airlines Letter

Southwest Airlines Co.
Peter B. Houghton
Sr. Manager – Airport Affairs
P.O. Box 36611
Dallas, Texas 75235-1611
214-792-5280
E-mail:pete.houghton@wnco.com

July 27, 2015

Ginger Evans
Commissioner
Department of Aviation
10510 West Zemke Road
Chicago, Il 60666

Dear Commissioner Evans:

We have been following the news reports and discussions about the new runways at O'Hare Airport and the issues that have been raised about aircraft noise. Southwest Airlines is concerned that there has been a call for keeping the diagonal runways (14/32 L&R) open in an attempt to spread the noise over a larger area because the operation of those runways impacts the Midway Airport airspace. There are two specific impacts that the use of the 14/32 parallel runways cause:

1. The use of runway 14L/R for arrivals requires missed approach procedures that are protected from MDW traffic so it restricts our airspace at MDW.
2. Arrivals on runways 32L/R can restrict the MDW eastbound departures to a 2000 foot ceiling which is an operational issue for us due to obstructions.

Southwest and the other airlines serving MDW have worked with the Department for a number of years on improving the airfield capacity at MDW and we would not want to undo some of those gains. We ask that the Department of Aviation keep us advised of any change in the current plan to close the diagonal runways. We are also willing to provide information and comments to the FAA on the impact of those runways to the MDW operations.

Please let us know if you have questions or need more information.

Sincerely,

Peter B. Houghton

Peter B. Houghton
Senior Manager-Airport Affairs

cc: Michael Boland
Erin O'Donnell

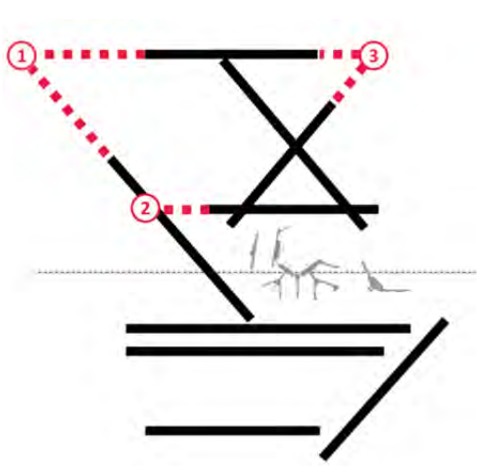
O'HARE INTERNATIONAL AIRPORT
CONVERGING RUNWAY OPERATIONS (CRO)

The FAA, at the recommendation of the National Transportation Safety Board (NTSB)[1], has recognized and taken action to address the safety issues associated with intersecting and converging runways. In April 2014, FAA implemented new rules[2] at airports across the country to manage runways with converging flight paths to reduce conflicts, reduce risk and increase safety.

The goal of CRO is:

1. To create safe separation between departing and arriving aircraft on runways with converging flight paths, even if those runways do not physically intersect.

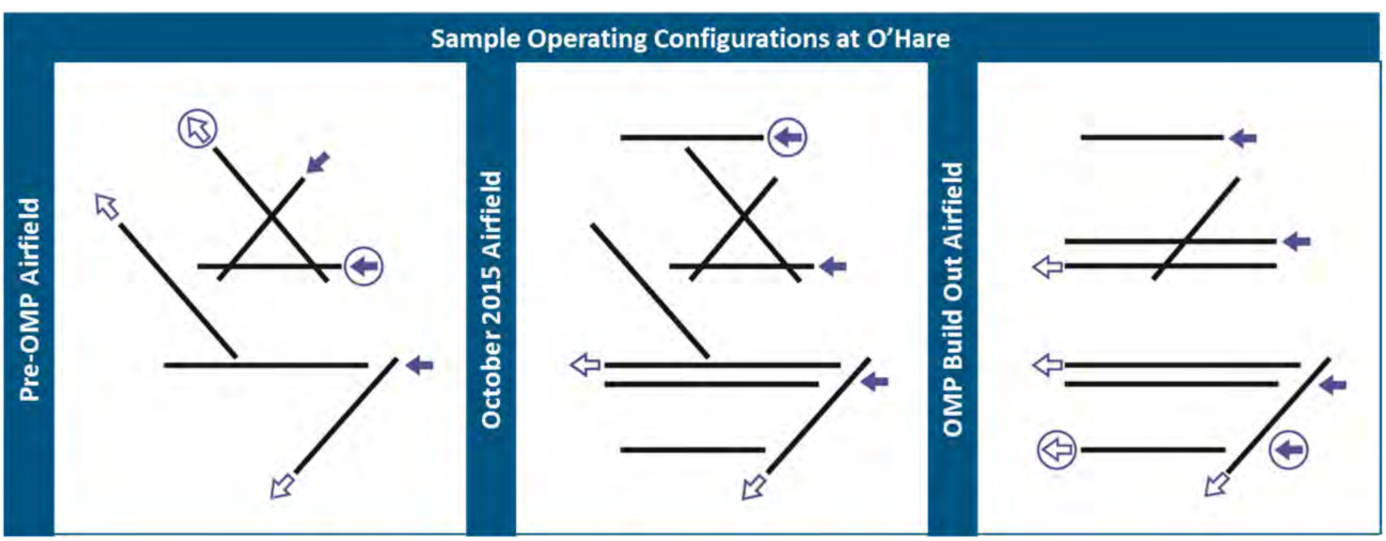
2. To create safer missed approach procedures for arriving aircraft on runways with departing aircraft from converging flight paths.



The CRO rules increased separation that effectively reduced the number of operations O'Hare can handle per hour. If not for the O'Hare Modernization Program (OMP), the impact of the FAA's CRO rules would have been significantly more impactful to the airport's capacity. It is estimated that with CRO in place, the current annualized arrival rate for O'Hare is 20 percent higher due to parallel runways opened in 2008 and 2013.

Parallel Runways Eliminate Intersecting and Converging Runway Operations

The use of intersecting runways reduces aircraft throughput rates and thus the capacity of the airport. More importantly they increase operational safety concerns. Aware of these issues, the FAA further restricted converging operations at O'Hare in 2001 and 2014 in favor of a full parallel runway system. The need for crosswind runways has diminished over time due to modern aircraft advances. Modern hub airports now rely on parallel runway layouts for safe and efficient operations (see examples in the back page). In October 2015, the south airfield will be a modern, parallel system, but the north airfield includes a complex inefficient layout.



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[1] NTSB Safety Recommendation A-13-024, July, 1, 2013

[2] FAA Notices N JO 7110.652, N JO 7110.655, and N JO 7110.690

O'HARE INTERNATIONAL AIRPORT PARALLEL RUNWAYS

The O'Hare Modernization Program's runway system that will eventually consist of six parallel runways in the primary east-west orientation and two in a northeast-southwest orientation for high wind days has been determined to be best suited to manage airport operations safely and efficiently in all weather conditions. This determination is a result of years of aviation industry study and detailed evaluation as part of the environmental review process, and is consistent with the best practices of the aviation industry worldwide. The partial implementation of the parallel runways has significantly reduced delays that would be dramatically worse without the OMP projects (O'Hare has experienced a 57 percent reduction in FAA-related delays as a result of the opening of Runway 9R/27L in 2008 and opening of 10C/28C in 2013.[1] These reductions are based on actual data measurements of flight and taxi times.)

The parallel runway configuration was studied and modeled extensively as part of the OMP process, and continues to be relevant today.

"The Illinois General Assembly finds and determines […] O'Hare cannot efficiently perform its role in the State and national air transportation systems unless it is reconfigured with multiple parallel runways."[2]

The Federal Aviation Administration (FAA) used the Total Airspace & Airport Modeller (TAAM) to support the planning and environmental analyses of the OMP's Environmental Impact Statement (EIS). TAAM is a computer simulation model used to calculate aircraft delays and travel times as well as to provide information to be used in the air quality and noise analyses.[3] In total, the FAA invested over 2,000 hours reviewing assumptions, animations, and draft/final analyses.[4] Based on TAAM simulation results the delay reduction achieved by OMP is greater than the delay reduction of other proposed alternatives.

Parallel runway configurations are the airport standard nationwide.

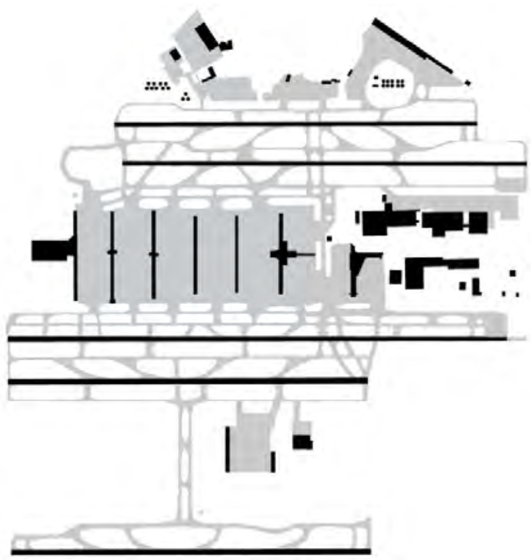
The use of intersecting runways reduces aircraft throughput rates and thus the capacity of the airport. More importantly they increase operational safety concerns. Aware of these issues, the FAA further restricted converging operations in 2001 and 2014 in favor of full parallel runway system. The need for crosswind runways has diminished over time due to modern aircraft advances. Modern hub airports now rely on parallel runway layouts for safe and efficient operations (see examples in the back page). In October 2015 the south airfield will be a modern, parallel system, but the north airfield includes a complex inefficient layout designed in the 1950s.

"Today's modern aircraft are less dependent on wind conditions. Thus, new runway architecture, as demonstrated at Atlanta, Dallas/Fort Worth, and Denver, feature parallel, non-intersecting, 'independent runways' which permit constant streams of landings or take offs for each runway, regardless of what activity may be occurring on another parallel runway. The City of Chicago's proposal with its six parallel runways breaks the O'Hare 'runway triangle' and allows for far more operations in all weather conditions without compromising safety." [5]

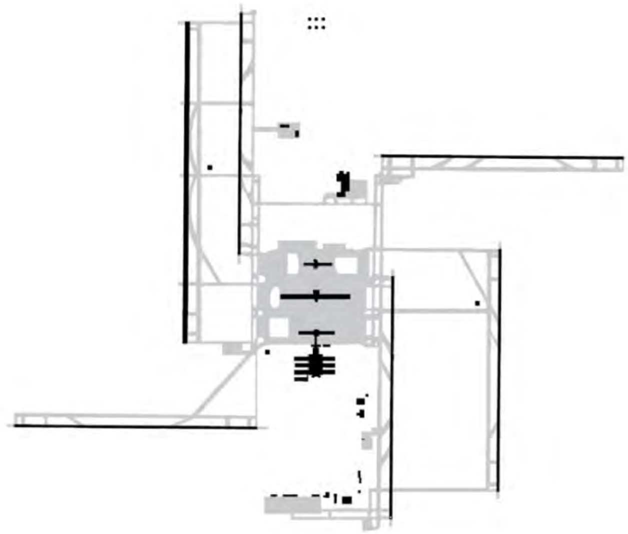
"By definition, the FAA will not allow any runway configuration to be operated in an unsafe manner. However, some runway alignments allow greater efficiencies in the movement of aircraft both in the air and on the ground. Other combinations of runways produce the potential for unsafe conditions, which then requires the FAA to reduce the volume of traffic to or from those runways to a level that insures safety will not be compromised. [Parallel runway configurations] give controllers a measure of operational flexibility in directing constant streams of arrivals and departures in all weather conditions." [6]

[1] Federal Aviation Administration
[2] O'Hare Modernization Act, Illinois Public Act 93-0450, August 6, 2003; Section 5(a)(2).
[3] http://www.faa.gov/airports/airport_development/omp/modeling/delay_and_time/
[4] Federal Aviation Administration; Record of Decision For O'Hare Modernization at Chicago O'Hare International Airport, September 2005; pg. 29. http://www.faa.gov/airports/airport_development/omp/eis/rod/Media/ORD_ROD_Final.pdf
[5] *Ibid.*, pg. 4.
[6] *Ibid.*, pg. 97-98.

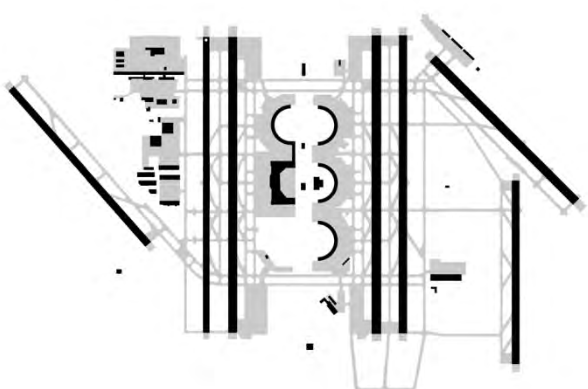
Examples of Airports with Parallel Runway Configurations



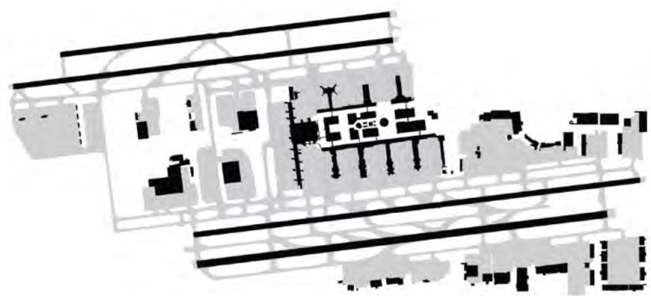
Hartsfield-Jackson Atlanta International Airport



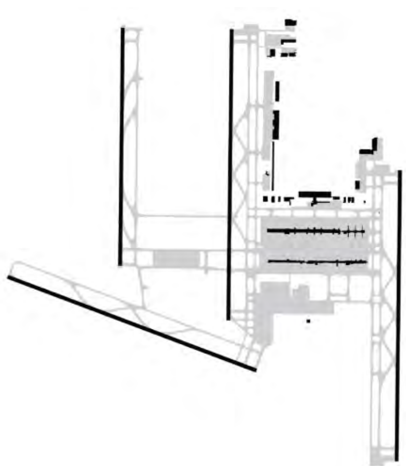
Denver International Airport



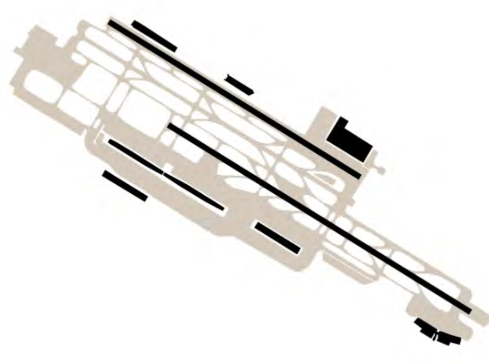
Dallas-Fort Worth International Airport



Los Angeles International Airport



Washington Dulles International Airport



Dubai International Airport

O'HARE INTERNATIONAL AIRPORT

AIR TRAFFIC BASICS

The manner in which an airport and the surrounding airspace is designed can determine the delay and capacity of not only the airport, but also the National Airspace System (NAS).

OPERATING CONFIGURATIONS

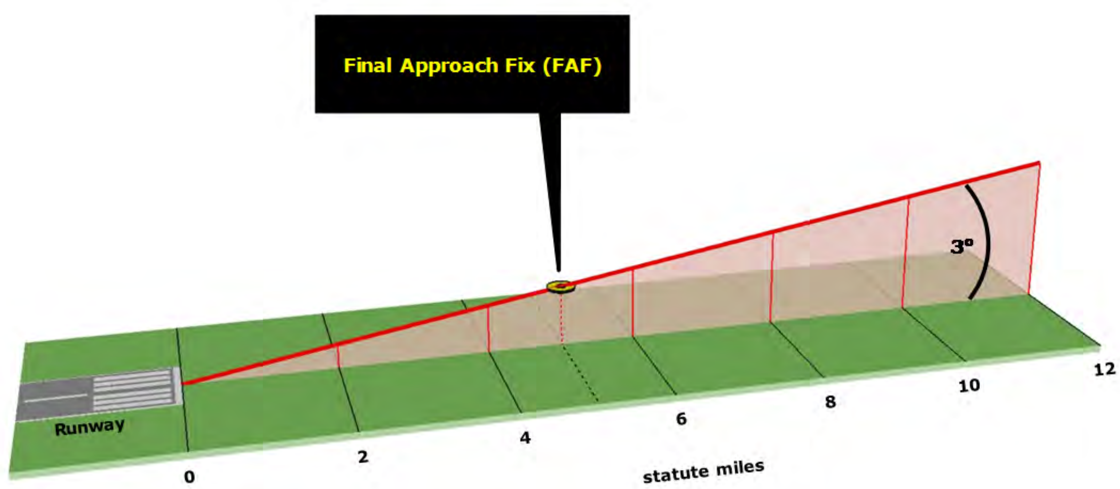
Numerous dependencies between arrival and departure operations exist either because (1) arrivals and departures share the use of a common runway; or (2) arrivals and departures to different runways cross one another, either in the air or on the ground. Arrivals and departures that take place on separate runways reduce these dependencies and increase capacity. A shift to multiple parallel, non-intersecting operational flows can provide multiple parallel approaches in both visual flight rules (VFR) (good weather) and instrument flight rules (IFR) (poor weather) conditions. This also allows for increased runway availability during snow events.

SIMULTANEOUS OPERATIONS

Simultaneous operations with parallel runway orientation have been determined to be best suited to manage airport operations safely and efficiently in all weather conditions. This determination is a result of years of aviation industry study and detailed evaluation as part of quantitative efficiency and safety studies, environmental review processes, all while continuing to be in line with the best practices of the aviation industry worldwide. The implementation of simultaneous operations with parallel runway orientations has significantly reduced delays that would be dramatically worse without these procedures.

GLIDESLOPE

The glideslope is the proper imaginary path for an airplane approaching a runway that shows the vertical path a landing airplane would follow if it made a textbook descent. While aircraft can intercept the glideslope at various locations due to traffic flow, the aircraft is typically on the glideslope before reaching the Final Approach Fix (FAF). The FAF is typically located between four and six nautical miles from the end of the runway. The 3.0 degree glideslope has been determined by the FAA to be the optimal approach glideslope angle for all aircraft from an operational safety perspective. For O'Hare the 3.0 degrees could only be increased to the maximum allowable (3.1 degrees) in order to clear obstacles. There are no obstacles in the runway approaches at O'Hare, therefore given this fact, and the types/sizes of aircraft serving O'Hare, all O'Hare approaches operate with a 3.0 degree glideslope angle, and are required to operate in that manner.[1]



[1] Letter from FAA Great Lakes Regional Administrator Barry Cooper to O'Hare Noise Compatibility Commission, July 7, 2011

ARRIVAL ALTITUDES

The below table lists standard arrival altitudes for Runways 9R and 27L at 2, 3 and 4 nautical miles from the runway threshold for a typical day on a 3.0 degree glideslope.

Chicago O'Hare International Airport Runway 9R/27L Arrival Altitudes				
Runway	**Distance (Nautical Miles)**	**Distance (Statute Miles)**	**Altitude (MSL)[1]**	**Altitude (AGL)[2]**
9R	2.0	2.3	1,393	703
9R	3.0	3.5	1,738	1,028
9R	4.0	4.6	2,059	1,362
27L	2.0	2.3	1,276	641
27L	3.0	3.5	1,599	957
27L	4.0	4.6	1,918	1,272

Note 1: Mean Sea Level (MSL) is the altitude measured in feet above the average level of the the surface of one or more of Earth's oceans.
Note 2: Above Ground Level (AGL) is the altitude measured in feet with respect to the underlying ground surface.
Source: City of Chicago Department of Aviation's Airport Noise Management System

O'HARE INTERNATIONAL AIRPORT

NOISE METRICS

Given the multiple dimensions of sound, a variety of descriptors, or metrics, have been developed for describing sound and noise. Some of the most commonly used metrics are discussed in this section. They include:

- Maximum Level (Lmax)
- Sound Exposure Level (SEL)
- Equivalent Sound Level (Leq)
- Day-Night Average Sound Level (DNL)

MAXIMUM LEVEL (Lmax)

Lmax is simply the highest sound level recorded during an event or over a given period of time (i.e. the peak of a noise event curve). It provides a simple and understandable way to describe a sound event and compare it with other events. In addition to describing the peak sound level, Lmax can be reported on an appropriately weighted decibel scale (A-weighted, for example) so that it can disclose information about the frequency range of the sound event in addition to the loudness. Lmax is described in units of decibels (dB).

Lmax, however, fails to provide any information about the duration of the sound event. This can be a critical shortcoming when comparing different sounds. Even if they have identical Lmax values, events of greater duration contain more sound energy than those of shorter duration. Further, in a real world situation, the loudest event may be infrequent, while slightly less loud events may occur often. Research has demonstrated that for many kinds of sound effects, the total sound energy, not just the peak sound level, is a critical consideration.

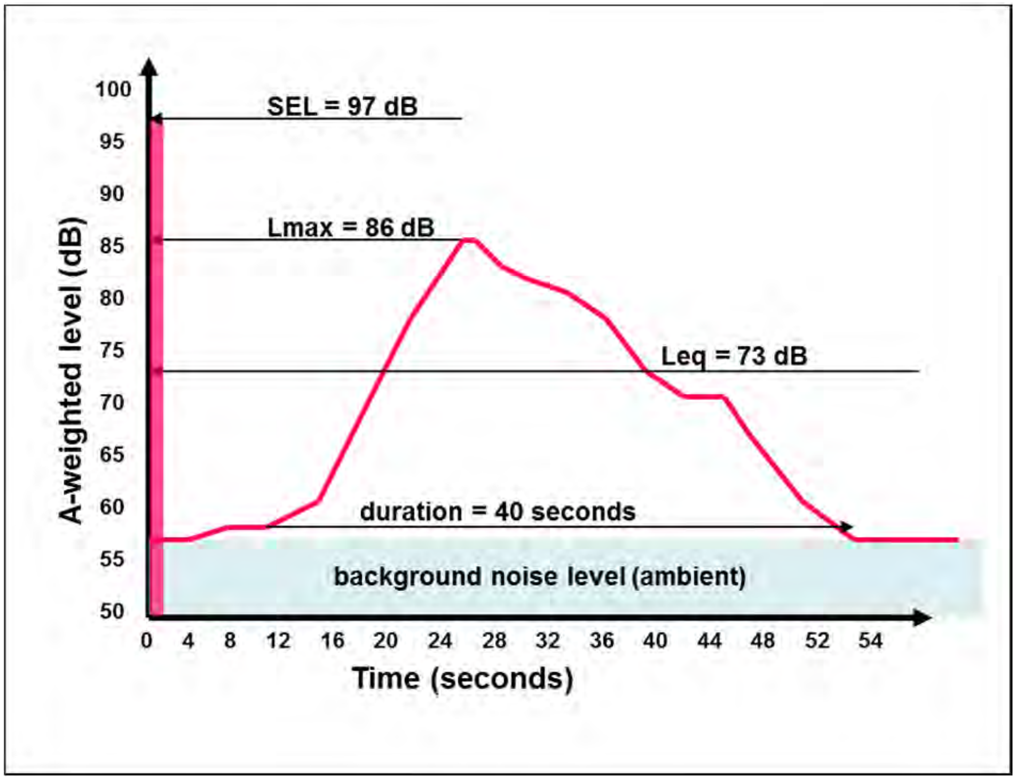
SOUND EXPOSURE LEVEL (SEL)

The sound exposure level (SEL) metric provides a way of describing the total sound energy of a single event. In computing the SEL value, all sound energy occurring during the event that is within 10 dB of the peak level (Lmax) is mathematically integrated over one second. (Very little information is lost by discarding the sound below the 10 dB cut-off, since the highest sound levels completely dominate the integration calculation.) Consequently, the SEL is always greater than the Lmax for events with a duration greater than one second. SELs for aircraft overflights typically range from 5 dB to 10 dB higher than the Lmax for the event. SEL is described in units of decibels (dB).

EQUIVALENT SOUND LEVEL (LEQ)

The equivalent sound level (Leq) metric may be used to define cumulative noise dosage, or noise exposure, over a period of time. In computing Leq, the logarithmically calculated total noise energy over a given period of time, during which numerous events may have occurred, is averaged over the time period. The Leq represents the steady sound level that is equivalent to the varying sound levels actually occurring during the period of observation. For example, an 8-hour Leq of 67 dB indicates that the amount of sound energy in all the peaks and valleys that occurred in the 8-hour period is equivalent to the energy in a continuous sound level of 67 dB. Leq is typically computed for measurement periods of one hour, eight hours, or 24 hours, although any time period can be specified. It is also frequently computed for a single noise event. LEQ is described in units of decibels (dB).

Leq is a critical noise metric for many kinds of analysis where total noise dosage, or noise exposure, is under investigation. As already noted, noise dosage is important in understanding the effects of noise on both animals and people. Indeed, research has led to the formulation of the "equal energy rule." This rule states that it is the total acoustical energy to which people are exposed that explains the effects the noise will have on them. That is, a very loud noise with a short duration will have the same effect as a lesser noise with a longer duration if they have the same total sound energy.



DAY-NIGHT AVERAGE SOUND LEVEL (DNL)

The DNL metric is a special variation of the 24-hour Leq metric. Like Leq, the DNL metric describes the total noise exposure during a given period. Unlike Leq, however, DNL, by definition, can only be applied to a 24-hour period. In computing DNL, an extra weighting of 10 dB is assigned to any sound levels occurring between the hours of 10:00:00 p.m. and 6:59:59 a.m. This penalty is intended to account for the greater annoyance that nighttime noise is presumed to cause for most people. Recalling the logarithmic nature of the dB scale, this extra weight treats one nighttime noise event as equivalent to ten daytime events of the same magnitude. DNL is described in units of decibels (dB).

As with Leq, DNL values are strongly influenced by the loud events. For example, 30 seconds of sound of 100 dB, followed by 23 hours, 59 minutes, and 30 seconds of silence would compute to a DNL value of 65 dB. If the 30 seconds occurred at night, the same example would yield a DNL of 75 dB.

This example can be roughly equated to an airport noise environment. Recall that an SEL is the mathematical compression of a noise event into one second. Thus, 30 SELs of 100 dB during a 24-hour period would equal DNL 65 dB or DNL 75 dB if they all occurred at night. This situation could actually occur in places around a real airport. If the area experienced 30 overflights during the day, each of which produced an SEL of 100 dB, it would be exposed to DNL 65 dB. Recalling the relationship of SEL to the peak noise level (Lmax) of an aircraft overflight, the Lmax recorded for each of those overflights (the peak level a person would actually hear) would typically range from 90 dB to 95 dB.

DNL is the standard metric used for environmental noise analysis in the U.S. This metric was accepted by the USEPA in 1974 and by the FAA in 1981.

O'HARE INTERNATIONAL AIRPORT

HOW NOISE IS MEASURED

THE DNL METRIC AND ITS HISTORY

The day-night average sound level (DNL) metric describes the total noise exposure during a given period. DNL can only be applied to a 24-hour period and is defined by federal regulation at 14 CFR 150.7. In computing DNL, an extra weighting of 10 decibels (dB) is assigned to any sound levels occurring between the hours of 10:00:00 p.m. and 6:59:59 a.m. This penalty is intended to account for the greater disturbance that nighttime noise causes for most people. Recalling the logarithmic nature of the dB scale, this extra weight treats one nighttime noise event as the equivalent to ten daytime events of the same magnitude. For this reason DNL values are strongly influenced by the loud events. For example, 30 seconds of sound of 100 dB, followed by 23 hours, 59 minutes, and 30 seconds of silence would compute to a DNL value of 65 dB. If the 30 seconds occurred at night, the same example would yield a DNL value of 75 dB.

DNL is the standard metric used for environmental noise analysis in the U.S. This practice originated with the U.S. Environmental Protection Agency's (USEPA's) effort to comply with the Noise Control Act of 1972. The USEPA designated a task group to "consider the characterization of the impact of airport community noise and develop a community noise exposure measure." The task group recommended using the DNL metric. The USEPA accepted the recommendation in 1974, based on the considerations listed below.

1. The measure is applicable to the evaluation of pervasive, long-term noise in various defined areas and under various conditions over long periods of time.
2. The measure correlates well with known effects of the noise environment on individuals and the public.
3. The measure is simple, practical, and accurate.
4. Measurement equipment is commercially available.
5. The metric at a given location is predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.

Soon thereafter, other federal agencies adopted the use of DNL. At about the same time, the Acoustical Society of America developed a standard which established DNL as the preferred metric for outdoor environments (ANSI S3.23-1980). This standard was reevaluated in 1990, and the same conclusions were reached regarding the use of DNL (ANSI S12.40-1990).

In 1980, the Federal Interagency Committee on Urban Noise (FICUN) met to consolidate federal guidance on incorporating noise considerations in local land use planning; participating federal agencies included the Federal Aviation Administration (FAA) and the USEPA. The committee selected DNL as the best noise metric for this purpose, thus endorsing the earlier work of the USEPA and making it applicable to all Federal agencies.

In 1981, the FAA adopted the DNL 65 dB noise metric (often written as 65 DNL) and related land use compatibility guidelines in Part 150 of Title 14 of the Code of Federal Regulations (14 CFR Part 150) in response to the Aviation Safety and Noise Abatement Act of 1979 (ASNA) and the recommendations of the USEPA and FICUN. The Part 150 regulations were finalized in 1984 and became effective in 1985.

In the early 1990s, Congress authorized the creation of a new interagency committee to study airport noise issues. The Federal Interagency Committee on Noise (FICON) was formed with membership from the FAA, the USEPA, and other federal agencies. FICON concluded in its 1992 report that Federal agencies should "continue the use of the DNL metric as the principal means for describing long term noise exposure of civil and military aircraft operations." FICON further concluded that there were no new descriptors or metrics of sufficient scientific standing to substitute for the DNL cumulative noise exposure metric.

In 1993, the FAA issued its Report to Congress on Effects of Airport Noise. Regarding DNL, the FAA stated, "Overall, the best measure of the social, economic, and health effects of airport noise on communities is the Day-Night Average Sound Level (DNL)." In that report, the FAA also committed to the establishment of an interagency committee and subsequently convened the Federal Interagency Committee on Aviation Noise (FICAN) in November 1993; participating federal agencies include the FAA and the USEPA. Since that time, FICAN has served as the federal government's forum for aviation noise research and development.

CURRENT REVIEW OF METRICS

The FAA is currently updating the scientific evidence it uses to measure aircraft noise exposure and its effects on communities around airports, and will conduct a national survey around selected U.S. airports, with results to determine whether changes to the FAA's current noise metrics are necessary. The results of the survey will then be used to determine whether changes to the FAA's use of the 65 DNL noise metric are warranted. If changes are determined to be warranted, revised policy and related guidance will be proposed and will be subject to interagency coordination and public review.

O'HARE INTERNATIONAL AIRPORT

FAA REVIEW OF 65 DNL THRESHOLD

Currently, the Federal Aviation Administration (FAA) defines the threshold for significant aircraft noise impacts as Day-Night Average Sound Level of 65 decibels (commonly written as 65 DNL), which was established in 1981 in response to the Aviation Safety and Noise Abatement Act of 1979. This threshold has been the subject of debate since its inception and adoption in the 1970s, with critics alleging that it does not adequately represent impacts on communities adversely affected by noise.

In recent years, the Airports Cooperative Research Program (ACRP) developed a framework of study for a reassessment of this metric to help determine if the FAA should change its approach to noise disturbances, as well as consider compatible land uses and justification for federal expenditures for areas not compatible with airport noise. The ACRP is an applied research program that is managed by the Transportation Research Board (TRB) of the National Academies and sponsored by the FAA.

On June 12, 2014, the FAA published a notice and request for public comments in the Federal Register. In the notice, the FAA sought public comments about its "intention to request the Office of Management and Budget (OMB) approval to undertake an information collection. The purpose of this research is to conduct a nation-wide survey to update the scientific evidence of the relationship between aircraft noise exposure and its effects on communities around airports."[1]

On July 3, 2014, Chicago Mayor Rahm Emanuel sent a letter to FAA Administrator Michael Huerta urging him to speed up this national study of the 65 DNL metric.[2] Mayor Emanuel urged the FAA to "expedite [the study] with the utmost care and haste," citing the struggles of residents in Chicago and surrounding communities as reason to complete this research in a timely manner.

On April 27, 2015, the FAA received approval from the OMB to conduct its noise survey.

On May 7, 2015, the FAA announced the next step in its study, a comprehensive noise survey.[3] The FAA will contact residents around selected U.S. airports through mail and telephone to survey public perceptions of aviation noise throughout the course of a year. This will be the most comprehensive study using a single noise survey ever undertaken in the United States, polling communities surrounding 20 airports nationwide. Data gathering is scheduled for completion at the end of 2016. The results of the survey will then be used to determine whether changes to the FAA's use of the 65 DNL noise metric are warranted. If changes are determined to be warranted, revised policy and related guidance will be proposed and will be subject to interagency coordination and public review.

---

[1] 79 Fed. Reg. 33797, June 12, 2014

[2] http://www.chicagobusiness.com/article/20140703/BLOGS02/140709918/emanuel-asks-feds-to-speed-up-study-of-airport-noise

[3] https://www.faa.gov/news/press_releases/news_story.cfm?newsId=18774

O’HARE INTERNATIONAL AIRPORT

AIRCRAFT AND COMMUNITY NOISE

AIRPORT NOISE MANAGEMENT SYSTEM (ANMS)

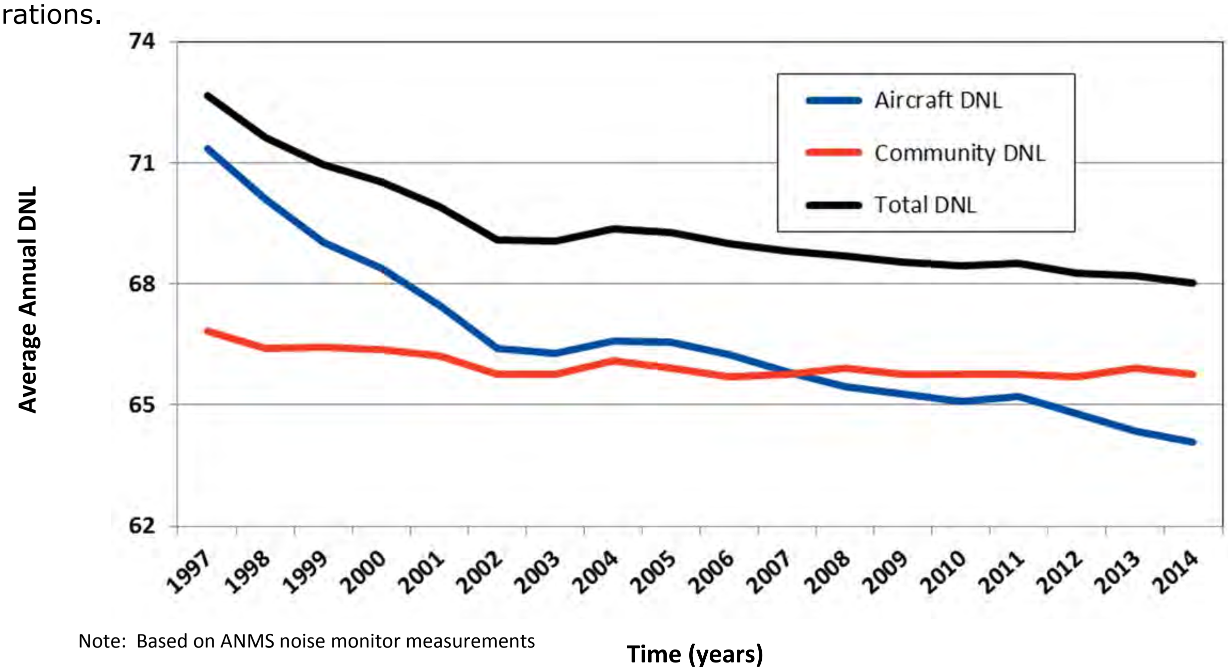
Installed in 1996, the Airport Noise Management System (ANMS) enables the City of Chicago to monitor the amount of noise being generated over the communities surrounding O’Hare by the aircraft operating at the Airport. The ANMS collects, analyzes and processes data from a number of sources of information including a network of 32 noise monitors around O’Hare, FAA radar data, weather data and noise complaints. Over 150,000 flights and 400,000 noise events are recorded by the ANMS each month for the Chicago Department of Aviation (CDA). The CDA and the O’Hare Noise Compatibility Commission utilize data from the ANMS to facilitate the development and management of noise abatement programs at the Airport.

AIRCRAFT VS. COMMUNITY NOISE

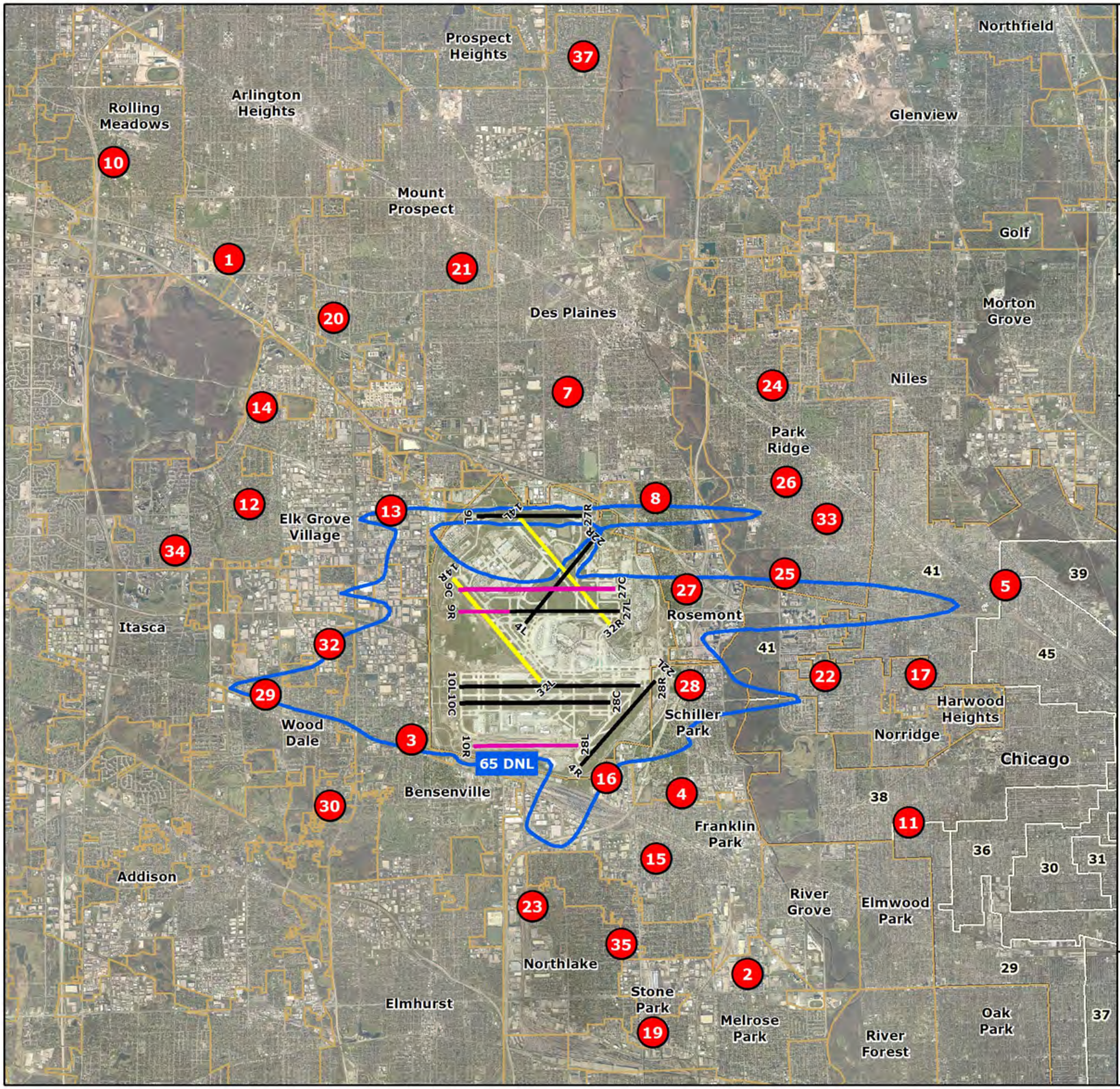
The CDA’s noise monitors record noise events based on threshold exceedance. Each noise event starts at the time the noise level exceeds a decibel threshold, typically slightly above the background or ambient noise level, and ends at the time the noise level returns to the threshold.

Once the noise events are collected and downloaded to the CDA’s ANMS, they are correlated to actual aircraft operations. The process that correlates noise events to aircraft operations uses defined parameters to match every eligible noise event to specific aircraft operations and these events are classified as aircraft noise. Noise events that fall outside these parameters are classified as community noise. Examples of community noise include regular vehicle traffic, sirens from emergency vehicles, construction equipment, lawn mowers, powered hand tools, and trains.

Due to the advancement of aircraft engine technology and the phase-out of louder originally manufactured Stage 2 aircraft, noise levels attributed to aircraft have decreased since the ANMS was installed while community noise has remained constant. **Through 2014, community noise within the ANMS area of coverage is louder than aircraft noise as measured by the permanent noise monitors surrounding O’Hare.** The below graph represents the average DNL for aircraft, community and total noise based on annual monitored data from the ANMS. This is based on overall average conditions over the total area monitored. Some areas have experienced an increase in noise from aircraft operations, while some areas have experienced a decrease in noise from aircraft operations.



Note: Based on ANMS noise monitor measurements



O'Hare International Airport

CHICAGO CDA DEPARTMENT OF AVIATION

Permanent Noise Monitor Locations

City of Chicago
Rahm Emanuel, Mayor

Department of Aviation
Ginger S. Evans, Commissioner

Legend

- Permanent Noise Monitors (32)
- Existing Runways
- Existing Runways to be Decommissioned
- Future Runways
- O'Hare Modernization Program Build-Out Noise Contour (65 DNL)
- Chicago Ward Boundaries
- Community Boundaries

Miles
0 1 2

N

Date: July 1, 2015
File: ORD_RMT_Vers2.mxd

O'HARE INTERNATIONAL AIRPORT

AIRPORT NOISE AND CAPACITY ACT OF 1990 & PART 36

In 1990, Congress passed the Airport Noise and Capacity Act (ANCA) to create a more comprehensive method for regulating aircraft noise. ANCA tasked the FAA with establishing a national noise policy, as well as substituted advances in "quiet engine" technology for restrictions on airport operations. These aircraft noise standards are codified in FAA Part 36 regulations, "Noise Standards: Aircraft Type and Airworthiness Certification." Aircraft must meet Part 36 standards to receive "type" or "airworthiness" certificates to operate in the United States. There are four stages of noise standards for aircraft: Stage 1, Stage 2, Stage 3, and Stage 4.

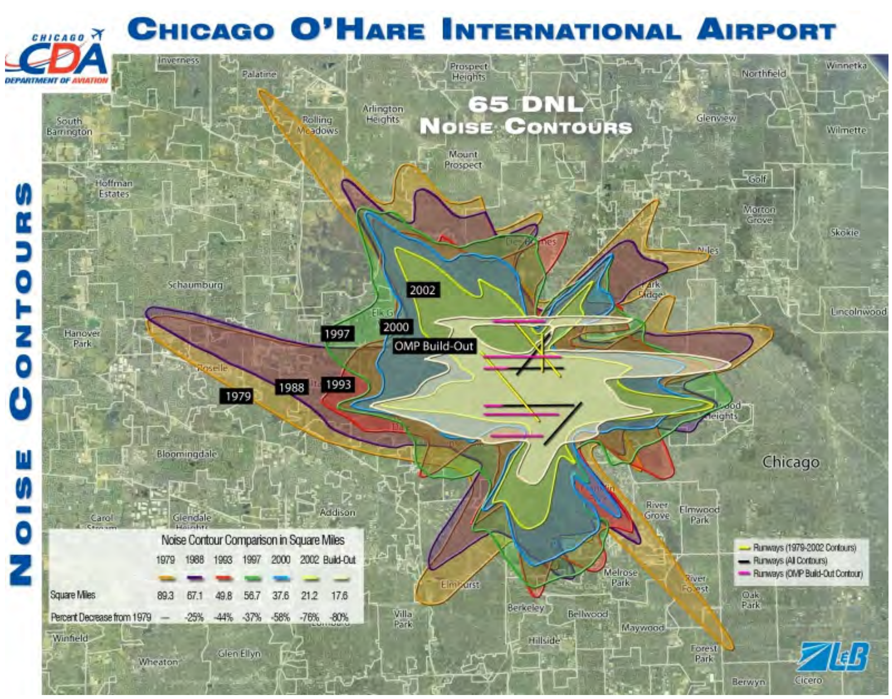
Timeline of FAA Part 36 Standards

- 1969: FAA established initial Part 36 standards (Stages 1 and 2).
- 1976: FAA sets a mandatory deadline for phase-out of all Stage 1 aircraft in excess of 75,000 lbs. (January 1, 1985).
- 1977: FAA introduces a new stage with increased stringency (Stage 3).
- 1990: ANCA sets a mandatory deadline for phase-out of Stage 2 aircraft in excess of 75,000 lbs. (January 1, 2000).
- 2005: FAA introduces a new stage with increased stringency (Stage 4).
- 2013: FAA sets a mandatory deadline for phase-out of all remaining Stage 1 and 2 aircraft less than 75,000 lbs. (January 1, 2016).
- Congress has not required a Stage 3 phase-out at this time.

ANCA also limits the ability of airports to implement aircraft restrictions. All access restrictions are essentially prohibited unless reviewed and approved by the FAA, and during the review process, all existing operators at an airport and all potential operators not currently operating at the airport have standing to challenge the application.

Despite this limitation, aircraft noise has decreased considerably around airports nationwide because of the phase-out of louder Stage 1 and 2 aircraft. Newer aircraft currently being manufactured are much quieter than older aircraft and many already meet Stage 4 requirements recommended by the International Civil Aviation Organization (ICAO).

The modeled 65 DNL noise contour at O'Hare has shrunk in size consistently since 1979 (below) despite an increase in total aircraft operations because of the replacement of Stage 1 and 2 aircraft with Stage 3 and 4 aircraft mandated by ANCA.



O'HARE INTERNATIONAL AIRPORT

RESIDENTIAL SOUND INSULATION PROGRAM

Program History

Since 1995, the Chicago Department of Aviation (CDA) has administered the Residential Sound Insulation Program (RSIP) in communities surrounding O'Hare International Airport and is one of the most aggressive programs in the world. More than $600 million has been spent on noise insulation, including over $273 million on over 10,900 residential units. In 1996, the O'Hare Noise Compatibility Commission (ONCC) was formed to provide input and oversight to the implementation of all noise programs, including the RSIP.

Program Purpose

The RSIP is designed to reduce the effects of aircraft noise inside the home. The goal of the Program is to achieve a quieter environment and better quality of life within the homes in the highest impacted areas affected by aircraft noise. The noise reduction level goals of the RSIP are to reduce aircraft noise levels in residences by at least 5 decibels and to attain an interior noise level of 45 dB. By properly sound-insulating eligible homes, homeowners not only gain a quieter interior, but may also benefit from long-lasting improvements and increased efficiency in their heating and cooling utilities. The RSIP is designed and directed by experts experienced in the use of construction techniques that have been tested and shown to be successful in minimizing interior noise.

Program Eligibility

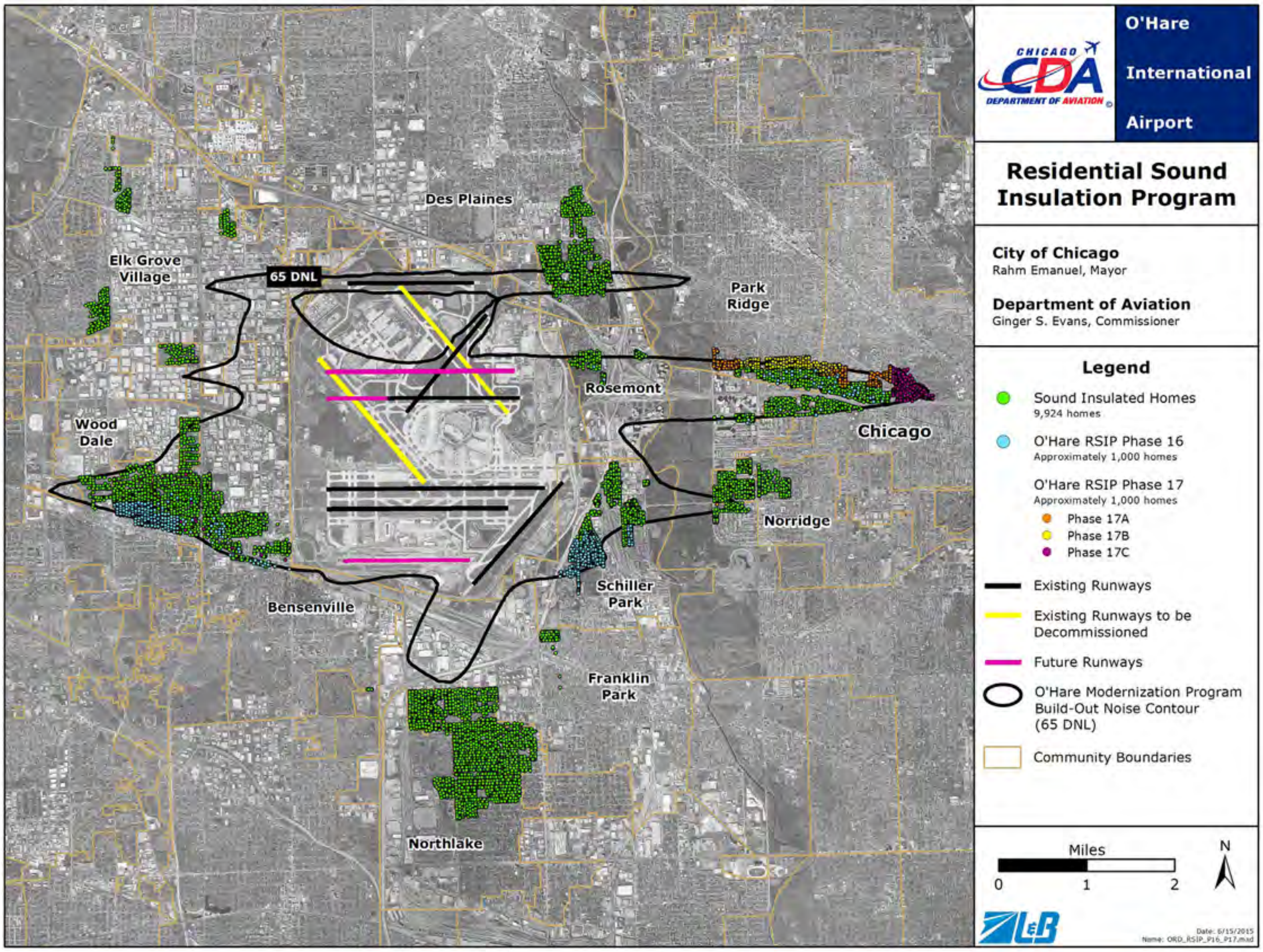
A home must meet the following criteria to be eligible for the RSIP:

1. The home must be within a noise contour with an annual day/night average sound level equal to or greater than 65 DNL within the Federal Aviation Administration (FAA) approved O'Hare Modernization Program (OMP) Build-Out Noise Contour as defined by the FAA's Record of Decision for the Environmental Impact Statement (2005) except in cases of block rounding described below;
2. Home must have been constructed before September 30, 2005; and
3. Home must be on a block where an individual home is within the 65 DNL noise contour, and in such cases, homes on both sides of the street and up to the next intersection or street change are eligible.

Dwelling units can be in single-family, multi-family, or mixed use buildings. In cases of mixed use buildings, only the residential portion of the building will be sound-insulated. Sequencing of the homes is recommended by the CDA and approved by the ONCC. Homes are only eligible for one round of sound insulation.

Program Funding

Prior to the O'Hare Modernization Program, the RSIP was funded entirely by approved airport revenue sources. Currently, the FAA provides 80% of the funding using Airport Improvement Program (AIP) grants, while the City of Chicago provides the remaining 20% using approved airport revenue sources.



NOISE CONTOUR USED	1993	1993	1993	1993	1997	1997	2000	2000	2000	OMP	OMP	OMP	OMP	OMP	OMP		OMP	OMP	
PROGRAM YEAR	DEMONSTRATION 1995	1996	1997	1998	1999	2000	2002	2003	2004	2006 Group A	2006 Group B	2007	2008	2009	2010				
PHASE															15	TOTAL HOMES COMPLETED	16	17	TOTAL HOMES ALLOCATED
COMMUNITY																			
Bensenville	0	125	63	97	84	139	84	25	61	0	148	33	217	78	597	1,751	234	0	1,985
Chicago																			
Chicago Ward 38	0	0	0	0	36	37	30	0	1	0	0	3	0	0	0	107	0	0	107
Chicago Ward 41	0	0	0	0	68	2	5	0	0	0	198	0	359	461	134	1,227	0	585	1,812
Des Plaines	0	30	22	29	13	21	82	201	229	214	3	11	5	2	2	864	0	0	864
Elk Grove Village	0	0	0	0	141	78	46	2	1	0	0	0	0	0	0	268	0	0	268
Franklin Park	5	28	0	42	0	0	47	3	2	0	0	0	0	0	0	127	0	0	127
Norridge	0	28	0	42	211	108	47	6	89	0	0	7	0	0	0	538	0	0	538
Northlake	0	120	173	92	196	231	94	7	9	0	0	0	0	0	0	922	0	0	922
Park Ridge	0	0	0	0	0	0	0	0	0	0	76	0	62	212	4	354	0	401	755
Rosemont	0	0	0	22	38	27	4	5	0	0	0	0	0	0	242	338	0	0	338
Schiller Park	5	131	140	23	0	130	40	2	1	7	38	30	347	223	6	1,123	345	0	1,468
Unincorporated Cook County																			
Elk Grove Township	0	0	0	40	0	0	2	4	0	0	0	0	0	0	0	46	0	0	46
Leyden Township	0	51	344	426	0	0	188	230	82	0	0	0	0	0	0	1,321	0	0	1,321
Norwood Park Township	0	0	0	0	0	0	0	0	0	0	127	0	4	4	2	137	0	0	137
Unincorporated DuPage County																			
Addison Township	0	50	19	36	0	10	3	43	53	0	0	22	0	0	1	237	0	0	237
Wood Dale	0	51	0	0	63	67	102	72	83	44	25	46	4	7	0	564	389	0	953
TOTALS:	10	614	761	849	850	850	774	600	611	265	615	152	998	987	988	9,924	968	986	11,878

O'HARE INTERNATIONAL AIRPORT

SCHOOL SOUND INSULATION PROGRAM

Program History

Since 1982, the Chicago Department of Aviation (CDA) has administered the School Sound Insulation Program (SSIP) in communities surrounding O'Hare International Airport and is the largest and one of the oldest programs in the world. More than $600 million has been spent on noise insulation, including more than $351 million on 123 schools. In 1996, the O'Hare Noise Compatibility Commission (ONCC) was formed to provide input and oversight to the implementation of all noise programs, including the SSIP.

Program Purpose

The goal of the O'Hare SSIP is to reduce aircraft noise levels in schools and create a quieter learning environment for students in the O'Hare area.

Program Eligibility

A school must meet the following criteria in order to seek sound insulation funding:

1. School is recognized by the Illinois Board of Education providing K-12 education and has submitted a letter requesting to participate in the SSIP.
2. School's annual day/night average sound level is equal to or greater than 60 DNL within the latest Federal Aviation Administration (FAA) approved noise contour.
3. School's measured, A-weighted, windows-open interior sound level is equal to or greater than 45 Leq resulting from aircraft operations.

Program Funding

If a school meets all criteria and grant funding becomes available, the school would then need to apply to the FAA for sound insulation funding. A school must then obtain an executed grant agreement with the FAA in order to receive reimbursement. The FAA reimburses 80% of the cost using Airport Improvement Program (AIP) funds, while the City of Chicago reimburses the remaining 20% using approved airport revenue sources.

Types of Insulation

Once a school is selected to receive sound insulation funding, there are several measures that can be done to the school in order to reduce aircraft noise impacts. Typical sound insulation measures could include:

- Window modifications;
- Addition of acoustical insulation batts to ceiling assemblies;
- Weather-stripping windows and doors;
- Installation of new air conditioning and ventilation systems; and
- Addition of vestibules at exterior doors.

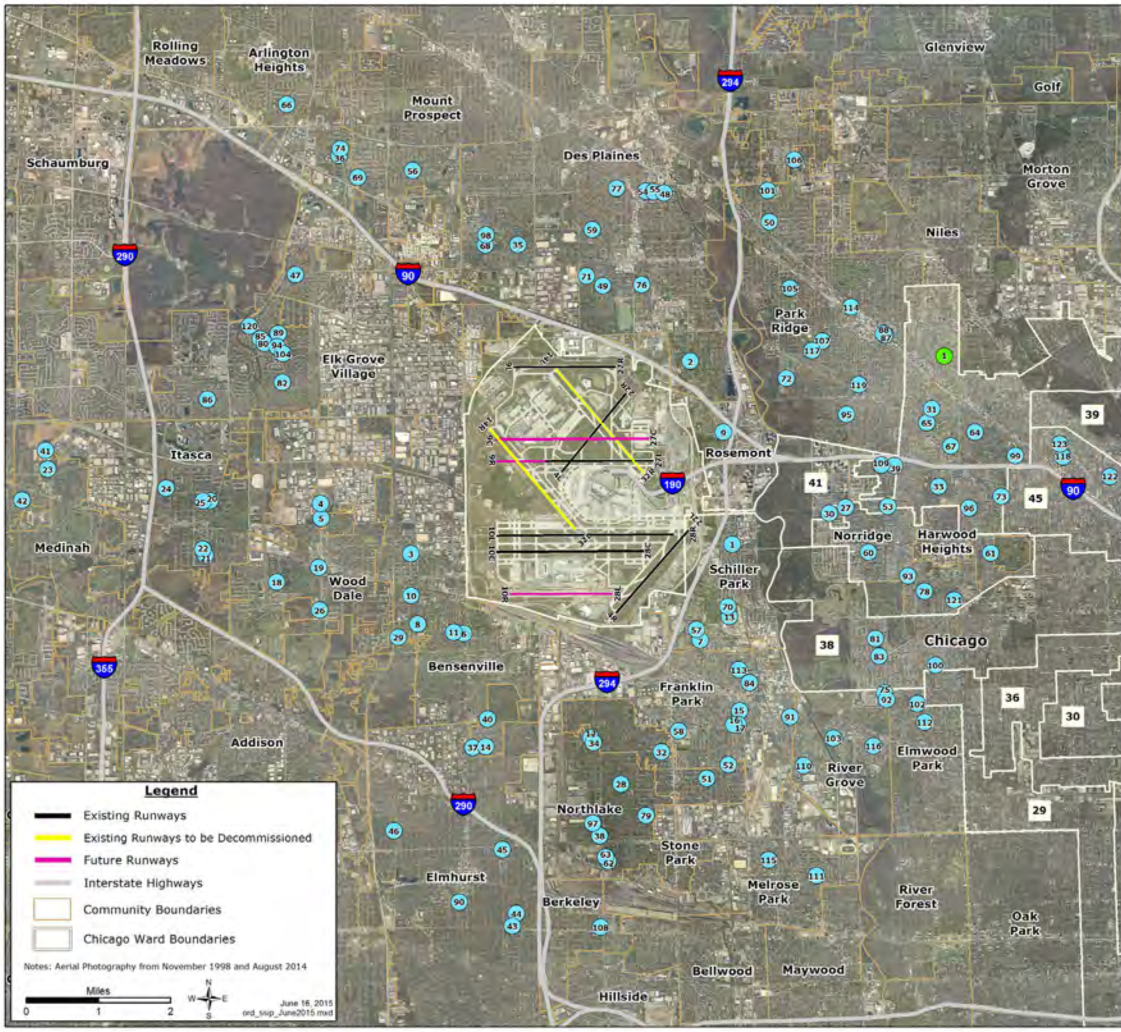
CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

School Sound Insulation Program

City of Chicago
Rahm Emanuel, Mayor

Department of Aviation
Ginger S. Evans, Commissioner



Schools Completed

1. George Washington Elementary, Schiller Park
2. Orchard Place Elementary
3. Mohawk Elementary (demolished)
4. Wood Dale Junior High
5. Early Childhood Education Center
6. Chippewa Elementary
7. St. Maria Goretti Elementary
8. Blackhawk Middle
9. Rosemont Elementary
10. Fenton High
11. Tioga Elementary
12. Westdale Elementary
13. St. Beatrice Elementary
14. Conrad Fischer Elementary
15. St. Gertrude Elementary
16. West Passow Elementary
17. Hester Junior High
18. Westview Elementary
19. Holy Ghost Elementary
20. St. Peter the Apostle Elementary
21. St. Luke Elementary
22. Raymond Benson Primary
23. Medinah Intermediate Elementary
24. Elmer H. Franzen Intermediate
25. F.E. Peacock Middle
26. Oakbrook Elementary
27. Pennoyer Elementary
28. Roy Elementary
29. W.A. Johnson Elementary
30. Dirksen Elementary
31. Edison Elem. Reg. Gifted School
32. Mannheim Middle
33. Oriole Park Elementary
34. West Leyden High
35. Devonshire Elementary
36. Forest View Educ. Center Phase I
37. Churchville Junior High
38. St. John Vianney School
39. St. Paul Lutheran Elementary
40. St. Charles Borromeo School
41. Lake Park East High
42. Medinah Primary School
43. Sandburg Junior High
44. Edison Elementary
45. Field Elementary
46. Emerson Elementary
47. Rupley Elementary
48. Central Elementary
49. Plainfield Elementary
50. Benjamin Franklin Elementary
51. Scott Elementary
52. South Elementary
53. St. Eugene Elementary
54. Immanuel Lutheran Elementary
55. Our Lady of Destiny Elem. North
56. Robert Frost Elementary
57. John F. Kennedy Elementary
58. Enger Elementary
59. Algonquin Junior High
60. Leigh Elementary
61. Union Ridge Elementary
62. Northlake Middle
63. Riley Elementary
64. Norwood Park Elementary
65. Resurrection High
66. Juliette Low Elementary
67. Immaculate Conception Elementary
68. Friendship Junior High
69. John Jay Elementary
70. Lincoln Middle
71. Maine West High
72. Maine South High
73. Garvy Elementary
74. Forest View Education Center Phase II
75. Mother Theodore Guerin High
76. Our Lady of Destiny High
77. Willows Academy
78. James Giles Elementary
79. Whittier Elementary
80. Lutheran School of the Holy Spirit
81. Canty Elementary
82. Clearmont Elementary
83. St. Francis Borgia Elementary
84. North Elementary
85. Queen of the Rosary Elementary
86. Admiral Byrd Elementary
87. St. Paul of the Cross Elementary
88. St. Paul of the Cross Junior High
89. Ridge Elementary
90. Immaculate Conception High
91. East Early Childhood Center
92. Holy Cross High
93. Divine Savior Elementary
94. Grove Junior High
95. Mary Seat of Wisdom Elementary
96. St. Monica Elementary
97. Parkview Baptist Academy
98. St. Zachary Elementary
99. Taft High
100. Dever Elementary
101. Maine East High
102. St. Celestine Elementary
103. Bethlehem Lutheran Elementary
104. Al Hattendorf E.C.C.
105. Embers Elementary
106. Stevenson Elementary, Des Plaines
107. Abraham Lincoln Middle
108. MacArthur Middle
109. Socrates - St. Sava Academy
110. Rhodes Elementary
111. Jane Addams Elementary
112. John Mills Elementary
113. East Leyden High
114. St. Andrews Lutheran Elementary
115. Stevenson Elementary, Melrose Park
116. St. Cyprian Elementary
117. George Washington Elem., Park Ridge
118. Hitch Elementary
119. Theodore Roosevelt Elementary
120. Elk Grove High
121. Ridgewood High
122. Farnsworth Elementary
123. St. Tarcissus School

Schools In Design or Construction

1. Ebinger Elementary

Schools by Community

Community	Completed	Design or Construction
Arlington Heights	3	--
Bensenville	7	--
Berkeley	1	--
Chicago	17	1
Des Plaines	13	--
Elk Grove Village	9	--
Elmhurst	7	--
Elmwood Park	2	--
Franklin Park	8	--
Harwood Heights	1	--
Itasca	5	--
Medinah	2	--
Melrose Park	4	--
Mount Prospect	2	--
Norridge	5	--
Northlake	8	--
Park Ridge	11	--
River Grove	5	--
Roselle	1	--
Rosemont	1	--
Schiller Park	5	--
Unincorporated Cook County	1	--
Wood Dale	5	--
TOTAL	**123**	**1**

Schools by School District

School District	Completed	Design or Construction
District 2	5	--
District 7	4	--
District 10	3	--
District 11	2	--
District 59	10	--
District 62	4	--
District 63	1	--
District 64	4	--
District 78	1	--
District 79	1	--
District 80	2	--
District 81	3	--
District 83	5	--
District 84	5	--
District 84.5	1	--
District 86	1	--
District 87	4	--
District 89	2	--
District 100	1	--
District 108	1	--
District 205	6	--
District 207	3	--
District 212	2	--
District 214	3	--
District 234	1	--
District 299	10	1
District 401	1	--
Private	37	--
TOTAL	**123**	**1**

O'HARE INTERNATIONAL AIRPORT
SOC/JDA NOISE RECOMMENDATIONS

The SOC/JDA reports present several recommendations about noise impacts and noise management at O'Hare International Airport:

AN ANALYSIS OF THE TECHNICAL BASIS OF FAA'S NOISE REGULATORY FRAMEWORK AND ITS APPLICATION TO THE O'HARE MODERNIZATION PROGRAM (REPORT #1)

The Chicago Department of Aviation (CDA) agrees that the 65 DNL metric should be validated. On July 3, 2014, Chicago Mayor Rahm Emanuel sent a letter to FAA Administrator Michael Huerta, urging him to speed up this national study of the 65 DNL metric. Mayor Emanuel urged the FAA to "expedite [the study] with the utmost care and haste," citing the struggles of residents in Chicago and surrounding communities as reason to complete this research in a timely manner.

The CDA also acknowledges that complaints have risen dramatically and the CDA is committed to working with the communities to address these complaints.

CDA SHOULD USE BEST PRACTICES AND TOOLS TO PROVIDE NOISE INFORMATION TO COMMUNITIES (REPORT #2)

The CDA agrees with this point. The CDA staff along with the O'Hare Noise Compatibility Commission (ONCC) attend conferences, subscribe to industry publications, and are knowledgeable about industry best practices. Recently, the CDA has implemented the on-line flight tracking software WebTrak which SOC/JDA recommended. WebTrak is available on the CDA website and available to anyone at no cost. The CDA is also committed to making additional noise educational tools and noise monitoring data available on the CDA website to all communities. The CDA through the ONCC Technical Committee is also currently exploring any potential additional noise initiatives. In addition, The CDA will review "Best Practices" outlined in Airport Cooperative Research Program (ACRP) research projects like Report 15 "Aircraft Noise: A Toolkit for Managing Community Expectations" and adopt any not being performed.

ANALYSIS OF THE NEED AND JUSTIFICATION OF ADDITIONAL RUNWAY CAPACITY AT ORD (REPORT #3)

The CDA agrees with the SOC/JDA report that O'Hare needs to construct additional terminal and gates to add capacity. Based on the increasing activity, especially during peak periods, O'Hare needs both additional gates and additional runways. Currently O'Hare capacity in east flow is 30% less than in west flow. This causes heavier use of west flow. The new runways will allow more balanced east versus west usage and therefore more balanced noise impacts. Similarly the south airfield now has heavier use due to its parallel configuration. Completing the north airfield will balance usage (north runways versus south runways) and therefore more balanced noise impacts, consistent with the Environmental Impact Statement and Record of Decision.

O'HARE CROSSWIND/DIAGONAL RUNWAY LAYOUT AND USAGE (REPORT #4)

The CDA agrees with the SOC/JDA report of needing to "Balance Noise Impacts". The CDA is open to the idea of studying additional Fly Quiet enhancements including "spreading" out the noise to any available runway. The CDA believes that evaluating runway utilization during Fly Quiet hours is an area of opportunity for beneficial noise relief. Changes to the Fly Quiet Program will need to be recommended by the ONCC, after community input and consensus submitted by the CDA, and approved by the FAA.

USE OF VISUAL APPROACH DURING FLY QUIET HOURS (REPORT #5)

The CDA does not know if this would be best for the public, but is in favor of evaluating the potential with the FAA and community support.

O'HARE INTERNATIONAL AIRPORT
OMP PUBLIC OUTREACH

Extensive civic dialogue, agency notification, and public involvement and outreach efforts were conducted for the O'Hare Modernization Program (OMP), which is implemented by the Chicago Department of Aviation (CDA). The Federal Aviation Administration (FAA) was the lead federal proponent of the OMP's comprehensive three-year Environmental Impact Statement (EIS).

Pre-EIS Dialogue

- March 1999 – The Commercial Club of Chicago released its report *Chicago Metropolis 2020: Preparing Metropolitan Chicago for the 21st Century*. The report called for the expansion of O'Hare's capacity, stating that "construction of an additional runway should begin immediately or the existing system of intersecting runways should be reconfigured to provide for more runways in parallel."[1]
- June 15, 2001 – The U.S. Senate Committee on Commerce, Science, and Transportation held a field hearing in Chicago to urge local stakeholders "to develop a solution that would expand airport capacity in the Chicago region."[2]
- June 29, 2001 – Mayor Richard M. Daley announced his comprehensive plan for modernizing O'Hare.[1]
- August and September 2001 – Governor George Ryan hosted and attended four public hearings in Bensenville, Naperville, Des Plaines, and Tinley Park to seek input on Mayor Daley's plan for O'Hare and alternative options.[1]
- December 5, 2001 – Mayor Daley and Governor Ryan announced an agreement on a compromise airport plan. The agreement called for expansion/reconfiguration of O'Hare as proposed by Mayor Daley, plus additional measures. The Mayor and the Governor also called for immediate Congressional approval of the agreement.[1]
- May through July 2002 – The U.S. House of Representatives approved legislation ratifying the Daley-Ryan agreement (HR3479) by a vote of 343 to 87[3], but the U.S. Senate never voted on the legislation, so the proponents began to pursue legislative relief for O'Hare expansion with the Illinois General Assembly.[1]

EIS Scoping

- July 2001 through August 2002 – Nearly 90 City of Chicago pre-scoping briefings and public outreach opportunities with various stakeholders[4]
- July 17, 2002 – Notice of Intent to prepare an EIS and conduct public scoping meetings published in the Federal Register[5]
- July 19, 2002 – Legal notices published in four major newspapers: *Chicago Tribune*, *Chicago Sun-Times*, *Daily Herald*, and *Daily Southtown*[6]
- August 19-20, 2002 – Agency scoping meetings in Springfield and Chicago accommodating 38 total attendees representing 17 organizations[7]
- August 21-22, 2002 – Public scoping meetings in Des Plaines and Elk Grove Village accommodating 317 total attendees from 22 communities[7]
- August 29, 2002 – General informational mayors meeting; 91 Chicago-area mayors were invited[8]
- 1,385 comments made by 305 commenters during scoping, categorized into 14 issue groups; Noise was the largest category, encompassing 14% of the total comments[4]

O'Hare Modernization Act

- May 31, 2003 – The Illinois 93rd General Assembly passed the O'Hare Modernization Act (OMA) by a wide margin. The bill, known as HB0721, was approved by a vote of 84 to 31 in the Illinois House of Representatives and by a vote of 40 to 19 in the Illinois Senate.[9]
- August 6, 2003 – Governor Rod Blagojevich signed the OMA into law, which became Public Act 093-0450.[9]

Draft EIS

- February 7, 2003, June 4, 2004, January 25, 2005, May 6, 2005, and June 3, 2005 – Briefings for the O'Hare Noise Compatibility Commission (ONCC)[10,11]
- March 19, 2003 – Purpose and Need public meeting in Schiller Park[12]
- April 25, 2003 – Launch of a public website dedicated to the EIS[13]

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[1] http://www.civiccommittee.org/initiatives/ohare-modernization
[2] https://www.congress.gov/107/crpt/srpt161/CRPT-107srpt161.pdf
[3] https://www.congress.gov/bill/107th-congress/house-bill/3479/actions
[4] Federal Aviation Administration; Final Environmental Impact Statement For O'Hare Modernization at Chicago O'Hare International Airport, July 2005, Appendix S, Attachment S-2
[5] 67 Fed. Reg. 47029, July 17, 2002
[6] Federal Aviation Administration; Final EIS, July 2005, Appendix S, Section I, page I-1
[7] Federal Aviation Administration; Final EIS, July 2005, Appendix S, Section V, page V-1
[8] Federal Aviation Administration; Final EIS, July 2005, Appendix S, Section II, page II-1
[9] www.ilga.gov
[10] Federal Aviation Administration; Record of Decision For O'Hare Modernization at Chicago O'Hare International Airport, September 2005, page 36
[11] Federal Aviation Administration; Final EIS, July 2005, Final EIS, Appendix T, pages T-2 and T-101
[12] 68 Fed. Reg. 7646, February 14, 2003
[13] Federal Aviation Administration; Record of Decision For O'Hare Modernization at Chicago O'Hare International Airport, September 2005, page 37

- October 17, 2003 – Alternatives Working Session in Des Plaines for invited members of local governments[14]
- November 2003 through August 2004 – Numerous public meetings for environmental justice outreach, including a survey of communities, three public workshops, and submission of and response to written comments[15]
- September 29, 2004 – Notice of availability of draft technical analyses data in the Federal Register[16]
- January 14, 2005 – The Draft EIS was published and made available for review in 31 community libraries and 2 college libraries.[17,18]
- January 28, 2005 – Second notice of availability of the Draft EIS in the Federal Register[19]
- Publication of over 7.5 million pages of modeling data and other EIS documentation[20]
- Investment of over 2,000 hours by an FAA air traffic working group for airspace modeling.[21]

Public Response to Draft EIS

- January 21, 2005 to April 6, 2005 – Public comment period for the Draft EIS, which resulted in over 900 comment letters and petitions received[22] totaling approximately 3,000 pages[23], including from:
  - U.S. Congress: Rep. Melissa Bean, Rep. Henry Hyde, Sen. Peter Fitzgerald, Sen. Richard Durbin, Sen. Barack Obama
  - Federal Agencies: USACE, USFWS, USEPA, FHWA, DOI
  - State Agencies: IDNR, IDOT, IEPA
  - Numerous community and professional groups
  - 937 individual citizens[24]
- February 22, 23, and 24, 2005 – Public hearings in Elk Grove Village, Elmhurst, and Niles, accommodating approximately 1,500 attendees, with 209 giving oral testimony and 184 giving private testimony.[25]

Final EIS and ROD

- July 25, 28, and 29, 2005 – The Final EIS responded to all comments made regarding the Draft EIS, was approved by the FAA on July 25th, released to the public on July 28th, announced in the Federal Register on July 29th, and was made available for review in 31 community libraries and 2 college libraries.[26,27,28]
- September 30, 2005 – The Record of Decision (ROD) was published and gave environmental approval of the OMP on the condition of many requirements, including noise requirements.[29,30]

Media Coverage

The OMP was widely reported upon before and during the three-year EIS process. It continues to be the subject of extensive media coverage by local, national, and global news outlets, including the *Chicago Tribune*, *Chicago Sun-Times*, *Daily Herald*, *Crain's Chicago Business*, WGN-TV Chicago, WLS-TV Chicago (ABC), WMAQ-TV Chicago (NBC), WBBM-TV Chicago (CBS), and WTTW-TV Chicago (PBS).

Post-EIS Outreach between October 2005 and July 2015

Prior to the opening of Runway 9L/27R in 2008 and Runway 10C/28C in 2013 and thereafter, the CDA, FAA, and ONCC have conducted more than 50 meetings, briefings, and outreach events to explain the effects of new runways to local communities.

EIS Re-Evaluation

As part of the OMP EIS Re-Evaluation, the FAA has announced four Public Workshops[31]:

- Monday, August 10, 2015, from 1:00 to 9:00 p.m. at White Eagle Banquets, 6839 North Milwaukee Avenue, Niles, Illinois 60714
- Tuesday, August 11, 2015, from 1:00 to 9:00 p.m. at Taft High School, 6530 West Bryn Mawr Avenue, Chicago, Illinois 60631
- Wednesday, August 12, 2015, from 1:00 to 9:00 p.m. at Monty's Elegant Banquets, 703 South York Road, Bensenville, Illinois 60106
- Thursday, August 13, 2015, from 1:00 to 9:00 p.m. at Belvedere Events and Banquets, 1170 West Devon Avenue, Elk Grove Village, Illinois 60007

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14 Federal Aviation Administration; Final EIS, July 2005, Appendix T, page T-3
15 Federal Aviation Administration; Final EIS, July 2005, Appendix P
16 69 Fed. Reg. 58217, September 29, 2004
17 ftp://public-ftp.agl.faa.gov/ORD%20DEIS/Press%20Release.pdf
18 70 Fed. Reg. 3244, January 21, 2005
19 70 Fed. Reg. 4119, January 28, 2005
20 ftp://public-ftp.agl.faa.gov/ORD%20DEIS/Press%20Release.pdf
21 Federal Aviation Administration; Record of Decision For O'Hare Modernization at Chicago O'Hare International Airport, September 2005, page 29
22 Federal Aviation Administration; Final EIS, July 2005, Appendix U, page U.1-2
23 Federal Aviation Administration; Final EIS, July 2005, Appendix U, page U.1-1
24 Federal Aviation Administration; Final EIS, July 2005, Appendix U
25 Federal Aviation Administration; Final EIS, July 2005, Appendix T, page T-4
26 Federal Aviation Administration; Record of Decision For O'Hare Modernization at Chicago O'Hare International Airport, September 2005, page 38
27 http://www.faa.gov/airports/airport_development/omp/eis/feis/Media/PressRelease.pdf
28 70 Fed. Reg. 43929, July 29, 2005
29 http://www.faa.gov/airports/airport_development/omp/eis/rod/Media/PressRelease.pdf
30 70 Fed. Reg. 58784, October 7, 2005
31 80 Fed. Reg. 40119, July 13, 2015

MEMORANDUM

TO: Chicago Department of Aviation

FROM: KAPLAN KIRSCH & ROCKWELL LLP[1]

DATE: July 30, 2015

SUBJECT: **Evaluation and Recommendations Related to Public Involvement in the Environmental Review Process for the O'Hare Modernization Program**

This memorandum contains our independent analysis. It was prepared for legal counsel and has not been shared with, or prepared in connection with, any individuals within the Department of Aviation. It was prepared without reliance on any confidential material and does not contain any privileged attorney-client communications in the event that you choose to release publicly any portion of this memorandum or the results of our analysis.

OVERVIEW

The City of Chicago, through the Chicago Department of Aviation (CDA), has requested that our firm review the quality and quantity of public outreach conducted in connection with the Chicago O'Hare Modernization Program (OMP). We have conducted this review with respect to four separate public outreach phases: (1) public outreach in connection with the federal environmental review that resulted in the Federal Aviation Administration (FAA) Record of Decision (ROD) approving the OMP; (2) CDA's public outreach efforts during implementation of the OMP; (3) the public outreach process that FAA is currently providing as it prepares a Written Reevaluation of its 2005 environmental analysis of the OMP; and (4) any additional opportunities for public outreach that CDA could or should pursue going forward.

In connection with our analysis, we reviewed and compared the public process for OMP against public outreach efforts for comparable airport development projects and environmental reviews.

This memorandum sets forth our analysis and conclusions.

[1] At your request, we have attached a brief description of our firm's practice at Attachment A.

Table of Contents

EXECUTIVE SUMMARY

CDA requested that we conduct an independent review of the following:

(1) The public outreach during the federal environmental review of the O'Hare Modernization Program (OMP) that resulted in FAA's Record of Decision (ROD) approving the project in 2005;

(2) The City and CDA's efforts to inform and educate the public during the implementation of the OMP;

(3) The public outreach for FAA's pending written reevaluation of the 2005 OMP environmental impact statement (EIS) in light of schedule changes for Phase 2 of the project; and

(4) Additional opportunities for public involvement that CDA could or should pursue going forward.

Our review started with the applicable federal regulations and guidance regarding public outreach obligations during federal environmental reviews under the National Environmental Policy Act (NEPA). We reviewed the documentation of the public outreach efforts during the initial OMP EIS as well as for the pending written reevaluation. We also reviewed the City and CDA's efforts to keep the public informed as the project is being implemented. Finally, we reviewed recent FAA environmental reviews of other major airport development projects in order to evaluate how public outreach for the OMP EIS compares to the public outreach that occurred for comparable airport projects.

In brief, we found that FAA, the City, and CDA have provided extensive opportunities for public involvement and that the OMP has received robust public scrutiny and comment as it has evolved from the initial proposals to the pending Written Reevaluation. The collective efforts of the City, CDA, and FAA to inform and engage the public in connection with the OMP have been among the most ambitious, most transparent, and most comprehensive of any airport project in the last two decades.

Our findings are summarized below.

1. Public Involvement in the 2005 Federal Environmental Review for the OMP

FAA prepared an EIS on the proposed O'Hare Modernization Program and issued a ROD approving the OMP in 2005. During this process, FAA conducted a comprehensive public outreach effort.

In particular:

- The OMP project received more public involvement and scrutiny than required by FAA policies, regulations, and law. FAA held almost 70 pre-scoping briefings; held an additional 40 additional meetings after scoping; released 7.5 million pages of technical data to the public before completion of the draft EIS; and answered hundreds of pages of comments.

- We reviewed the public process conducted during EISs for other large, controversial, and/or environmentally significant projects over the last decade including Los Angeles International (LAX), Houston George Bush Intercontinental Airport, Philadelphia International Airport, Phoenix Sky Harbor International Airport, and New York's LaGuardia Airport.

- We found that the OMP project received the same or more public outreach and involvement than virtually any other airport project we reviewed. The few exceptions are due to unusual or extraordinary circumstances not applicable to OMP.[2]

2. <u>Public Involvement During OMP Implementation</u>

The City and CDA have taken significant steps to keep the public informed and engaged during the implementation of the project and to ensure that the public has an ongoing access to data to understand impacts of O'Hare on their communities.

- The community has had significant and ongoing opportunities to participate in public meetings.

- City and FAA officials have regularly communicated with the public about project timelines and implications.

- Throughout this process, ONCC has served as a successful platform for the public to identify and resolve problems.

3. <u>Public Involvement in the Pending Written Reevaluation</u>

The schedule for implementing Phase 2 of the OMP has changed, such that the opening of the final three runway projects will not all occur in a single year as was contemplated at the time of the EIS. As a result, FAA is currently preparing a written reevaluation of the 2005 EIS.

A written reevaluation is a document used to determine whether a previously-prepared EIS remains valid or whether new or supplemental environmental documentation is required. To

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[2] An example is the late addition of an entirely new alternative for the Los Angeles International Airport Master Plan Improvements Project. The new alternative arose due to the intervening events of September 11, 2011. This caused FAA to schedule a full suite of additional hearings on the draft EIS and the supplemental draft EIS.

support its written reevaluation for the OMP, FAA is preparing an analysis of the impacts during the interim configurations that will as Phase 2 of the project is completed. These interim configurations were not examined in the EIS.

Federal regulations do not require any public process for written reevaluations and in fact, do not even require FAA to make any final document public. Nevertheless, FAA has been increasing public involvement in its written reevaluations generally. The agency has started not only publishing its final conclusions, but also accepting comments on draft written reevaluations. For comparison purposes, we reviewed the public process conducted during recent written reevaluations at airports including Philadelphia International Airport, LAX, Fort Lauderdale-Hollywood International Airport, Panama City-Bay County International Airport, and Boston's Logan International Airport.

We found that in comparison to the public outreach offered for other FAA written reevaluations, FAA is conducting an extraordinary amount of public outreach for its pending written reevaluation of the OMP EIS.

In particular:

- FAA is holding four public hearings on the draft written reevaluation. To put this in context, for the seven other written reevaluations that we reviewed, FAA offered no formal public hearings at all.

- FAA has decided to accept comments for 30 days, even though it has no obligation to seek any public comment. In half of the written reevaluations that we reviewed, FAA sought no public comment at all.

4. **<u>Additional Opportunities for Public Involvement</u>**

Although the City and FAA have already offered extensive opportunities for public involvement in the OMP process, there are still steps that the City could take to enhance public involvement and increase transparency and community awareness of noise impacts from the OMP. In particular, the City could:

- Enhance the mission of ONCC so that it is charged with providing advice on additional community outreach and information measures;

- Prepare and disseminate regular updates regarding noise issues and noise impacts as Phase 2 of the OMP is implemented;

- Seek community input and recommendations on revisions to the Fly Quiet program to ensure its continued effectiveness;

- Design and implement an aggressive community outreach and education program to address the implementation of NextGen flight tracks in the Chicago metropolitan area, *regardless* of what public outreach FAA initiates; and

- Recommend additional opportunities for public comments on the pending written reevaluation.

* * *

INTRODUCTION

The Federal Aviation Administration (FAA) conducted an environmental review as required by the National Environmental Policy Act (NEPA) between 2001 and 2005, when it issued a final Record of Decision (ROD) approving the O'Hare Modernization Program (OMP) at the Chicago O'Hare International Airport (O'Hare).

The City of Chicago (City) owns and operates O'Hare through the Chicago Department of Aviation (CDA). CDA has requested that we prepare an independent review of the public outreach process conducted in connection with approval and development of the OMP. The purposes of this review are:

(1) To assess the level of public involvement during the development of the OMP Environmental Impact Statement (EIS) in light of minimum requirements for public involvement and also compared to actual examples of public involvement in comparable, major airport EISs.

(2) To assess the City's efforts in communicating with the public since the OMP project was approved.

(3) To assess the opportunities for public involvement in the pending written reevaluation of the 2005 ROD in light of minimum requirements and as compared to actual examples of public involvement in comparable FAA written reevaluations.

(4) To identify any additional steps that CDA and the City could take to ensure that the public is—and continues to be—fully informed and adequately involved in assessing the impacts of the OMP and changes in the timing and sequencing of portions of this project.

In connection with this memorandum, we reviewed the principal public involvement requirements set forth in the following federal regulations and guidance documents:

Regulations

- Council on Environmental Quality (CEQ), NEPA regulations, 40 C.F.R. Part 1500

Agency Orders

- FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (July 2015)[3]

[3] FAA Order 1050.1F was issued in final form earlier this month; its predecessor order, Order 1050.1E, is not substantively different in its public involvement requirements in this context.

- FAA Order 1050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* (April 2006)

Agency Guidance

- FAA Air Traffic Organization, *FAA Response to RTCA, Inc. "Blueprint for Success to Implementing Performance Based Navigation" Recommendations* (June 2015)[4]
- CEQ, *Collaboration in NEPA: A Handbook for NEPA Practitioners* (October 2007)
- CEQ, *A Citizen's Guide to the NEPA: Having Your Voice Heard* (December 2007)
- FAA, *Best Practices for Environmental Impact Statement Management* (January 2002)
- FAA, *Community Involvement Policy Statement* and *Community Involvement Manual* (April 1995)

To put the OMP in context, we compared the public process conducted for the OMP against the public processes conducted for recent and comparable airport development projects elsewhere in the country. We also reviewed additional airport projects that have undergone written reevaluations. We limited our reviews to airport development projects for which a full EIS was conducted.[5]

The airport projects we reviewed for comparison are as follows:

✈ **Philadelphia International Airport**, *Capacity Enhancement Program* (2010 ROD; 2015 Draft Written Reevaluation)[6]

✈ **Fort Lauderdale – Hollywood International Airport**, *Development and Expansion of Runway 9R/27L and Other Associated Airport Projects* (2008 ROD; 2011 Written Reevaluation; 2014 Written Reevaluation)[7]

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[4] The OMP does not include the implementation of new Performance Based Navigation (PBN) procedures at O'Hare. Nevertheless, we reviewed FAA's recent analysis of recommendations for implementing PBN because this document contains FAA Air Traffic Organization's most recent conclusions about the need for expanded community involvement and transparency when implementing new flight procedures.

[5] Many airport projects do not require preparation of a full EIS and are subject to the much less stringent NEPA procedural obligations that call for preparation of an environmental assessment or are categorically excluded from any NEPA documentation.

[6] In 2010, FAA issued a ROD approving the Capacity Enhancement Program at the Philadelphia International Airport. FAA prepared a draft Written Reevaluation in July 2015. The EIS and ROD are available at: http://www.phl-cep-eis.com/documents.asp. The draft Written Reevaluation is available at: http://www.faa.gov/airports/eastern/environmental/.

[7] In 2008, FAA issued a ROD approving runway expansion and associated development projects at Fort Lauderdale-Hollywood International Airport. FAA prepared two Written Reevaluations, first in 2011 and then in 2014. The EIS is available at: http://www.broward.org/Airport/Community/Pages/FEIS.aspx#feis. The ROD and 2011 Written Evaluation are available at: http://www.faa.gov/airports/environmental/records_decision/?airport=fll. The 2014 Written Evaluation is available at: http://www.broward.org/Airport/Community/Pages/FEIS.aspx#eval.

- **Panama City-Bay County International Airport**, *Proposed Airport Relocation* (2006 ROD; 2009 Written Reevaluation; 2011 Written Reevaluation)[8]

- **Phoenix Sky Harbor International Airport**, *Airport Development Program* (2006 ROD)[9]

- **Los Angeles International Airport**, *Master Plan Improvements* (2005 ROD; 2014 Written Reevaluation on West Aircraft Maintenance Area)[10]

- **Logan International Airport**, Airside Improvements Planning Project (2002 ROD; 2007 Written Reevaluation on Centerfield Taxiway)[11]

- **Houston George Bush Intercontinental Airport (IAH)**, *Runway and Master Plan Improvements (*2000 ROD)[12]

- **LaGuardia Airport**, *East End Roadway Improvements Project* (2000 ROD)[13]

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[8] In 2006, FAA issued a ROD approving the relocation of the Panama City-Bay County International Airport to a new greenfield site in Bay County, Florida. In 2009, the sponsor announced its desire to increase the length of the primary runway at the relocated airport. FAA prepared a 2009 Written Reevaluation to examine this change. Subsequently, in 2011, FAA prepared a Written Reevaluation of the impacts of redevelopment of the prior airport site. The ROD and Written Reevaluations are available at: http://www.faa.gov/airports/environmental/records_decision/?airport=pfn.

[9] In 2006, FAA issued a ROD approving comprehensive airport improvements to terminals, access roads, and the airfield at the Phoenix Sky Harbor International Airport. The ROD is available at: http://www.faa.gov/airports/environmental/records_decision/?airport=phx.

[10] In 2005, FAA issued a ROD approving an updated ALP at the Los Angeles International Airport (LAX) to depict improvements identified in the 2004 LAX Master Plan. FAA prepared a Written Reevaluation of this change in 2013. The 2005 ROD is available at: http://www.faa.gov/airports/environmental/records_decision/?airport=lax. The 2014 Written Reevaluation is available at: http://www.lawa.org/ourLAX/wama.aspx.

[11] In 2002, FAA issued a ROD approving comprehensive airside improvements at Boston Logan International Airport. In 2007, FAA prepared a Written Reevaluation on the Centerfield Taxiway. The 2002 ROD and 2007 Written Reevaluation are available at: http://www.faa.gov/airports/environmental/records_decision/.

[12] In 2000, FAA issued a ROD approving a new air carrier length runway (8L-26R) and related near-term master plan improvements at George Bush Intercontinental Airport (IAH). The ROD is available at: http://www.faa.gov/airports/environmental/records_decision/.

[13] In 2000, FAA issued a ROD approving a roadway reconfiguration project at LaGuardia Airport (LGA). The ROD is available at: http://www.faa.gov/airports/environmental/records_decision/.

I. PUBLIC INVOLVEMENT IN THE 2005 OMP EIS AND ROD

NEPS requires federal agencies to conduct a review of the environmental consequences of proposed actions prior to making any decisions. A critical goal of the statute is to ensure that environmental information is available for review and comment *before* decisions are made and *before* actions are taken.[14] Public involvement is integral and essential to this process.[15] The public often has valuable information about local resources and can help identify not only potentially harmful impacts, but also possible mitigation opportunities.[16]

The applicable NEPA regulations (issued by the CEQ) set forth minimum requirements for all federal agencies.[17] In the case of airport projects, these requirements are supplemented by FAA directives, most notably Order 1050.1F, *Environmental Impacts, Policies and Procedures* (applicable to all FAA actions), and Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* (applicable only to FAA actions related to airports) (referred to in this memorandum respectively, Order 1050.1F and Order 5050.4B).[18] These documents set forth FAA's obligations to provide sufficient public notice and opportunities for involvement during any NEPA process.[19]

In brief, FAA has an *obligation* to involve the public during two key phases of an EIS: (1) scoping; and (2) review of the draft EIS. FAA also has the *discretion* to solicit public comment on the final EIS and on any subsequent written reevaluation. The key steps in any EIS and the stages where the public can be involved are outlined in Figure 1 below. FAA also has a community involvement policy[20] that encourages the agency to incorporate open, effective community

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[14] 40 C.F.R. § 1500.1; *see also* Council on Environmental Quality, *A Citizen's Guide to the NEPA: Having Your Voice Heard* (2007) at 2 (hereinafter, *Citizen's Guide*).

[15] 40 C.F.R. § 1500.1(b) ("Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.").

[16] *E.g., Citizen's Guide* at 1-2.

[17] *See generally,* 40 C.F.R. Part 1503 ("Commenting").

[18] While FAA Order 1050.1F provides directives on NEPA compliance for all FAA organizations, Order 5050.4B provides specific directives on NEPA compliance for airport-related actions in particular. In that respect, Order 5050.4B supplements Order 1050.1F. The EIS for the OMP was prepared before Order 1050.1F was effective, but the public involvement requirements are essentially unchanged from Order 1050.1E, which was in effect at the time the EIS was prepared.

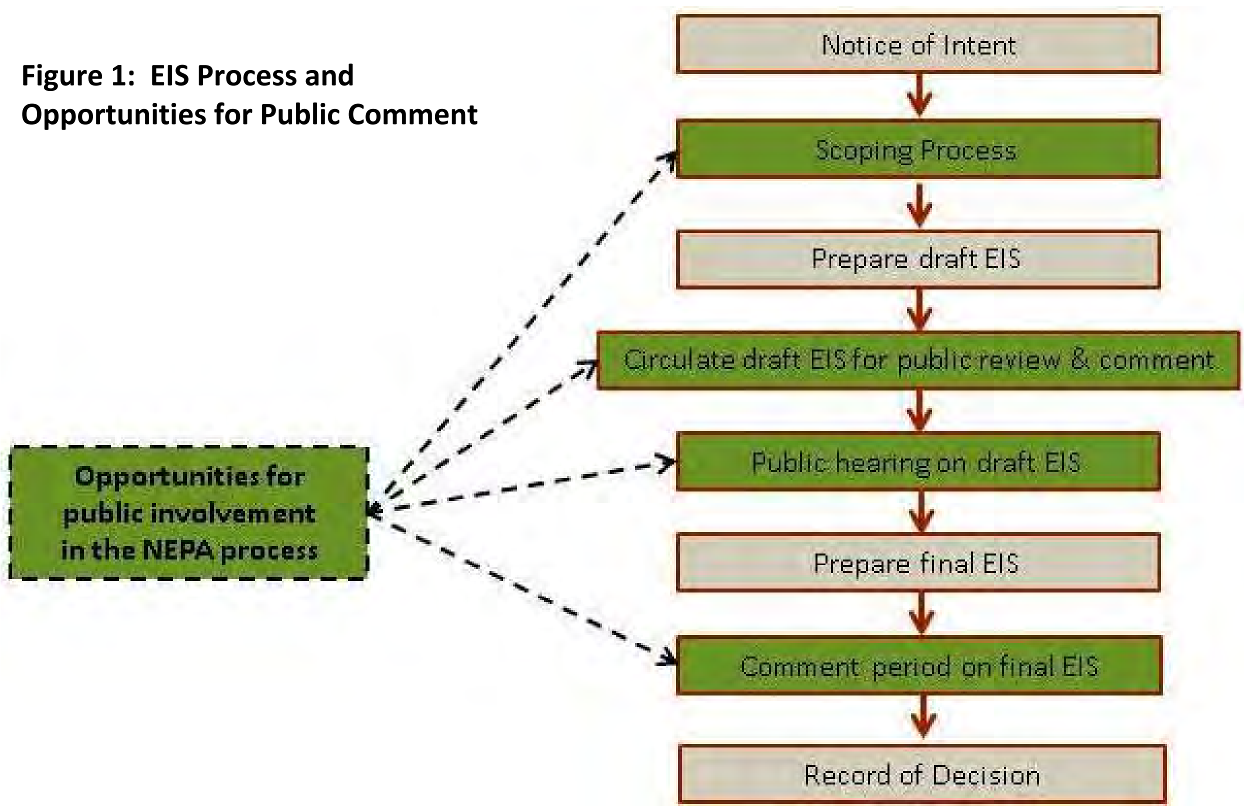
[19] It is important to note that NEPA and FAA requirements stipulate that FAA, not the airport proprietor, is responsible for NEPA compliance. It is a common misconception that the airport proprietor itself prepares an EIS. Although CDA was, of course, intimately involved throughout the entire EIS process, the process, including all public outreach, was supervised closely by FAA and its contractors. During the EIS process, the City may have engaged in other outreach but City-initiated outreach is not formally considered to be part of the EIS process*.*

[20] *FAA, Community Involvement Manual, FAA-EE-90-03 (1995) (*hereinafter *Community Involvement Manual*).

involvement.[21] This policy applies more broadly than the NEPA requirements but, unlike Order 5050.4B and Order 1050.1F, is not mandatory. It nevertheless provides a valuable reference and offers helpful suggestions for designing community involvement programs for FAA-funded or supported projects like the OMP.

Finally, any airport sponsor submitting an application for Airport Improvement Program (AIP) funding for a project that involves the location of a new runway or a major runway extension is obligated by federal law to certify that it has provided an opportunity for a public hearing "to consider the economic, social, and environmental effects of the location and the location's consistency with the objectives of any planning that the community has carried out."[22] This is the only explicit statutory requirement applicable to public involvement in this context and is independent of any NEPA obligations imposed on FAA.

Figure 1: EIS Process and Opportunities for Public Comment



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[21] *Id.; see al*so Order 5050.4B ¶ 401.

[22] 49 U.S.C. § 47106(c)(1)(A)(i).

A. Notice of Intent

FAA must publish a Notice of Intent (NOI) to prepare an EIS "as soon as practicable" after its decision to prepare an EIS.[23] For OMP, FAA more than met its mandate to integrate the NEPA process with other planning at the earliest possible time. FAA published its NOI for the OMP EIS on July 17, 2002, five months *before* the City formally submitted its draft Future Airport Layout Plan to FAA for approval.[24,25]

As indicated in Figure 2, the NOI for the OMP EIS included all the necessary information required to notify the public of the EIS process and to provide relevant information about the agency's proposed scoping process and how the public could get involved in the NEPA process.[26]

Figure 2: Notice of Intent

Required Content in a Notice of Intent[27]	OMP EIS Notice of Intent
• Description of the proposed action	✓
• Name of the project proponent	✓
• Explanation of why the proponent wants to undertake the project	✓
• Description of when and where the proposed action would occur	✓
• Description of the alternatives under consideration	✓
• Description of FAA's proposed scoping process	✓
• The name and telephone number of the responsible FAA official who will answer questions about the proposed action and the EIS	✓

In addition, legal notices inviting the public to participate in the scoping meetings were published in the *Chicago Tribune*, *Chicago-Sun Times*, *Daily Herald* and *Daily Southtown* on July 19, 2002.[28]

[23] 40 C.F.R. § 1501.7; Order 5050.4B ¶ 907(a); *see also* Order 1050.1F ¶ 7-1.2(b); 40 C.F.R. § 1501.2.

[24] 67 Fed. Reg. 47029 (July 17, 2002).

[25] O'Hare Airport Master Plan Report (Feb. 2004) at I-3.

[26] *Citizen's Guide* at 13.

[27] Order 5050.4B ¶ 908(a); Order 1050.1F ¶ 7-1.2(b); *see also* 40 C.F.R. § 1508.22.

[28] O'Hare Modernization Program Scoping Summary at 4 (Appendix S, Attachment S-2 to the OMP EIS).

B. Scoping

The purpose of scoping is to provide an "early and open process" for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.[29] This process is designed to encourage the interested public to present their ideas, alternatives, and concerns *before* EIS preparation begins.

Before commencing the formal scoping process for the OMP EIS, FAA held 68 pre-scoping briefings and public meetings with federal, state, and local organizations, elected officials, and the local public. These meetings involved a broad range of interested parties including the FAA Air Traffic Organization, O'Hare air traffic controllers, and numerous mayors and citizens groups from surrounding communities.[30] Many of these meetings were briefings for state and local elected officials and more than half of these meetings were public meetings and community outreach efforts with local residents.

Based upon our review of major airport projects, this is an unprecedented level of pre-scoping coordination. To put this in context: there is no obligation to engage the public before scoping, and FAA often conducts no pre-scoping coordination at all. Of the specific airport projects we reviewed, FAA conducted pre-scoping meetings for only two of the other projects: (1) FAA held seven pre-scoping meetings for the LAX Master Plan Improvements EIS; and (2) FAA held just two focus group meetings prior to scoping for the Fort Lauderdale Runway Expansion EIS.

FAA also conducted a comprehensive scoping process for the OMP. It held four scoping meetings (two agency scoping meetings and two general public scoping meetings). The two public meetings were held at the Fountain Blue Banquets facility in Des Plaines and the Avalon Banquets facility in Elk Grove Village, respectively.[31] FAA published notices in local publications advertising the scoping meetings. FAA also sent 577 individual letters inviting agencies, elected officials, community organizations, and airport/airline representatives to participate in the scoping process.[32] Likely as a result of this extensive outreach, the scoping meetings were well-attended: a total of 317 individuals attended the two public scoping meetings.[33]

The scoping meetings were conducted as informational workshops with FAA and City representatives available to answer questions. Of particular note, a City representative was available at the scoping meetings to assist attendees in identifying the location of their

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[29] 40 C.F.R. § 1501.7.

[30] A full list of these meetings is provided in the O'Hare Modernization Program Scoping Summary at pages 1- 4 (Appendix S, Attachment S-2 to the OMP EIS) (hereinafter *Scoping Summary*).

[31] See 67 Fed. Reg. 47029 (July 17, 2002).

[32] *Scoping Summary* at ii (486 letters sent to individuals and 91 letters sent to Chicagoland mayors).

[33] *See, Scoping Summary* at iii.

residence or property relative to the location of the Airport by using a property locator program.[34] The sign-in sheets indicate that communities all around the Airport were represented at the scoping hearings.[35]

Ultimately, the OMP scoping process was successful in that it accomplished the statutory and regulatory goals of encouraging early identification of public ideas, alternatives, and concerns.

Public involvement should not end when the formal scoping meetings are over, however. While there is no formal obligation to make data or analyses available before the release of the draft EIS, there is an emerging trend of offering preliminary information to the public. In several recent airport projects, FAA has released early drafts or working papers on critical EIS elements such as a draft of the required "purpose and need" statement[36] for a project or the anticipated alternatives[37] for review. By way of example, for the Philadelphia Capacity Enhancement Program, FAA held public information meetings to provide an update on the draft purpose and need and alternatives screening process. For the proposed Southern Nevada Supplemental Project, FAA made available a draft Purpose and Need Working Paper[38] and a draft Alternatives Working Paper.[39] In both projects, FAA's intent was to solicit comments early in the process of preparing the EIS so that problematic issues could be identified and resolved before the formal publication of the draft EIS. When a project is complex or controversial, FAA has found that this early engagement of the public helps make the draft EIS more complete and responsive to community or agency concerns.

FAA followed this emerging trend for the OMP project. It held a public meeting to introduce the preliminary purpose and need statement at the Sheraton Four Points Hotel in Schiller Park on March 29, 2003.[40] It also held an alternatives working session with local government representatives from 15 area municipalities. That session was held at the Fountain Blue

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[34] *Scoping Summary* at 7, 16.

[35] *Scoping Summary* at 16.

[36] *See Citizen's Guide* at 16 ("One key aspect of a draft EIS is the statement of the underlying purpose and need.30 Agencies draft a "Purpose and Need" statement to describe what they are trying to achieve by proposing an action. The purpose and need statement explains to the reader why an agency action is necessary, and serves as the basis for identifying the reasonable alternatives that meet the purpose and need.").

[37] As CEQ explains, "The identification and evaluation of alternative ways of meeting the purpose and need of the proposed action is the heart of the NEPA." *Citizen's Guide* at 16. Agencies are obligated to evaluate all reasonable alternatives or a range of reasonable alternatives in enough detail so that a reader can compare and contrast the environmental effects of the various alternatives analysis. *Id*.

[38] 73 Fed. Reg. 4366 (Jan. 25, 2008).

[39] 73 Fed. Reg. 45,268 (Aug. 4, 2008).

[40] 68 Fed. Reg. 7646 (Feb. 14, 2003).

Banquet Hall in Des Plaines on October 17, 2003.[41] The report from the meeting indicates that concerns on issues such as airspace changes and reducing impacts on surrounding communities were fully aired.[42]

In addition, FAA took the more unusual step of releasing significant amounts of environmental modeling data and documentation on environmental impacts for the OMP EIS before the release of the draft EIS.[43] (While FAA has started to seek input early in the EIS process, it is still unusual for the agency to release its own data before all analysis is completed. The fact that FAA released data before all analysis was completed was an unusually transparent action by the agency.) The released data included more than 7.5 million pages of Total Airspace and Airport Modeller (TAAM) simulation experiment results and surface transportation modeling results.[44] We are not aware of any other recent airport projects for which this magnitude of technical analysis was released for public review prior to publication of the draft EIS.

The early public outreach effort for the OMP EIS also included:[45,46]

- An information meeting for mayors;
- Four briefings to the ONCC;
- 28 briefings to municipal and community organizations;
- Three environmental justice public workshops; and
- More than 30 small group meetings to address environmental justice issues.

The figures below compare the early outreach efforts conducted for OMP and other recent airport projects. The data demonstrate that the public process for the OMP EIS exceeded not just the minimum regulatory requirements but also the actual public involvement conducted for other recent airport projects.

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[41] OMP EIS, Appendix T at Attachment T-6 (Alternatives Outreach Materials).

[42] OMP EIS, Appendix T at Attachment T-6 (Alternatives Outreach Materials); *see, e.g., id.* at T-170.

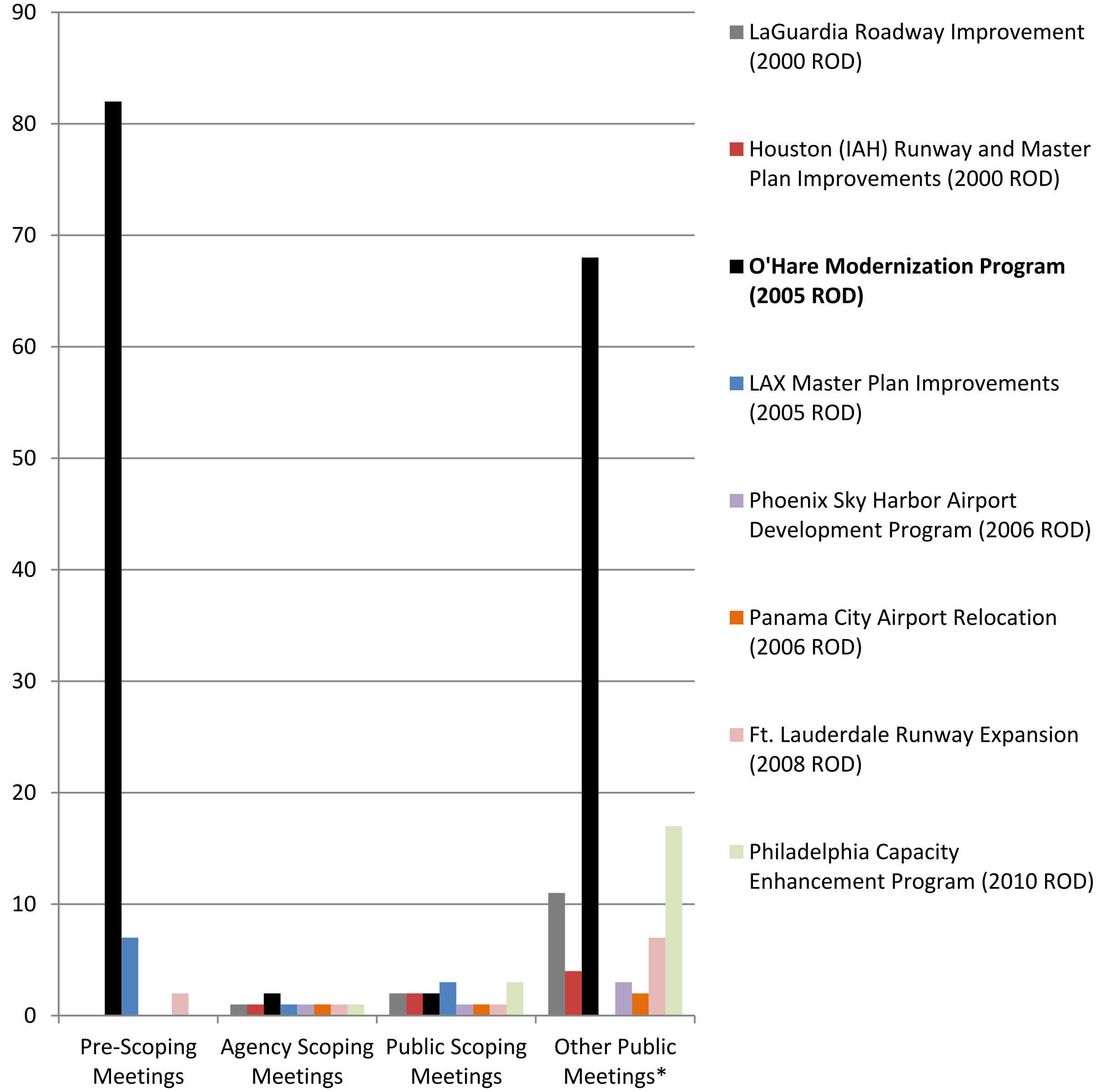
[43] 69 Fed. Reg. 58,217 (Sept. 29, 2004).

[44] OMP EIS at Appendix T (Public Outreach and Agency Coordination), p. T-3.

[45] OMP EIS at Appendix T (Public Outreach and Agency Coordination), p. T-2 – T-3.

[46] OMP ROD at 71 (environmental justice).

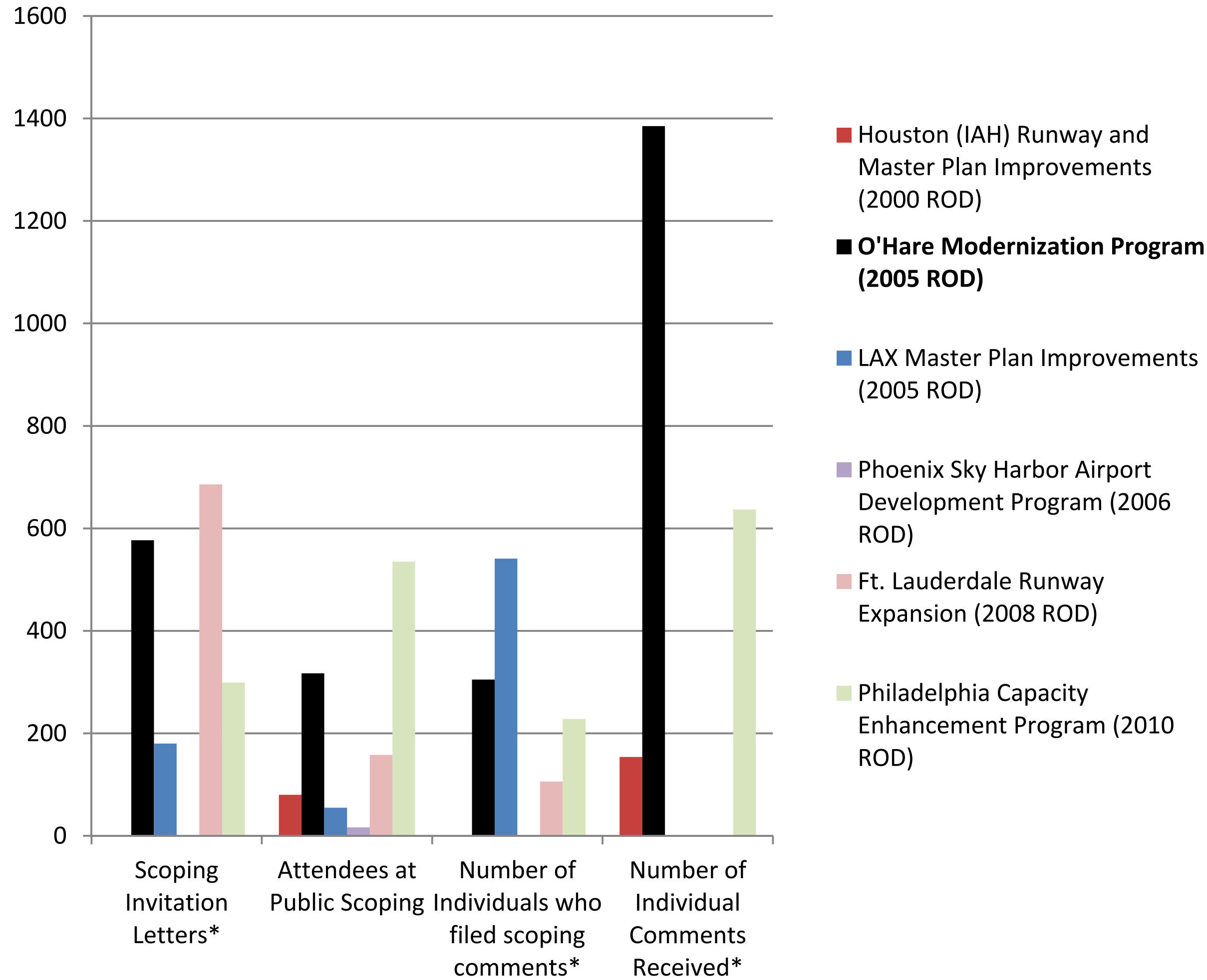
Figure 3: Pre-Scoping, Scoping and Early Coordination Meetings[47]



** Data for the number of other public meetings sent was not available for LAX.*

[47] Figure 3 compares the public process conducted *prior* to the release of the draft EIS. "Pre-Scoping Meetings" are those meetings conducted before the formal scoping process. "Other Public Meetings" are only those meetings held after the formal scoping meeting but before the public hearing on the draft EIS.

Figure 4: Scoping Process



** Data for the number of scoping letters sent was not available for IAH or Sky Harbor;*
Data for the number of commenters during scoping was not available for IAH or Sky Harbor;
Data for the number of individual scoping comments was not available for LAX, Sky Harbor or Fort Lauderdale.

C. Draft Environmental Impact Statement

NEPA requires that federal agencies circulate a draft of the EIS,[48] request comments from the public, and "affirmatively" solicit comments from interested persons.[49] This interim review produces information and input that is critical to producing an effective final EIS. The public must be given a minimum of 45 days to review a draft EIS.[50]

[48] 40 C.F.R. § 1502.19.

[49] 40 C.F.R. § 1503.1(a)(3).

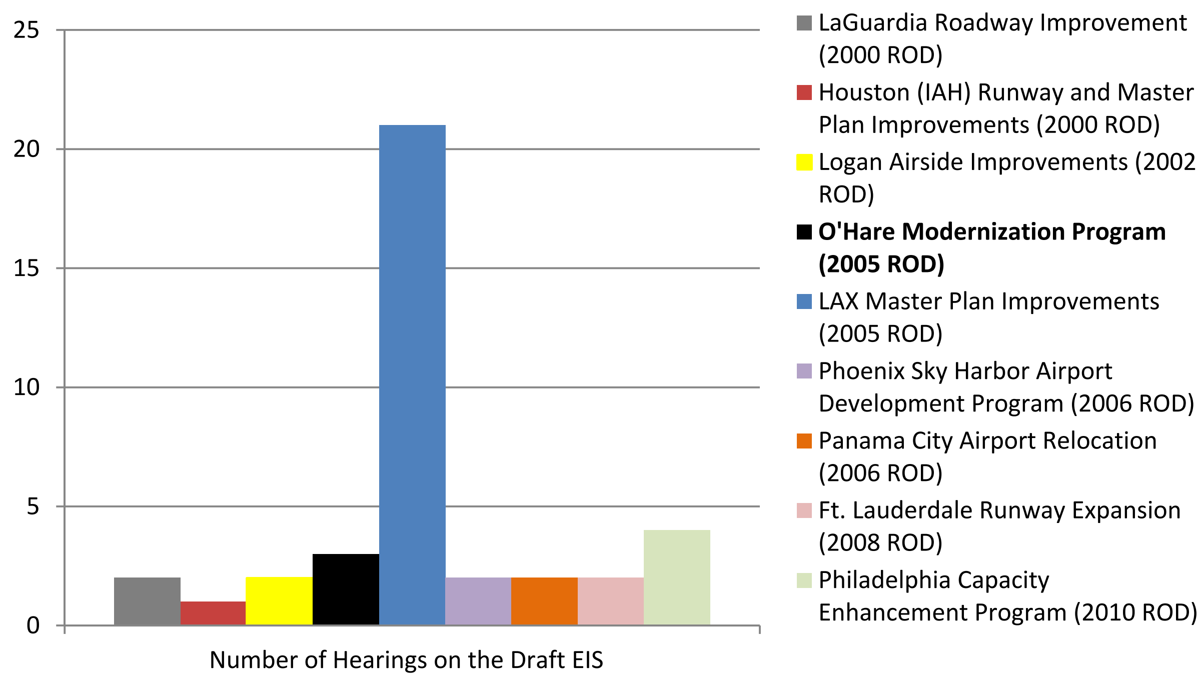
[50] 40 C.F.R. § 1506.10(c); Order 1050.1F ¶ 7-1.2(d).

FAA afforded extensive opportunity for public comment on the draft OMP EIS. FAA and the United States Environmental Protection Agency (EPA) published notices of availability of the draft EIS on January 21, 2005, and January 28, 2005, respectively.[51] The draft EIS was distributed widely to local libraries, city halls, and many of the principal commenters. In addition, FAA (in coordination with the United States Army Corps of Engineers and the Illinois Environmental Protection Agency) held three public hearings:[52]

- February 22, 2005 in Elk Grove Village
- February 23, 2005 in Elmhurst
- February 24, 2005 in Niles

As indicated in Figure 5, we are aware of at least one other major FAA project (Philadelphia Capacity Enhancement Program) for which there were four public hearings on the draft EIS. We also know that FAA held an unparalleled 21 hearings on a draft and supplemental draft EIS for LAX.[53] Nevertheless, three hearings on a draft EIS is still considerably more than required and also above the industry standard.

Figure 5: Number of DEIS Hearings



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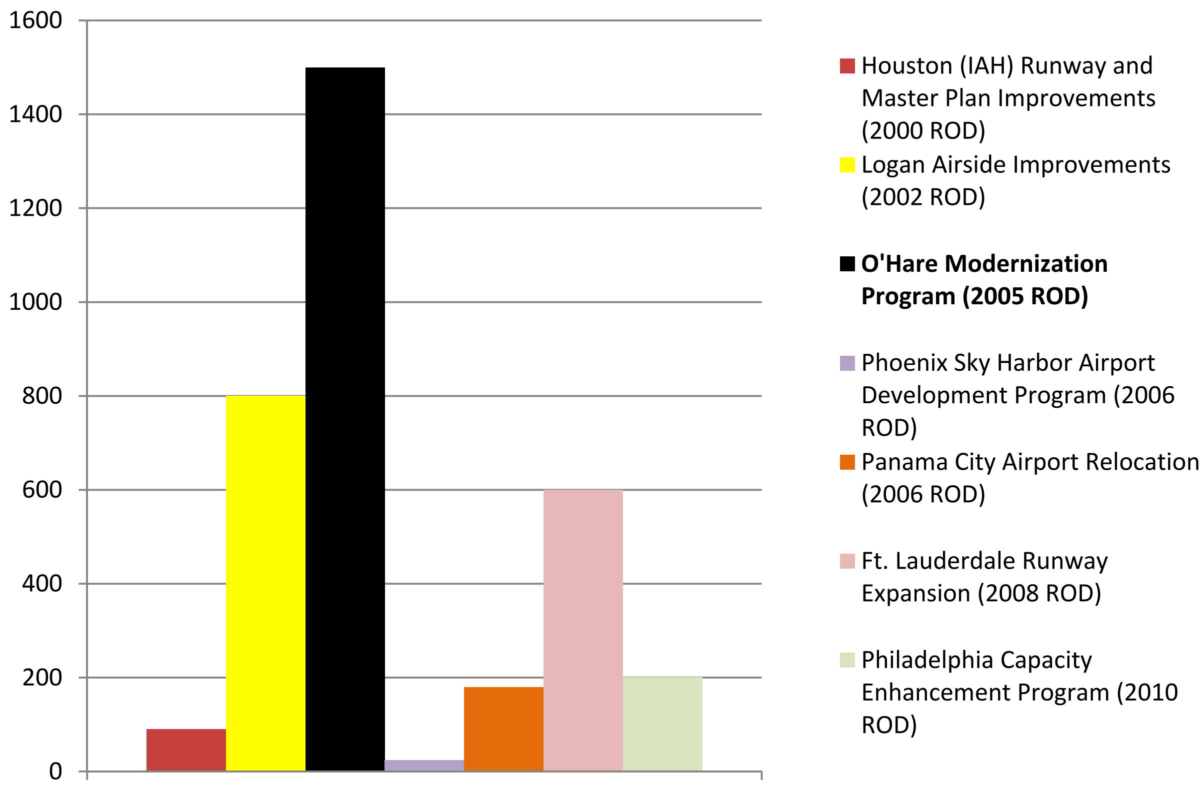
[51] 70 Fed. Reg. 3244 (Jan. 21, 2005); 70 Fed. Reg. 4119 (Jan. 28, 2005).

[52] OMP ROD at 37.

[53] There were a total of 21 hearings for the LAX Master Plan initial draft EIS and a subsequent supplemental draft. The extraordinary number of hearings was due, in large part, to the occurrence of the September 11, 2001 terrorist attacks during the comment period on the initial draft EIS. In response, the sponsor identified an entirely new alternative in order to address heightened security concerns. This triggered a lengthy supplemental draft EIS.

According to FAA, approximately 1,500 people attended the hearings on the draft EIS (approximately 1,025 at the Elk Grove Village hearing; approximately 260 at the Elmhurst meeting; and 215 at the Niles meeting).[54] As depicted in Figure 6, this is a high turnout for hearings on a draft EIS even for a major airport project.

Figure 6: Attendance at DEIS Hearings



The hearings for the draft EIS were designed to ensure and encourage opportunity for public comment. FAA provided the opportunity for attendees at the hearings to provide testimony in one of two ways: (1) live testimony in front of a hearing officer and the public audience, with a court reporter present; or (2) testimony directly to a court reporter in a private setting. Nearly 400 individuals—*i.e.*, almost a third of the attendees—provided testimony during the three public hearing sessions.[55] FAA staffed the hearings with persons trained in sign language and with Spanish/English translators. FAA displayed approximately 50 exhibit boards at each hearing. FAA and its contractor staffed the meetings with approximately 45 individuals and technical experts, all of whom were available to answer questions from the public. FAA also provided an automated property locator map at the hearings to enable interested members of

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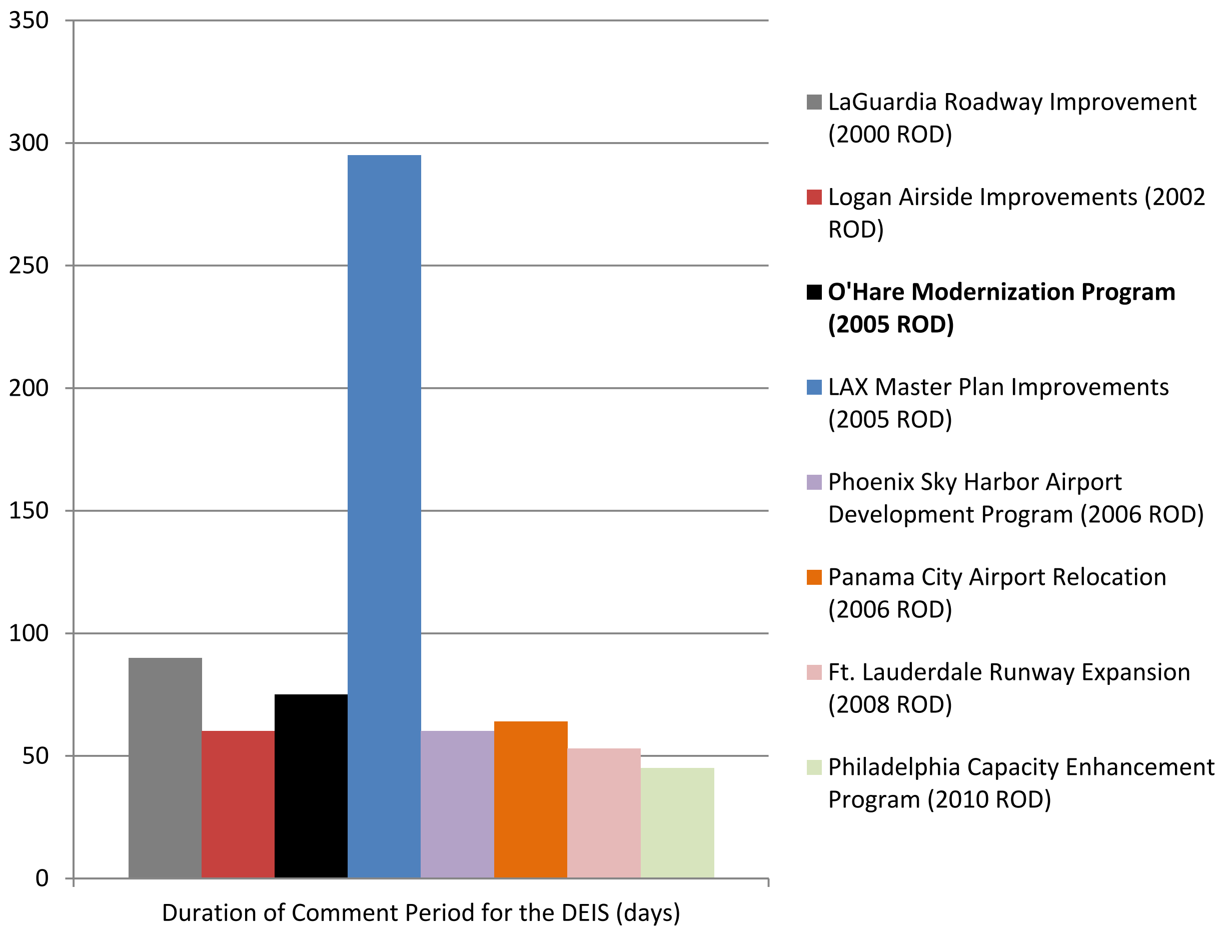
[54] OMP EIS at Appendix U (Response to Comments), p. U.1-1.

[55] O'Hare Modernization Final Environmental Impact Statement at U.1-1.

the public to locate their residence in relation to existing and forecasted future noise contours.[56]

FAA invited public comment on the draft EIS for 75 days.[57] This not only exceeds the minimum requirement of 45 days, but also is more than afforded in most airport EISs.[58]

Figure 7: Duration of Comment Period for Draft EIS



The extended public comment period for the OMP resulted in nearly 1,500 comments.[59] As depicted in Figure 8, this is a significant response for an airport EIS.[60]

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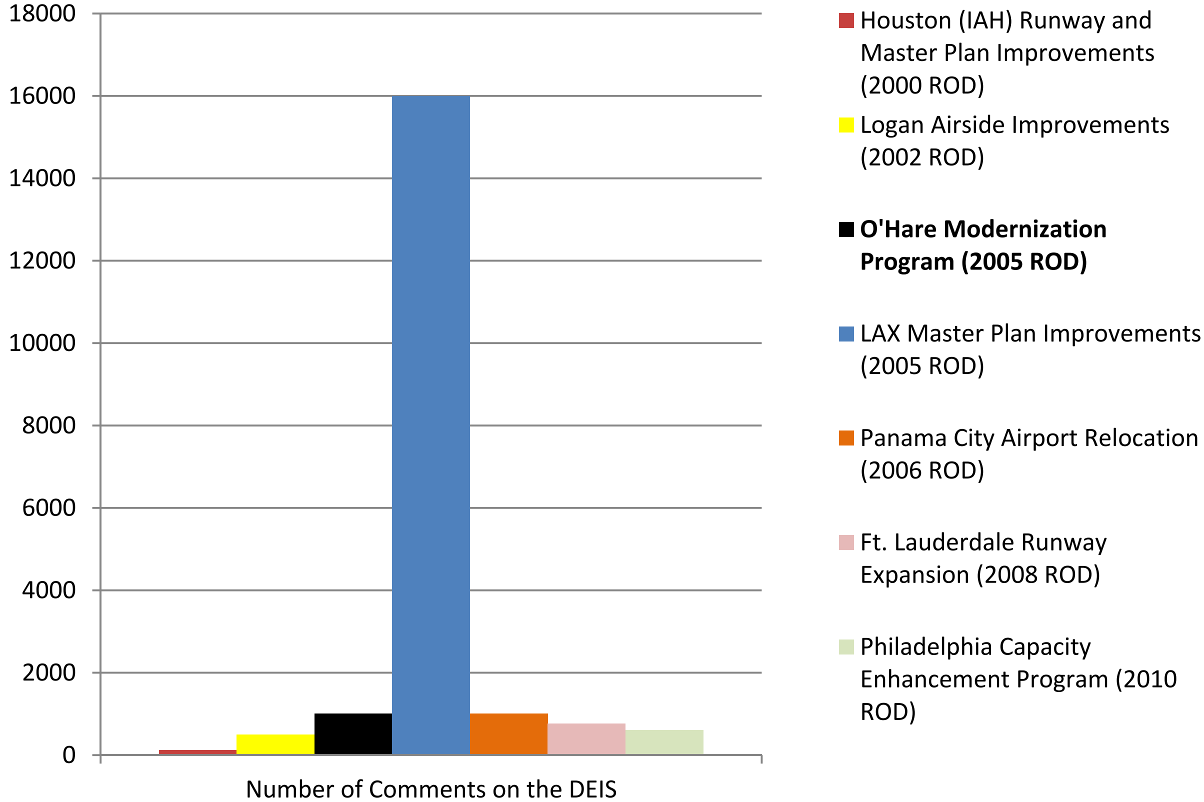
[56] OMP EIS, Appendix T at T-4 – T-5.

[57] OMP EIS, Appendix U (Response to Public Comments) at U.1-1.

[58] The comment period for the LAX Master Plan project lasted 295 days. As noted above, this is an extreme outlier and is due to the intervening events of September 11, 2011 and the subsequent emergence of an entirely new alternative.

[59] OMP ROD at 37.

Figure 8: Number of Comments on the draft EIS



D. Final Environmental Impact Statement

When the public comment period on the draft EIS closes, the federal agency must evaluate and consider all comments, both individually and collectively, and must resolve all of the issues raised prior to issuing its final EIS. Resolution of public comments in the final EIS can take many forms including supplemental analysis, factual corrections, or explanation of why no further agency response or analysis is warranted.[61]

FAA published the final EIS for the OMP in July 2005, six months after it distributed the draft EIS, and three months after the close of the public comment period.[62] As required, in the final EIS, FAA provided responses to each of the comments filed on the draft EIS.[63] For example, commenters had requested that the flight tracks be presented over an area-wide map to

[60] Again, of the airport EISs we examined, only the LAX Master Plan project received more comments.

[61] 40 C.F.R. § 1503.4; *see also Citizen's Guide* at 16, 18.

[62] 70 Fed. Reg. 43,929 (July 29, 2005).

[63] See generally, OMP EIS, Appendix U (Response to Comments).

disclose the location of those affected. In response, FAA added 29 exhibits regarding the location of the flight tracks to the final EIS.[64]

While FAA is not obligated to solicit comments on a final EIS,[65] the current trend is to afford at least 30 days for public comment before a ROD is prepared. Of the airport projects we reviewed, FAA solicited public comments on the final EIS for all but the earliest project (the 2000 LaGuardia Roadway Improvement Project). For the other projects we reviewed, FAA generally afforded the same 30-day public comment period; in one case, the 2006 Panama City Relocation final EIS, FAA afforded 45 days for comment on the final EIS.

For the OMP EIS, FAA offered a 30-day comment period[66] to permit interested parties to formally comment on those portions of the final EIS that had been updated or refined since publication of the draft EIS. In addition, in order to facilitate public review, FAA distributed copies of the final OMP EIS broadly to public libraries, city halls, and many of the principal commenters on the draft EIS. FAA also made the final EIS available on its website. In response, FAA received several hundred pages of public comments on the final EIS.[67]

FAA considered the comments it received prior to publishing its final decision in the ROD. The ROD includes 351 pages of responses to these comments. FAA reports that it "drafted each section of the main body of the Record of Decision after having given full consideration to the comments" and that it also "made a commitment to review and respond to comments received after the close of the comment period, to the extent practicable … ."[68]

E. Findings

In its ROD for the OMP, FAA stated that it had provided "extensive" opportunities for the public to comment throughout the EIS process.[69] We concur.

We found that the public outreach conducted for the OMP EIS far exceeded the minimum requirement and was more extensive than almost any other recent major airport development project. The outreach was consistent with, and some instances, exceeded best practices in the airport industry.

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[64] OMP EIS at U.5-22.

[65] 40 C.F.R. § 1503.1(b) ("An agency *may* request comments on a final EIS before the decision is finally made.") (emphasis added).

[66] 70 Fed. Reg. 43,929, 43,930 (July 29, 2005).

[67] OMP ROD at 38.

[68] OMP ROD, Appendix A (Response to Comments) at A.0-1.

[69] OMP ROD at 38.

Highlights of the OMP EIS public process include:

Pre-Scoping

- FAA conducted 68 pre-scoping briefings and public meetings with federal, state, and local organizations, elected officials, and the local public. ***This is substantially more than any of the pre-scoping public outreach opportunities afforded for the other major airport EISs that we reviewed.***

Scoping

- FAA held four scoping meetings.
- FAA sent written invitations to participate in the scoping process to over 500 individuals

Early Coordination and Release of Information

- ***FAA held more public meetings between scoping and release of the draft EIS for the OMP EIS than for any other airport EIS that we reviewed.***
- These meetings included:
  - An informational meeting for local mayors.
  - Five briefings to the O'Hare Noise Compatibility Commission (ONCC).
  - A public outreach meeting on the preliminary purpose and need for the project.
  - A working session for local governments on project alternatives.
  - Three environmental justice public workshops.
  - More than 30 small group meetings on environmental justice issues.
- FAA also released almost 7.5 million pages of technical data early in the process, before issuing the draft EIS.

Draft EIS

- FAA held three public hearings on the draft EIS, which is above the industry standard.
- FAA extended the comment period on the draft EIS from 45 days to 75 days.
- FAA received and responded to approximately 1,000 comments on the draft EIS.

Final EIS

- FAA offered a 30 day comment period on the final EIS.
- FAA received and responded to approximately 500 comments on the final EIS.

* * *

II. PUBLIC INVOLVEMENT DURING IMPLEMENTATION OF OMP

A. OVERVIEW

With the issuance of a ROD, FAA's formal NEPA responsibilities are complete. Nevertheless, many airport sponsors have found it both prudent and responsible to continue public outreach efforts long after the ROD and especially during the construction period for a complex project. However, measuring and comparing these efforts among airports is difficult because post-ROD community outreach is neither required nor formally documented in any manner. Unfortunately, we do not have the benefit of the same kind of quantitative analysis that was available to compare the OMP EIS outreach efforts with public outreach for other airport EISs. Nevertheless, we can make some qualitative observations about the City's ongoing outreach efforts both absolutely and comparatively, in relation to other major airports and airport development projects.

The following are some examples of the most common tools that other large airports generally use in promoting public outreach during construction and development of complex projects:

- Public Websites. Many airports host public websites that can be used to provide easily-accessible information on an ongoing program or project. These websites can be used to provide a single source of definitive information and to answer frequently asked questions (FAQs). For example, Fort Lauderdale hosts a comprehensive website dedicated to its sound insulation program.[70] In addition, like many other airport sponsors, the City of Los Angeles has a dedicated website and publishes fact sheets in plain English about its LAX development plans.[71]

- Videos. Some airports have published sophisticated videos and simulations to provide the public with a visual sense of the development project.[72] Los Angeles maintains a webcam so the public can monitor project progress in real time.[73]

- Publication of Data and Information. Airports commonly publish FAQs, white papers, and other documents containing educational materials and data. For example, the City of Houston has published a comprehensive "project definition manual" on its website which

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[70] See, for example, the website for the Ft. Lauderdale sound insulation program, http://www.fllnoisemitigation.com/ or the site for the Louisville Standiford Field sound insulation program, http://www.flylouisville.com/quieter-home/.

[71] http://www.lawa.org/laxdev/ProjectFactSheet.aspx.

[72] See, for example, the video of the development of an 'airport city' at Denver International Airport, https://www.youtube.com/watch?v=5A-xCGyyJms or the video of the new terminal complex at New Orleans Louis Armstrong Airport, http://www.youtube.com/watch?v=Tiqq1FQNezw&feature=c4-overview&list=UUDwlfIrMROhiNNSMcVwKMAQ.

[73] http://www.earthcam.net/external/image.php?t=e892c39b606beddd17f51fd69c78e6d9&m=7606.jpg.

provides significant detail about the project elements of its international terminal expansion project.[74] Houston also maintains a multimedia gallery about its international terminal expansion at Houston Hobby Airport so the public can easily monitor the progress of the project.[75]

- Public Outreach. Airport sponsors also offer a broad array of public outreach opportunities. For example, when it was engaged in an ambitious expansion and redevelopment of its terminal, San Jose Mineta Airport published a regular blog of latest news.[76] Town Hall-style meetings are another common tool to keep the public informed about airport development projects.[77] Other airports, such as San Francisco International, have well-established community roundtables that exercise oversight and review of the airport's environmental program.[78]

If there is a common theme through all of these efforts, it is that airport sponsors use different tools to achieve the same objective: to provide the public with accurate, up-to-date information about the progress of complex projects and to offer a single point-of-contact for comments, questions, and concerns.

B. Public Information Tools At O'Hare

Chicago employs many of the traditional best practices to promote transparency about operations at and impacts from O'Hare. The City also has several distinctive tools that are unavailable to most other airport communities. We have highlighted below some of the key elements of the City's public outreach efforts.

1. O'Hare Noise Compatibility Commission (ONCC)[79]

ONCC is unique among U.S. airports. No other airport has created a *permanent* intergovernmental entity like ONCC that is directly responsible for advice, formal oversight, and

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[74] http://www.fly2houston.com/TDPlan.

[75] http://www.fly2houston.com/HOUMediaGallery.

[76] http://www.thesanjoseblog.com/2013/10/sjc-expanding-international-terminal.html.

[77] *See, e.g.*, http://www.flysfo.com/professional-services-town-hall (San Francisco International); http://www.burbankairport.com/airportauthority/airport-authority/city-airport-visioning-process.html (Burbank Bob Hope Airport); and http://www.sun-sentinel.com/local/broward/fl-airport-noise-meeting-20150217-story.html (Ft. Lauderdale).

[78] *See* http://sforoundtable.org/.

[79] ONCC is an inter-governmental agency that was established in 1996 and is dedicated to reducing aircraft noise around O'Hare. Its members include 36 municipalities, Cook County, and 16 school districts near O'Hare. *See*, OMP ROD at 7-2; *see also* http://www.oharenoise.org/about-oncc/about-us.

supervision of the airport's noise program.[80] While its original mission is limited to the oversight of the noise insulation program, ONCC operates as a forum to promote transparency more broadly and has successfully engaged the community in a wide range of noise-related issues. ONCC meetings also provide an opportunity for regular updates about relevant noise data and information of interest to the public. For example:

- CDA representatives regularly appear at ONCC meetings to discuss noise, runway use, and complaints.[81,82]

- FAA representatives frequently make presentations at ONCC meetings. For example, in May 2014, FAA Great Lakes Regional Administrator Barry Cooper presented information about Converging Runway Operations that FAA initiated at O'Hare International Airport on Airport April 14, 2014 at the direction of the National Transportation Safety Board (NTSB). At that presentation, Mr. Cooper explained that to comply with the NTSB directive, O'Hare is now limiting departures from Runway 32L during West Flow operations and from Runway 4L during East Flow operations during the day.[83]

2. Airport Noise Management System (ANMS) Noise Data

CDA maintains and makes publicly available a full suite of noise data through its ANMS, which was first installed in 1996. The ANMS collects, analyzes, and processes data from a number of sources of information including a network of 32 noise monitors around O'Hare, FAA radar data, weather data, and noise complaints. Over 150,000 flights and 400,000 noise events are recorded by the ANMS each month.[84] Monthly reports are made public on the ONCC website.[85] CDA has published fact sheets providing diagrams and technical information to give readers a better understanding of how the monitors work in communities.[86] CDA has been working with ONCC to acquire and install eight new permanent airport noise monitors in Chicago and the suburban communities near O'Hare International Airport.[87,88]

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[80] Community advisory groups are common but generally are far more limited in duration (*e.g.*, during the preparation of an environmental document or a noise compatibility program) or their mission is limited to review of noise monitoring data.

[81] *E.g*, ONCC, Meeting Minutes (May 2, 2014).

[82] ONCC, Meeting Minutes (Oct. 3, 2014).

[83] ONCC, Meeting Minutes (May 2, 2014).

[84] http://www.flychicago.com/OHare/EN/AboutUs/NoiseManagement/Pages/Aircraft-Noise-Management-System-Reports.aspx.

[85] http://www.oharenoise.org/noise-management/noise-reports/anms.

[86] ONCC, Meeting Minutes (May 2, 2014).

[87] ONCC, Meeting Minutes (Aug. 12, 2014).

3. Fly Quiet Program

In June of 1997, the City, in coordination with the airlines, ONCC, and FAA, implemented the "Fly Quiet" Program in an effort to further reduce the impacts of aircraft noise on surrounding neighborhoods.[89] The Fly Quiet Program implements a series of voluntary noise abatement flight and operating procedures designed to reduce the impact of aircraft noise during nighttime hours.[90] CDA prepares and makes available to the public a quarterly Fly Quiet Report. The Fly Quiet Report contains detailed information regarding nighttime runway use, flight operations, flight tracks, and noise complaints and 24-hour tracking of ground run-ups. The data presented in this report is compiled from the ANMS and airport operation logs.[91] CDA also has published a Fly Quiet Manual that describes the program.[92] ONCC members encourage the public to review the manual to get a better understanding of how runways are utilized during the nighttime hours.[93]

4. CDA Community Outreach Vehicle

One of the distinctive tools used by the City to increase awareness is CDA's Community Outreach Vehicle (COV), which is available to travel to community events within the City of Chicago and surrounding areas to discuss noise management and mitigation. The COV has onboard technology to provide video presentations and computer demonstrations that explain noise data to the public.[94]

5. Noise Complaints

Like most airports, O'Hare also has a system for the public to log noise complaints, either via telephone to the O'Hare Noise Hotline or via an online form. The complaints are forwarded to CDA for tracking purposes and are included as data in the ANMS reports.[95]

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[88] ONCC, Meeting Minutes (Oct. 14, 2014).

[89] *See*, http://www.flychicago.com/OHare/EN/AboutUs/NoiseManagement/FlyQuiet/Quarterly-Reports.aspx.

[90] OMP ROD at 7-2.

[91] http://www.flychicago.com/OHare/EN/AboutUs/NoiseManagement/FlyQuiet/Quarterly-Reports.aspx.

[92] http://www.flychicago.com/OHare/EN/AboutUs/NoiseManagement/FlyQuiet/Pages/Fly-Quiet-Program.aspx.

[93] *E.g.,* ONCC, Meeting Minutes (May 13, 2014).

[94] http://www.flychicago.com/OHare/EN/AboutUs/NoiseManagement/AirportNoise/Pages/Airport-Noise.aspx#commission.

[95] http://www.flychicago.com/OHare/EN/AboutUs/NoiseManagement/NoiseComplaints/Pages/Noise-Complaints.aspx.

C. Post EIS Public Outreach on OMP

To date, the City has completed Phase 1 of the OMP, which includes new Runway 9L/27R on the north airfield, the extension to Runway 10L/28R on the south airfield, and new runway 10C/28C. [96] The City and CDA have taken significant steps to keep the public informed and engaged during the implementation of the project and to ensure that the public has an ongoing access to data to understand impacts of O'Hare on their communities.

ONCC has been an essential element of this outreach. It holds more than 20 public meetings annually.[97] These meetings have provided a forum for regular updates on construction progress and dialogue with FAA. For example, ONCC provided regular public updates in preparation of the opening of new runway 10C/28C. In November 2012—*almost a year before the new runway was commissioned*—CDA and FAA made an initial public presentation to ONCC, announcing the status of the construction, the intent to open the new runway in October 2013, and the fact that air traffic changes would occur when Runway 10C/28C was commissioned. The presentation included analysis of how noise contours have changed over time and the impacts of the Residential Sound Insulation Program. Over the course of the next year, CDA, in cooperation with FAA and ONCC, held over 30 public meetings and seven community outreach efforts related to the commissioning of Runway 10C/28C,[98] including meetings in Itasca and [99] Bensenville.[100] This outreach effort included meetings with local, state, and federal officials, as well as Chicago ward representatives.[101,102,103,104]

CDA continues to use ONCC meetings as a forum to keep the community well-informed about OMP construction activities.[105] Additionally, CDA has been aggressive about distributing and presenting information that is directly responsive to public concerns about the OMP.

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[96] FAA, Draft Re-Evaluation of the O'Hare Modernization EIS at 1-1 & 2-4.

[97] *See* http://www.oharenoise.org/about-oncc/about-us.

[98] ONCC, Meeting Minutes (Nov. 1, 2013).

[99] ONCC, Meeting Minutes (Mar. 8, 2013) (referencing meetings with U.S. Congressman Mike Quigley).

[100] ONCC, Meeting Minutes (Oct. 4, 2013).

[101] E.g., ONCC, Meeting Minutes (Feb. 1, 2013) (referencing briefings with Illinois Senator John Mulroe of the 10th District and efforts to contact Chicago Ward Aldermen).

[102] ONCC, Meeting Minutes (Feb. 1, 2013).

[103] ONCC, Meeting Minutes (June 7, 2013).

[104] ONCC, Meeting Minutes (Sept. 6, 2013) (referencing meeting with "several state senators and representatives, Chicago aldermen, suburban mayors, FAA and CDA leaders and citizens represented by the FAIR Group").

[105] ONCC, Meeting Minutes (May 2, 2014).

For example:

- The City made its Community Outreach Vehicle available to keep the public educated about the progress of the OMP.[106]

- CDA distributed a Frequently Asked Questions (FAQs) document regarding the opening of Runway 10C/28C that proved successful in answering specific questions.[107]

- CDA has a *Nighttime Construction Awareness Program* and distributes flyers to provide the general public with detailed information concerning the nighttime construction schedule at O'Hare.[108]

- In response to concerns that the Fly Quiet program emphasized departures only, CDA agreed to present a comprehensive analysis of arrival patterns at an ONCC Technical Committee meeting.[109,110] This information has helped ONCC members and citizens to "look broadly at incidents – not necessarily at specific individual flights – and think about incremental changes to deal with arrivals."[111]

In addition, since publishing its ROD, FAA has made regular presentations regarding its ongoing role. For example: the O'Hare Air Traffic Control Tower Manager made a presentation on east-west flow procedures at O'Hare in March 2015.[112]

D. Findings

It is important to recognize that there is no legal obligation to continue public involvement in an airport project once the formal NEPA process has concluded. Nevertheless, many airport sponsors continue project-specific public outreach efforts long after the environmental review process is over because the success of a project is often dependent on an informed community and a transparent process.

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[106] ONCC, Meeting Minutes (Nov. 8, 2012).

[107] ONCC, Meeting Minutes (Nov. 12, 2013).

[108] E.g., Chicago O'Hare International Airport, *2015 Nighttime Construction Awareness Program No. 1* (April – Mid June); Chicago O'Hare International Airport, *2015 Nighttime Construction Awareness Program No.2* (Mid-June – November).

[109] ONCC, Meeting Minutes (March 11, 2014).

[110] ONCC, Meeting Minutes (April 8, 2014).

[111] ONCC, Meeting Minutes (May 2, 2014).

[112] ONCC, Meeting Minutes (Mar. 24, 2015).

The City and CDA employs all of the key tools and techniques, including public websites, data collection, complaint hotlines, and regular reporting. However, unlike its peers, Chicago benefits from the presence of a permanent intergovernmental entity – the ONCC – which has been successful in transmitting information and ensuring transparency so that community concerns can be aired and resolved in a constructive manner.

Ultimately, we found that the City and CDA have conducted comprehensive – and successful – community outreach efforts during the implementation of the OMP. The community has had significant and ongoing opportunities to participate in public meetings. City and FAA officials have regularly communicated with the public about project timelines and implications. Throughout this process, ONCC has served as a successful platform for the public to identify issues and air concerns.

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III. Public Involvement in the Pending Written Reevaluation

A. Overview

While the City of Chicago plans to complete all of the improvements examined in the 2005 EIS, it has modified the construction schedule for the completion of the runways in Phase 2. Specifically, the opening of new Runways 10R/28L and 9C/27C and the extension of Runway 9R/27L, along with the decommissioning of the 14/32 diagonal runways, will not all occur in a single year, as examined in the initial EIS. FAA has determined that a supplemental EIS is not warranted; however, FAA is examining the interim impacts of the revised construction sequence on aircraft noise and the environment through a written reevaluation.[113]

By way of background, a written re-evaluation is "a document used to determine whether the contents of a previously prepared environmental document (i.e., a draft or final EA or EIS) remain valid or a new or supplemental environmental document is required." [114] A written reevaluation may be necessary if there is either substantial new information or a substantial change to the project that is relevant to environmental concerns. In such cases, the responsible FAA official should "use his or her professional judgment to determine if a written reevaluation is needed."[115] Written reevaluations are generally an internal process. There is no requirement for public outreach when FAA prepares a written reevaluation to validate a prior EIS. In fact, FAA has no obligation to even share the final document with the public.[116]

Typically, FAA uses its discretion to prepare written reevaluations particularly when an airport sponsor proposes a modification to an approved, but not yet completed, project. For example:

- **Philadelphia, *Capacity Enhancement Program* (Written Reevaluation Pending)**. FAA issued a ROD approving the Capacity Enhancement Program at the Philadelphia International Airport in 2010. The Capacity Enhancement Program involves a comprehensive airfield reconfiguration to address significant delays at the Airport. The project, as approved in the 2010 ROD, included the relocation of the UPS hub facility to accommodate the new east-west parallel runway on the south side of the airport. The UPS hub facility was to be relocated in an area west of the Airport on property to be acquired from Tinicum Township, Delaware County, PA. Just east of the relocated UPS, Cargo City would be redeveloped in its current location with some expansion. In April 2015, the City of Philadelphia requested approval to modify the Capacity Enhancement Program relocations of Cargo City and UPS. These modifications, known as the Cargo City Reconfiguration Plan, were developed in concert with Tinicum Township officials in

[113] *See, e.g.,* ONCC Meeting Minutes (Oct. 3, 2014).

[114] Order 1050.1F ¶ 9-2.

[115] Order 5050.4B at ¶ 1401(c).

[116] Order 5050.4B ¶ 1401(d).

order to avoid or minimize residential and business relocations associated with the West Side Acquisition Area, while still accommodating the Capacity Enhancement Program. FAA is presently preparing a written reevaluation of these changes and released a draft Written Reevaluation just last week.

- **Los Angeles International Airport, *West Aircraft Maintenance Area* (2014 Written Reevaluation)**. In 2005, FAA issued a ROD approving an updated Airport Layout Plan (ALP) at LAX to depict planned future locations of runways, taxiways, aircraft parking aprons, terminal buildings, and other associated facilities identified in the 2004 LAX Master Plan. The original ALP depicted the consolidation of aircraft maintenance into the southwest quadrant of the airport, east of north/south Taxiway AA. The airport sponsor subsequently proposed to relocate those facilities to the west side of Taxiway AA. FAA prepared a written reevaluation of this change in 2014.

- **Fort Lauderdale, *Runway Expansion* (2011 Written Reevaluation; 2014 Written Reevaluation**. In 2008, FAA issued a ROD for a runway expansion and associated development projects. FAA conducted a written reevaluation in 2011 to evaluate changes to the ALP identified after issuance of the 2008 ROD. Changes included revised runway gradients, addition of taxiway bridge structures, and changes to NAVAIDS. This reevaluation included a comprehensive examination of the full scope of environmental analyses in the underlying EIS. FAA conducted a second written reevaluation in 2014 to address additional engineering and design refinements.

- **Panama City, *Airport Relocation and Relinquishment* (2009 Written Reevaluation)**. In 2006, FAA issued a ROD approving the relocation of the Panama City-Bay County International Airport to a new greenfield site in Bay County, Florida. In 2009, the sponsor submitted a request for approval of an updated ALP, increasing the length of the primary runway at the relocated airport from 8,400 to 10,000 feet. FAA prepared a nine page written reevaluation in 2009 to examine this change.

In some instances, FAA also conducts reevaluations to examine impacts that were not identified (or unknown) at the time of the underlying EIS. For example:

- **Panama City, *Airport Relocation and Relinquishment* (2011 Written Reevaluation)**. In 2011, FAA conducted a second reevaluation for the Panama City Airport Relocation EIS to examine the impacts of the disposal and development of the initial airport site. In the original 2006 EIS, FAA evaluated the impacts of redevelopment based on the best information available at the time. At that time, FAA noted that further environmental review would be conducted when FAA took formal action on the release and disposal of the old airport site. In 2011, the sponsor submitted a request for release from grant obligations for the former airport property. FAA then prepared a 2011 written reevaluation that included a comprehensive examination of the full suite of environmental impacts associated with the release and development of the prior site.

In rare occasions, FAA prepares a written reevaluation to address extraordinary public concern. For example:

- ✈ **Boston Logan, Centerfield Taxiway (2007 Written Reevaluation)**. In 2002, FAA completed an EIS and issued a ROD approving comprehensive airside improvements. During the EIS process, the public expressed significant concerns about noise and safety issues related to the Centerfield Taxiway. In response to community concerns, FAA deferred a decision concerning the Centerfield Taxiway in the 2002 ROD and committed to conduct additional analysis and offer additional opportunities for public involvement.

As these examples illustrate, while FAA has considerable discretion to reevaluate an EIS, most formal written reevaluations occur in two principal situations: (1) where the sponsor proposes changes or new elements in its project that were not previously evaluated in the EIS, and (2) where there were known project elements that were not examined in the original EIS for some defined reason.

B. Written Reevaluation for the O'Hare Modernization Program

The need for additional environmental documentation to address sequencing changes for implementing the OMP was aired early and often.

FAA announced its intent to prepare a written reevaluation as early as November 2012, in a presentation on the plans for the timing and commissioning for Runway 10C/28C. [117] Senior FAA officials made regular public presentations at ONCC meetings. In particular, FAA Regional Administrator Barry Cooper engaged in lengthy conversations with ONCC members and the public regarding the timing of, and need for, a written reevaluation.[118,119] In addition, FAA made regular presentations on the progress of the written reevaluation and plans for public review of the document. [120,121,122,123,124,125]

[117] ONCC, Meeting Minutes (Nov. 9, 2012) (public discussion regarding the intent to provide environmental documentation of temporary impacts associated with OMP schedule modifications.).

[118] ONCC, Meeting Minutes (May 2, 2014).

[119] ONCC, Meeting Minutes (Sept. 5, 2014).

[120] ONCC, Meeting Minutes (Sept. 9, 2014).

[121] ONCC, Meeting Minutes (Sept. 29, 2014).

[122] ONCC, Meeting Minutes (Oct. 3, 2014).

[123] ONCC Meeting Minutes (Jan. 13, 2015).

[124] ONCC, Meeting Minutes (April 14, 2015).

[125] ONCC, Meeting Minutes (May 1, 2015).

FAA ultimately released a draft written reevaluation for the OMP EIS on July 27, 2015.[126] The written reevaluation was designed to examine sequencing changes that had not been examined in the final EIS. The written reevaluation does not revisit the ultimate build-out condition or the project elements.

As it did with the EIS data, FAA provided for the early release of analysis on its reevaluation. On June 2, 2015, FAA published public workshop dates, times, and locations. On June 10, 2015, FAA also made its TAAM analysis available through its website. In addition, FAA published information about public workshop dates, times, and locations in the *Federal Register, Chicago Tribune, Chicago Sun-Times,* and *Daily Herald* on June 12, 2015.[127]

FAA ultimately decided to hold four public hearings on the draft written reevaluation in August 2015.[128] While it initially proposed just two hearings, the agency received strong pressure from the City and ONCC to increase that number to four.[129,130,131]

As depicted in Figure 9, four is an extraordinary number of public hearings for an FAA written reevaluation. NEPA and FAA policies do not require any particular public process for written reevaluations.[132] A written reevaluation is typically an internal document, and FAA, in fact, has no obligation to subject the final document to public scrutiny.[133] Of the seven other written reevaluations we reviewed, FAA offered *no other formal public hearings*.

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[126] 80 Fed. Reg. 44,416 (July 27, 2015). The draft is available at: http://www.faa.gov/airports/airport_development/omp/eis_re_eval/.

[127] FAA, Draft Re-Evaluation of the O'Hare Modernization EIS at 4-1.

[128] 80 Fed. Reg. 40,119 (July 13, 2015).

[129] ONCC, Meeting Minutes (April 14, 2015) ("[ONCC] Member] Ms. Dunlap noted three sessions were conducted when the original draft EIS was released and at that time the public felt it wasn't enough. She expressed her frustration that only two meetings would be held and said she was disappointed with FAA for not considering four open house sessions.").

[130] ONCC, Meeting Minutes (May 1, 2015) (referencing meetings between Chicago Mayor Emanuel and FAA Administrator Huerta).

[131] See, Press Release, Mayor Emanuel Announces National Study On Airport Noise To Be Expedited (May 8, 2015), available at: http://www.cityofchicago.org/city/en/depts/mayor/press_room/press_releases/2015/may/mayor-emanuel-announces-national-study-on-airport-noise-to-be-ex.html.

[132] *E.g.,* Order 1050.1F ¶ 9-2.

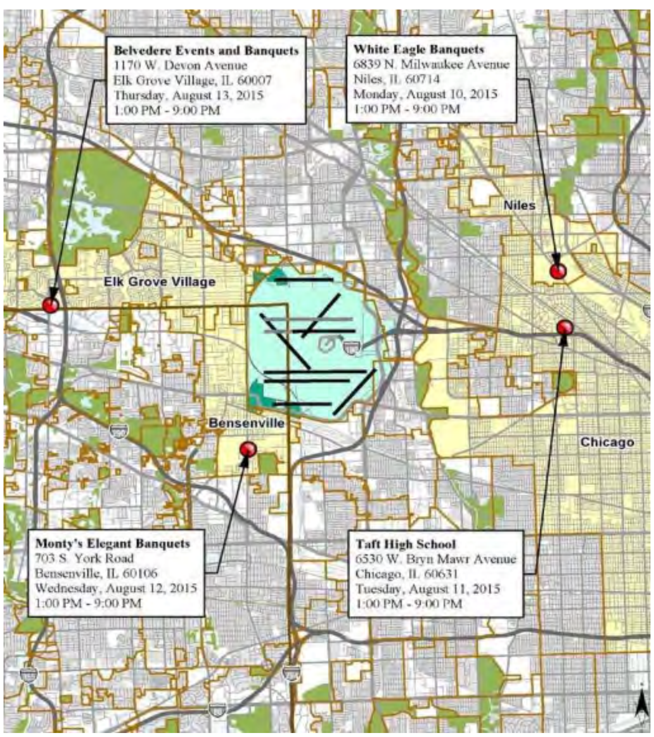
[133] Order 5050.4B ¶ 1402(d).

Figure 9: Hearings on FAA Written Reevaluations

FAA Written Reevaluations	Hearings on Written Reevaluation
O'Hare Modernization Program (Pending)	**4**
Philadelphia Capacity Enhancement Program (Pending)	0
LAX West Aircraft Maintenance Area (2014)	0
Fort Lauderdale Runway Expansion (2014)	0
Panama City Airport Relinquishment (2011)	0
Panama City Airport Relocation (2009)	0
Logan Airport, Centerfield Taxiway (2007)	0

The hearings on the written reevaluation will be held in four communities surrounding the airport: Niles, Chicago, Bensenville, and Elk Grove Village.[134]

Figure 10: Location of Public Hearings on FAA Written Reevaluation for the OMP EIS



FAA has also offered extensive opportunity for the public to provide written comments on the OMP Written Evaluation. Of the other written reevaluations that we reviewed, FAA provided this opportunity for only three other written reevaluations. Where FAA has offered a public

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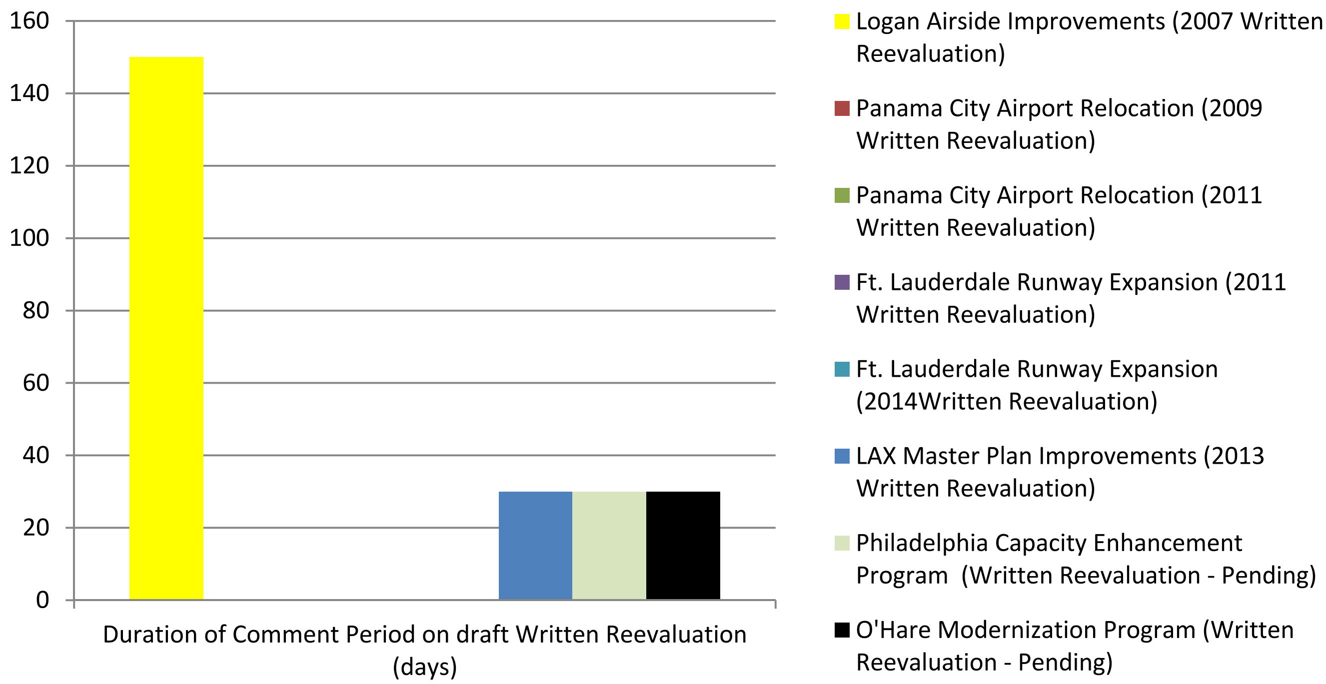
[134] FAA, Draft Re-Evaluation of the O'Hare Modernization EIS at 4-2.

comment period, that period is usually 30 days (as is the current case for the OMP written reevaluation[135]). However, as depicted in Figure 11, we are aware of at least one instance, the 2007 Logan Written Reevaluation, where the comment period was substantially longer.[136]

Figure 11: Public Comment Periods for FAA Written Reevaluations



C. Findings

While FAA is under no obligation to conduct any public process for a written reevaluation, it has offered unparalleled opportunities for public involvement in the OMP Written Reevaluation. FAA provided the early release of documents and information. It will be holding four public hearings on the draft written reevaluation in communities surrounding O'Hare. It will accept public comments on the draft document for 30 days, and it has committed to provide written responses to any comments received when it publishes a final written reevaluation.[137] This far exceeds the public involvement opportunities for any recent FAA written reevaluation and is consistent with the unusual degree of transparency afforded to the public with respect to OMP.

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[135] FAA, Draft Re-Evaluation of the O'Hare Modernization EIS at 4-3.

[136] The extended comment period for the 2007 Logan Written Reevaluation is due in large part to the agency's mitigation commitment in the ROD to conduct additional environmental evaluation and community involvement. *See Environmental Impact Statement and Record of Decision, Airside Improvements Planning Project Centerfield Taxiway, Logan International Airport* (2007) at 5.

[137] *See, generally,* FAA, Draft Re-Evaluation of the O'Hare Modernization EIS at Chapter 4 (Public Outreach).

IV. ADDITIONAL OPPORTUNITIES FOR PUBLIC INVOLVEMENT

CDA requested that we also identify opportunities that may exist for improvements or enhancement of public involvement going forward.

For the purpose of this forward-looking review, we examined not only the formal environmental review processes, but also the on-going level of community engagement at other airports. Each airport proprietor operates in a different public and political environment and public expectations for participation, disclosure, and transparency vary considerably. In this case, the City of Chicago operates in an environment that emphasizes public involvement and therefore, the public's expectations are higher than in most other cities.

A good starting point is FAA's *Community Involvement Policy Statement* and accompanying Manual, which identifies four key goals for any community involvement program:

- ***Inform/educate the public***. *When people understand why things are the way they are or how things work, they are more likely to accept or support planning recommendations. In the absence of information, people become suspicious. An adverse relationship tends to develop. Once this relationship develops, it is difficult to solve problems when they occur.*

- ***Gather information from the public***. *Community involvement provides an opportunity to gather information about local needs and concerns … .*

- ***Conflict resolution***. *Community involvement sometimes results in a general agreement which provides a base of support for proposed actions or policies. Because of the divided responsibility for aviation noise compatibility, many things can be resolved by mutual agreement that are difficult to accomplish by the decision of one of the agencies.*

- ***Establish the credibility of the decision-making process***. *Since there cannot be complete agreement on all solutions, decisions must derive their legitimacy not just from legal authority but from the common belief that they were arrived at in a fair and equitable manner. Decision-making must be open and visible so the public can make its own judgment about whether the decision-making process was fair. The public must believe that equal access has been provided to all individuals and groups.*[138]

[138] FAA, *Community Involvement Manual* at 13-14.

With these goals in mind, we have identified several actions that CDA and the City could take (either independently or in cooperation with FAA) in order to enhance transparency and community awareness of the OMP and its impacts on the community:

1. **Continue and enhance the role of ONCC**

ONCC has been remarkably successful as a forum for a civic dialogue between CDA and its neighbors. Other airports have tried with far less success to establish an entity which can act as such a liaison. The City should not only continue to rely on ONCC, but should take advantage of the pre-existing and trusted forum offered by ONCC. ONCC could expand its role and become a broader venue for conveying information about the City's airport plans that could have an impact on nearby communities. San Francisco, for example, has found that its Community Roundtable has provided a valuable forum for discussion and debate of noise issues in an environment which promotes meaningful dialogue on substantive issues. Issues are vetted through the Roundtable before being presented elsewhere, and the Roundtable has become a trusted advisor for the airport proprietor. The Roundtable has used its website, www.sforoundtable.org, as a reliable source of information not only about the airport and its noise program, but also about policies and science in connection with noise mitigation, abatement, and control.[139] The City and ONCC could certainly enhance the role of ONCC in this same respect.

ONCC also can continue to serve an important role in gathering information from the community. For example, ONCC is well-suited to identify the scope of community interest in the City taking further action to address mitigation of noise-affected residences. ONCC also may be able to identify other public outreach and community engagement strategies that could be effective in these particular communities.

2. **Increase opportunities for education about technical noise and operations data**

Past experience has shown that public engagement is especially effective when the public is well-informed on a continuing basis about the technical, practical, and legal constraints under which the airport must operate. This is especially true with respect to public engagement on issues concerning flight tracks and flight patterns. Airports have found it to be highly effective to convene a series of tutorials, designed for a lay audience, to explain those constraints in plain English. While FAA (and often the airport proprietor itself) makes technical information available on their respective webpages, the information is often not presented in a manner that is accessible to a public audience. Organizations like the Metropolitan Airports Commission (MAC) in Minneapolis-St. Paul, have done an exemplary job of both conducting public outreach and maintaining easily accessible web information to educate the public on noise-related issues.[140] For MAC in particular, the result has been a well-informed public dialogue and a focus on issues and approaches to noise problems that are practical and attainable.

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[139] *See* http://sforoundtable.org/noise-101/.

[140] *See* https://www.macnoise.com/.

The lessons from MAC are especially valuable as the public discusses the impacts of flight tracks from the new O'Hare runways. An enhanced website, combined with information about how aircraft fly, why they fly where they do, and the mechanics of FAA's NextGen initiatives, could be enormously valuable to the public in the vicinity of O'Hare. The investment in education—outside the narrow context of actions at O'Hare—could produce valuable dividends for both the community and the City because it could help direct the dialogue towards substantive issues of greatest importance to these communities.

In addition to enhancing the role of ONCC as a facilitator of public dialogue, there are specific tasks that CDA (in cooperation with ONCC or separately) could undertake that would increase public awareness and improve public confidence in CDA. FAA regulations set forth specific environmental requirements with respect towards preparation of noise contours for projects like the OMP. The OMP EIS and the Written Reevaluation contain noise contours that comply with federal requirements. Chicago has, of course, already extended its community outreach and public education well beyond the federal requirements and the environmental review process. Chicago should think of this as an on-going, continuing process of community engagement accomplished as a partnership between CDA and ONCC.

Airports have used a number of different mechanisms for keeping the public informed on an ongoing basis. Today, sophisticated websites and noise monitoring and reporting systems are virtually standard practices at large urban airports.[141] As noted above, the City already provides comprehensive data through the monthly ANMS and quarterly Fly Quiet reports. Some airports have also found it useful to keep the public informed on a continuing basis about noise contours and changes in those contours,[142] while others provide regular reports to the community.[143] It is important that the City not view this as a cookbook effort and merely mimic what has been done at other airports: ONCC should work with CDA to define and tailor a program of continuing education and outreach with updated noise information that would focus on the information and issues of greatest interest to O'Hare neighbors.

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[141] There are myriad impressive websites but many rely upon one of a few technologies developed by PlaneNoise (www.planenoise.com), Bruel & Kjaer's Webtrak (www.webtrak.bksv.com), and BridgeNet (http://www.airportnetwork.com/) among others.

[142] For example, after a major redevelopment of Palm Beach International Airport, the airport proprietor prepared annual noise contours for many years so the public could compare the predicted noise contours with the actual contours each year. An illustration of such a report appears on the Palm Beach County website: www.pbcgov.com/pubInf/Agenda/20081216/3f2.pdf.

[143] *See*, for example, the reports from Burbank Bob Hope Airport (http://www.burbankairport.com/noise/noise-issues/noise-monitoring.html), Massport (Boston area airports) (https://www.massport.com/environment/environmental-reporting/noise-abatement/noise-monitoring/) or Metropolitan Washington Airports (http://metwashairports.com/dulles/2542.htm).

3. Gather community input on the Fly Quiet Program

It is also important that the public have confidence in the City's continued commitment to noise abatement and mitigation. In the OMP ROD, FAA indicated uncertainty about the long-term future of the Fly Quiet program.[144] By all indications, this program has been highly effective in encouraging voluntary noise abatement efforts by pilots using O'Hare. The City and CDA may want to take steps to avoid any uncertainty and to reassure the public about the importance of Fly Quiet to the overall O'Hare noise program. For example, the City (in cooperation with FAA and the pilot and airline community) could request that ONCC immediately begin a program of public outreach to engage in a public dialogue about the effectiveness of Fly Quiet and whether the program should be continued and, if so, whether any changes to that program are warranted in light of the OMP. Of course, City and FAA participation in that process would be essential.

4. Request additional public process as FAA implements NextGen procedures in the Chicago metropolitan area

An additional opportunity for further community outreach and transparency concerns FAA's ongoing implementation of new NextGen flight procedures. FAA has embarked upon a nationwide effort to replace older, radar-based flight navigation procedures with the latest generation satellite-based navigation. The effort involves the redesign of the entire national airspace system and has resulted in new or modified flight tracks in some cities. This new technology is being introduced in two ways: (1) through the "Metroplex" initiative on a city-by-city basis,[145] or (2) through the addition of individual new procedures on an ad hoc basis. While this is entirely an FAA-controlled effort, CDA may be consulted during certain phases of the project design and implementation.

FAA has committed various levels and types of public outreach in connection with the rollout of NextGen at different airports. However, it is important to recognize that, unlike major airport development projects such as OMP, many airspace changes are typically categorically excluded from NEPA review. A recent—and on-going—example is in Phoenix, where FAA recently implemented its NextGen flight patterns for aircraft departing Phoenix Sky Harbor International Airport. When implementing the NextGen changes, however, FAA took the position that it was not required to engage in the affected community *in any way whatsoever*. The agency therefore implemented new flight tracks with no advance notice to the community. There were no public meetings and no circulation of its environmental analysis in advance. Not surprisingly, the agency action caught the affected communities entirely by surprise. The City of Phoenix (the proprietor of Sky Harbor International Airport) has had to play catch-up to inform the surrounding residents and to engage the community in possible solutions. It should

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[144] OMP ROD at 48.

[145] *See generally*, https://www.faa.gov/nextgen/. For information about NextGen implementation in the Chicago metropolitan area, *see* http://www.faa.gov/nextgen/snapshots/metroplexes/?locationId=4.

be self-evident that engagement after-the-fact is far less effective than providing information and education in advance.

The recent experience in Phoenix demonstrates the value of proactively seeking community involvement and engagement with the public about NextGen changes *before* they are implemented.[146] Of note, FAA recently accepted recommendations from an industry advocacy group formed to develop better processes for implementing performance based navigation (PBN) changes. That group, the RTCA[147] PBN Blueprint Task Group, recommended significant enhancements in opportunities for community involvement and transparency. In response, FAA has committed to revisiting its *Community Involvement Manual* and developing better community outreach practices.[148]

While FAA determines what the process will be for Chicago, the City and CDA can and should anticipate and recommend early community engagement with respect to the implementation of NextGen flight path changes in the Chicago area. In this regard, it will be critical to understand that while CDA and the City have been dealing with FAA's Airports Office in connection with OMP, it is FAA's Air Traffic Office (ATO) that will lead any NextGen efforts. The City and CDA should work proactively with ATO, in coordination with the FAA Regional Administrator and FAA Headquarters as necessary, to urge that the agency implement an aggressive and comprehensive community education and outreach effort that is consistent with the expectations of the communities around O'Hare.

5. Extend the opportunity for public outreach on the OMP Written Reevaluation

While FAA is holding an unprecedented number of public hearings on the Written Reevaluation, the subject matter is dense and technical. In particular, the draft Written Reevaluation just released for public review does not contain easily discernible data on the difference in impacts between now and what was revealed in the EIS. The public may benefit from additional time to digest this complicated material. CDA could consider requesting that FAA afford some additional time or opportunity for public comments. This would not be unprecedented. For

[146] About a year ago, FAA implemented new flight patterns that resulted in a shift in the location of overflights in the Phoenix area. FAA's analysis showed that any noise impacts would be insignificant. Although that conclusion has been challenged by the City of Phoenix in pending litigation, *City of Phoenix v. Huerta* (No. 15-1158, D.C. Circuit pending), the change in flight patterns certainly caused considerable community concern and impact. For a current update, *see* https://skyharbor.com/flightpaths/. For a good explanation of this history of the changes and the impacts on communities, *see* http://www.phoenixnewtimes.com/news/sound-and-fury-frustrated-phoenix-residents-are-roaring-ever-since-the-faa-changed-sky-harbor-flight-paths-6654056.

[147] RTCA (the Radio Technical Commission for Aeronautics) is a private, not-for-profit corporation that is utilized as a federal advisory committee. RTCA frequently works in response to requests from FAA to develop comprehensive, industry-vetted, and endorsed recommendations for the government on issues ranging from technical performance standards to operational concepts for air transportation.

[148] *See*, FAA Air Traffic Organization, *FAA Response to RTCA, Inc. "Blueprint for Success to Implementing Performance Based Navigation" Recommendations* (June 2015).

example, the comment period for the Logan Written Reevaluation was extended by a full month to permit additional participation. Another option in line with historic practices at O'Hare is to invite FAA to formally present its final Written Reevaluation to the public at an ONCC Meeting once the process is complete.

* * *

V. CONCLUSIONS AND RECOMMENDATIONS

As the previous sections of this memorandum have indicated, the amount of public information, input, and involvement in preparation of both the EIS and Written Reevaluation for the OMP have been far greater than required by FAA policies, regulations, and law and, in fact, far greater than for most other comparable airport projects in the last decade. In addition, the City's public outreach efforts, as it has proceeded with the OMP, have been consistent with best practices in the industry and have been characterized by transparency and repeated opportunities for public participation.

There are few *requirements* for public outreach in an airport development project EIS:

- FAA must publish a NOI to prepare an EIS in the *Federal Register*.
- FAA must conduct a scoping process in which it solicits comments from local governments and the public; however, formal scoping meetings are *not* obligatory.
- Once a draft EIS is prepared, FAA must publicize the availability of the draft EIS and make copies available for review and comment at public libraries and similar depositories
- FAA should hold a public hearing on a draft EIS if the subject matter is "of national scope."
- FAA must offer at least 45 days for public comment on a draft EIS.
- FAA must take into consideration all comments received on the draft EIS and comments recorded during public meetings or hearings and respond to the substantive comments in the final EIS.
- FAA must make the final EIS available to the public, but no formal comment period is required.
- No public process is required for a written reevaluation.

The public outreach conducted for the OMP EIS far exceeded these minimum requirements. OMP held almost 70 pre-scoping briefings; held an additional 40 additional meetings after scoping; released 7.5 million pages of technical data to the public before completion of the draft EIS; answered hundreds of pages of comments; and held more public hearings than almost any other recent airport project. In addition, for the pending written reevaluation, FAA has released a draft written reevaluation and has announced its intent to hold four public hearings. We are aware of no other instance in which FAA has offered so many public hearings on a written reevaluation.

The OMP public outreach process clearly met FAA goals of informing the public, gathering information from the public, and establishing the credibility of the decision-making process.[149] Ultimately, as FAA indicates in its *Community Involvement Manual*:

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[149] It is also instructive to compare the success of the public outreach efforts for the OMP EIS to the real world evidence of what happens when changes are made to flight tracks *without* any community involvement, education, or feedback such was the case when FAA changed flight patterns in Phoenix.

> *"Fundamental to the success of citizen involvement is openness. An open process is the key to successful citizen involvement. The purpose, procedures and schedule for conducting the planning process should be described as clearly and completely as possible. This information should include the following: decisions to be made, factors which will be considered, choices which are and are not open for consideration, and timing. Openness means that planning is done publicly to the maximum extent, and that decisions are made public. Any individual or group should have an opportunity to contribute to the process. Written information generated during the planning process should be made available to interested participants. This openness does not guarantee there will be trust or agreement between planners and the public, but it does help to ensure that what conflict does arise will be over the real issues to be resolved rather than the question of whether an honest intent to resolve them is being made."*

Moreover, the City and CDA have taken significant steps to keep the public informed and engaged during the implementation of the project and to ensure that the public has ongoing access to data to understand impacts of O'Hare on their communities.

While there have been robust opportunities for public involvement in the OMP, there are still several actions that CDA and the City could take (either independently or in cooperation with FAA) that could enhance transparency and community awareness of the noise impacts of the OMP:

- The City could recommend that the mission of ONCC be expanded to include providing advice on additional community outreach and information measures and with coordinating any such additional efforts. ONCC could be directed to examine not only one-time outreach efforts, but also on-going measures designed to keep the community informed on a continuing basis. Taking lessons from other successful airport outreach programs, ONCC could be asked to recommend changes to the existing public outreach and information programs and to spend more time educating the public on noise matters more generally.

- The City could work with ONCC to define and tailor a program of continuing education and outreach with updated noise information that would focus on the information of greatest interest to O'Hare neighbors. This information would supplement whatever information is made available through FAA's written reevaluation process.

- The City could request that ONCC initiate a process for reassessment of the Fly Quiet program to ensure its continued effectiveness and to recommend changes, as appropriate, in light of the OMP.

- The City could begin planning for the implementation of NextGen flight tracks in the Chicago area and could design and implement an aggressive community outreach and education program in cooperation with – or in addition to – whatever public input FAA seeks through its process.

- The City could coordinate with FAA to extend public outreach for the pending written reevaluation. For example, FAA may be willing to extend the public comment period. In addition, the City and ONCC should consider inviting FAA to present the final written reevaluation at an ONCC meeting.

* * *

ATTACHMENT A

Kaplan Kirsch & Rockwell is a national law firm focused on solving problems that involve environmental, land use, energy, public and private lands, infrastructure, and transportation law. The Firm represents state and local governments, individuals, corporate clients, and organizations in complex and controversial projects.

The Firm has represented more than 100 airports nationwide from small general aviation airports to some of the largest airports in the world. A large part of the Firm's practice concerns airport noise issues. The Firm has served as counsel to more than 60 airports – large and small – in connection with the development and implementation of comprehensive noise management, mitigation, and abatement programs. The Firm's attorneys frequently advise clients on strategies for implementing noise rules and on developing programs for preferential runway use, noise abatement departure procedures, and related voluntary noise abatement programs. The Firm's lawyers have represented communities in airport noise disputes as well as airport proprietors in their negotiations with noise-affected communities. As a result, the Firm understands both the needs of airports and the interests of communities who may be adversely affected by airport operations. The Firm's expertise in airport noise matters has led to work on the first airport noise rule adopted after enactment of the Airport Noise and Capacity Act of 1990; the negotiation of intergovernmental agreements to balance community and airport needs for large airport expansions and new airports; the preparation of noise compatibility programs under FAR Part 150; and development of aggressive noise abatement and mitigation programs.

Kaplan Kirsch & Rockwell has offices in Washington, DC and Denver, Colorado.

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APPENDIX 4

NEWSROOM

ONCC Selects Committee to Review O'Hare Nighttime Noise Abatement Program

September 18, 2015

Nine members representing Chicago and suburban communities near O'Hare International Airport were named today by O'Hare Noise Compatibility Commission (ONCC) Chair Arlene A. Juracek, mayor of Mount Prospect, to an ONCC Ad Hoc Fly Quiet Committee to review and recommend modifications to the airport's nighttime noise abatement program.

The initiative follows an assessment by the Federal Aviation Administration (FAA) of interim environmental conditions due to the O'Hare Modernization Program and the Chicago Department of Aviation's (CDA) recommendations for modifying the Fly Quiet Program, which were announced during meetings with community groups held this summer.

Joseph Annunzio, ONCC Vice-Chair and Niles village attorney, will lead the ad hoc committee whose members will represent Chicago and suburbs impacted by O'Hare noise.

Selected members include: ONCC Technical Committee Chair Catherine Dunlap, Chicago Ward 41; ONCC Technical Committee Vice-Chair Dennis Ryan, River Grove; Harwood Heights Mayor Arlene Jezierny; Schiller Park Mayor and Suburban O'Hare Commission (SOC) member Barbara Piltaver; Bensenville Mayor Frank Soto, SOC; Des Plaines Alderman Malcolm Chester; Schaumburg Director of Transportation Karyn Robles; and the Chicago Ward 45 designee.

"This ad hoc committee is a balanced representation of the citizens we serve," said Mayor Juracek. "The FAA tasked us with the responsibility to oversee O'Hare noise mitigation efforts. We have carefully reviewed the FAA's environmental re-evaluation, as well as CDA recommendations for ways to modify nighttime noise abatement procedures. Committee members are ready to tackle the complicated noise abatement program modification process."

ONCC has extended an invitation to the Fair Allocation in Runways (FAiR) Coalition to serve as a non-voting guest participant on the ad hoc committee with the promise of a standing agenda item at each committee meeting for direct citizen input.

"The sole purpose for this ad hoc committee is to look at the Fly Quiet Program and find ways we can provide relief for residents who are impacted by noise," said ONCC Vice-Chair Joseph Annunzio. "We will call upon both SOC and CDA consultants for their recommendations, as well as O'Hare Air Traffic Control, airlines and their pilots. We won't compromise safety, but stay focused to reach a consensus and present our modifications to the FAA," he said.

ONCC is an intergovernmental agency, established under the Illinois Constitution of 1970 and the Intergovernmental Cooperation Act, consisting of 55 voting members comprised of municipalities and school districts that represent nearly 1.3 million residents affected by O'Hare operations.

News Archives

» 2016
» 2015
» 2014
» 2013
» 2012

APPENDIX 5

O'HARE NOISE COMPATIBILITY COMMISSION

Arlene A. Juracek
Chair

Ginger S. Evans
Commissioner
Chicago Department of Aviation

Joseph J. Annunzio
Vice-Chair

Frank A. Damato
Chair, Residential Committee

Catherine Dunlap
Chair, Technical Committee

Judith Dunne Bernardi
Treasurer

Dr. Raymond J. Kuper
Chair, School Committee

Jeanette Camacho
Executive Director

Members:
Arlington Heights
Bartlett
Bellwood
Bensenville
Bloomingdale
Chicago
Chicago Wards
36, 38, 39, 40, 41, 45
Cook County
Des Plaines
Downers Grove
Elmwood Park
Franklin Park
Hanover Park
Harwood Heights
Hoffman Estates
Itasca
Lincolnwood
Maywood
Melrose Park
Morton Grove
Mount Prospect
Niles
Norridge
Northlake
Oak Park
Palatine
Park Ridge
River Forest
River Grove
Rolling Meadows
Rosemont
Schaumburg
Schiller Park
Stone Park
Wood Dale

School Districts:
59, 63, 64, 80, 81, 84,
84.5, 85.5, 86, 87, 88,
89, 214, 234, 299, 401

O'HARE NOISE COMPATIBILITY COMMISSION
FLY QUIET COMMITTEE MEETING
MONDAY, OCTOBER 19, 2015 10:00 A.M.
Chicago Department of Aviation
Conference Room 1, 2nd Floor
10510 W. Zemke Road, Chicago, IL 60666

AGENDA

1. Call to Order – Mr. Joseph J. Annunzio, Chair
2. Roll Call
3. Introduction
4. Define Objectives of the Committee
5. Define the Fly Quiet Program Redevelopment Process
6. Existing Fly Quiet Program Review
7. Review Changes to O'Hare
8. Review Potential Alternatives for Consideration
9. Next ONCC Fly Quiet Committee Meeting:
   November 16, 2015, Chicago Department of Aviation,
   10510 W. Zemke Road, Chicago, IL. 9:00 a.m.
10. Comments from ONCC Members:
11. Comments from the Audience

The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:

- Questions or comments should be limited to items placed on the meeting agenda, or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.
- Before making comments or asking questions, identify yourself to the Commission Chair and members by providing them with your name and address.

12. Adjournment

ONCC Meeting: Friday, November 6, 2015, Café la Cave,
2777 S. Mannheim Road, Des Plaines, IL, 8:00 a.m.

ONCC Technical Committee Meeting: Tuesday, November 10, 2015
Mount Prospect Village Hall, 50 S. Emerson, Mount Prospect, IL 9:00 a.m.

P.O. Box 1126 • Des Plaines, IL 60017-1126
773-686-3198 • www.oharenoise.org

O'Hare Fly Quiet Committee #1

October 19, 2015

Ginger S. Evans, Commissioner
City of Chicago, Department of Aviation

CHICAGO

AGENDA

1. Define Objectives
2. Define the Process
3. Review Existing Fly Quiet Program
4. Review Changes Since Fly Quiet Inception
5. Alternatives for Consideration

Define Objectives

MISSION STATEMENT

The ONCC acknowledges that aircraft noise at night impacts the residents in communities around O'Hare and that conditions have changed since Fly Quiet Program inception in 1997. The ONCC desires to evaluate ways to modify the Fly Quiet Program and make recommendations to the Chicago Department of Aviation (CDA) based on ONCC consensus.

OBJECTIVES

Assess Fly Quiet

Identify requirements of viable modifications

Achieve consensus

Adhere to guiding principles

GUIDING PRINCIPLES

Maximizing safety and efficiency must be achieved with all potential initiatives

Runways will continue to be selected to optimize safety and efficiency

The CDA will analyze alternatives and make a submittal to the FAA. FAA will then make a decision on the applicable processes for review and implementation.

Define the Process

FLY QUIET REDEVELOPMENT PROCESS

ONCC
Fly Quiet Committee
Review & Recommend*

→ **ONCC**
Full Commission
Consider & Approve*

→ **CDA**
Submit Plan

→ **FAA**
Review Plan

*ONCC recommendations shall be based on a supermajority (2/3) vote.

Review Existing Fly Quiet Program

Fly Quiet Program

- Preferential Runway Use Program
- Preferential Flight Tracks
- Ground Run–Up Enclosure (1st in U.S.)
- Noise Abatement Signs
- Fly Quiet Manuals for Pilots and Air Traffic Controllers
- Construction Awareness Flyers
- Fly Quiet Reports – Quarterly

Fly Quiet Program

Chicago O'Hare International Airport has eight runways that are utilized at different times depending primarily upon the prevailing wind conditions on the airfield, as well as other weather conditions, airfield conditions, and air traffic conditions.

O'Hare is located in a noise sensitive area surrounded by residential communities. The preferential runway use plan at O'Hare is voluntary and advisory in nature and does not compromise safety.

Recommended Preferential Runway Use Configuration

When feasible, these procedures should be implemented between 10:00 p.m. and 7:00 a.m. (2200 and 0700 local) in order to minimize the effects of nighttime noise on the surrounding communities.

Unless weather, runway closures, or loss of navigational aids dictate otherwise, the FAA, at its sole discretion will implement the following runway use configurations in no particular order:

- Arrivals on 14R and departures on 28R and 14R
- Arrivals on 27L and departures on 28R and 32L
- Arrivals on 22R and departures on 28R and 22R
- Arrivals on 10L and departures on 9R and 10L

Any runway may be closed on any given night for routine safety inspections.

Fly Quiet Program

Preferential Runway Use Configurations

Departures

Arrivals

N

NOT TO SCALE

The operational plans depicted on this page are presented in no particular order.

CHICAGO CDA DEPARTMENT OF AVIATION

Departure Procedures

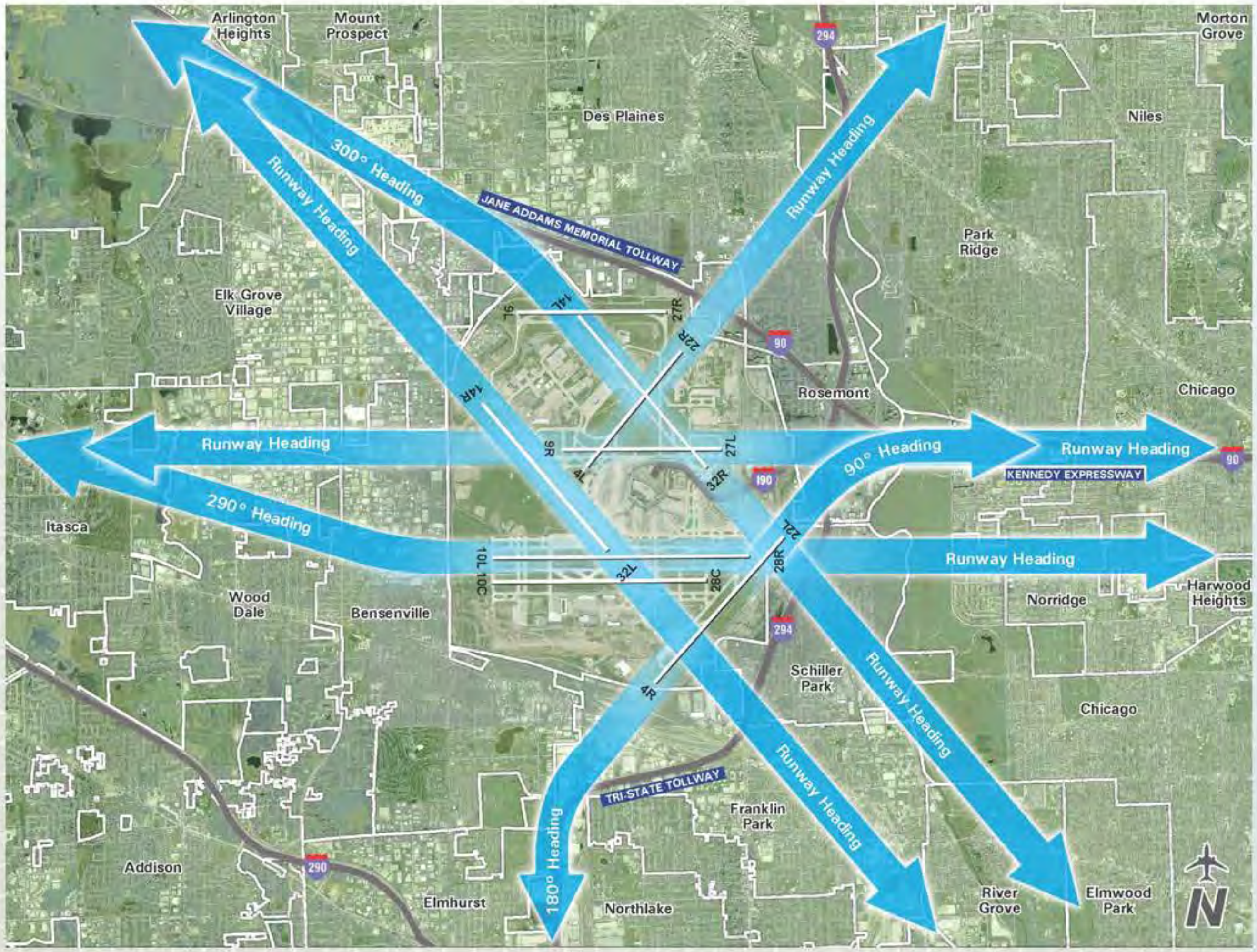
Fly Quiet Program

Recommended Nighttime Departure Procedures

During 10 p.m. to 7 a.m. (2200-0700 local)

The preferred routes direct aircraft over less-populated areas in an effort to limit the effects of noise on the surrounding communities.

Runway	Procedure
4L, 9R, 10L, 14L, 14R, 27L, 32L	Fly runway heading until 3,000 feet MSL.
4R	Fly runway heading for 1 mile then right turn heading 090° until 3,000 feet MSL *(following the Kennedy Expressway)*.
22L	Make left turn heading 180° until 3,000 feet MSL *(following the Tri-State Tollway)*.
28R	Make right turn heading 290° until 3,000 feet MSL.
32R	Make left turn heading 300° until 3,000 feet MSL *(following the Jane Addams Memorial Tollway)*.

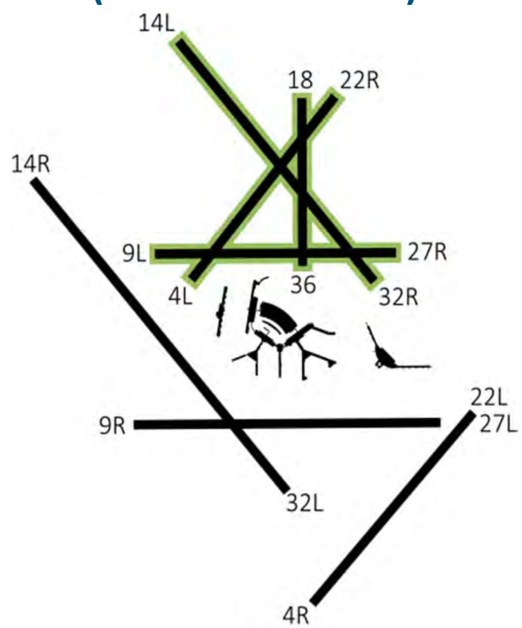


CHICAGO CDA DEPARTMENT OF AVIATION

Changes Since Fly Quiet Inception

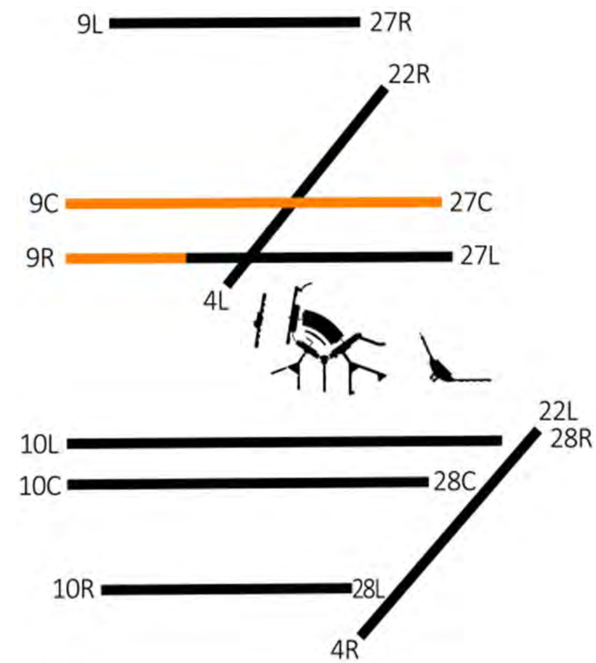
O’HARE MODERNIZATION PROGRAM

Intersecting Runway System (Pre-OMP Airfield)



Note: Green runways indicate the original “runway triangle” airfield.

Full Parallel Runway System

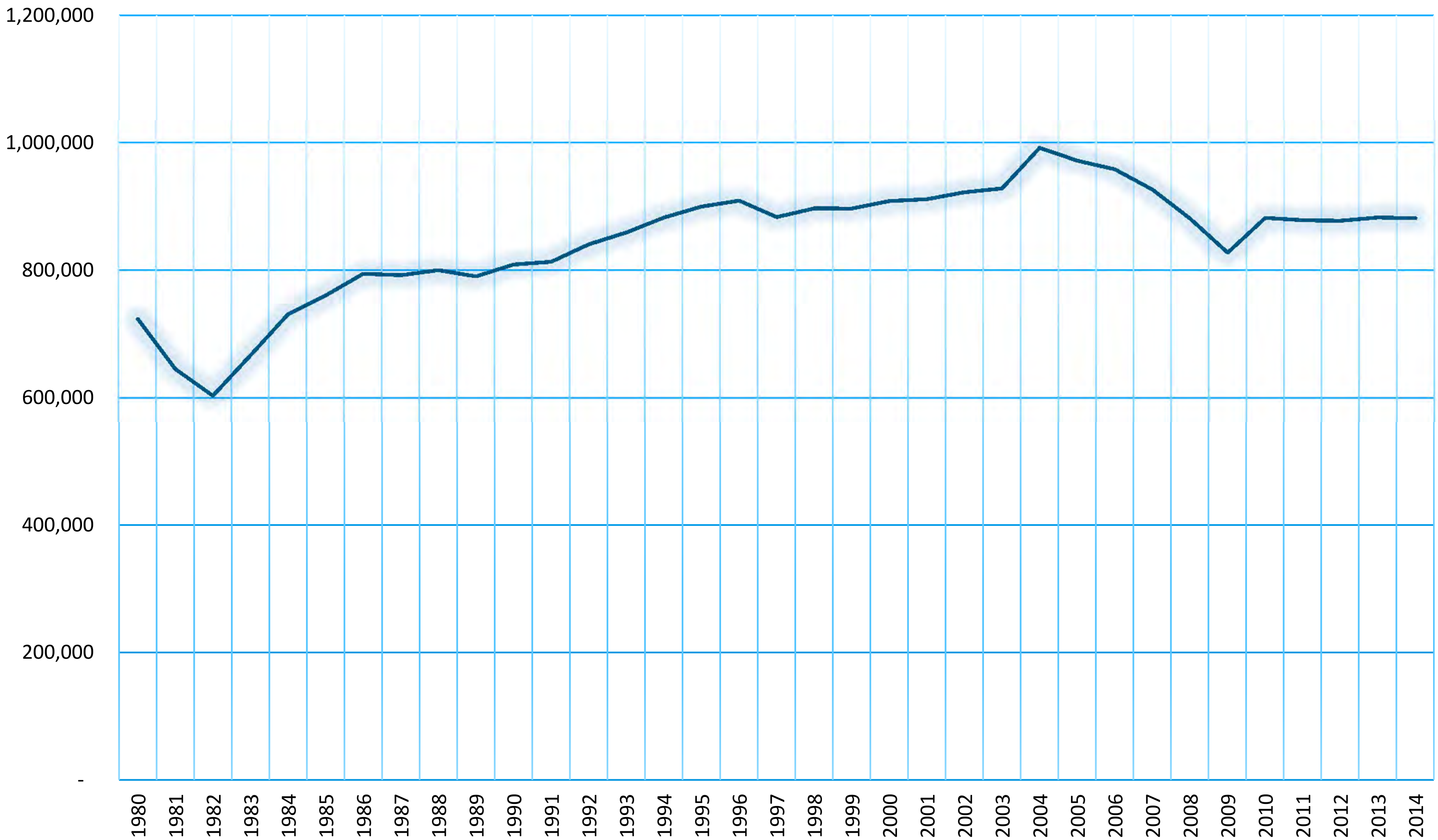


*“…the essence of any successful plan to provide significant delay reduction at O’Hare involves **correcting the existing “runway triangle”** and realigning the airfield in sets of parallel runways that can handle more traffic, **safely and efficiently** in all weather conditions.”*

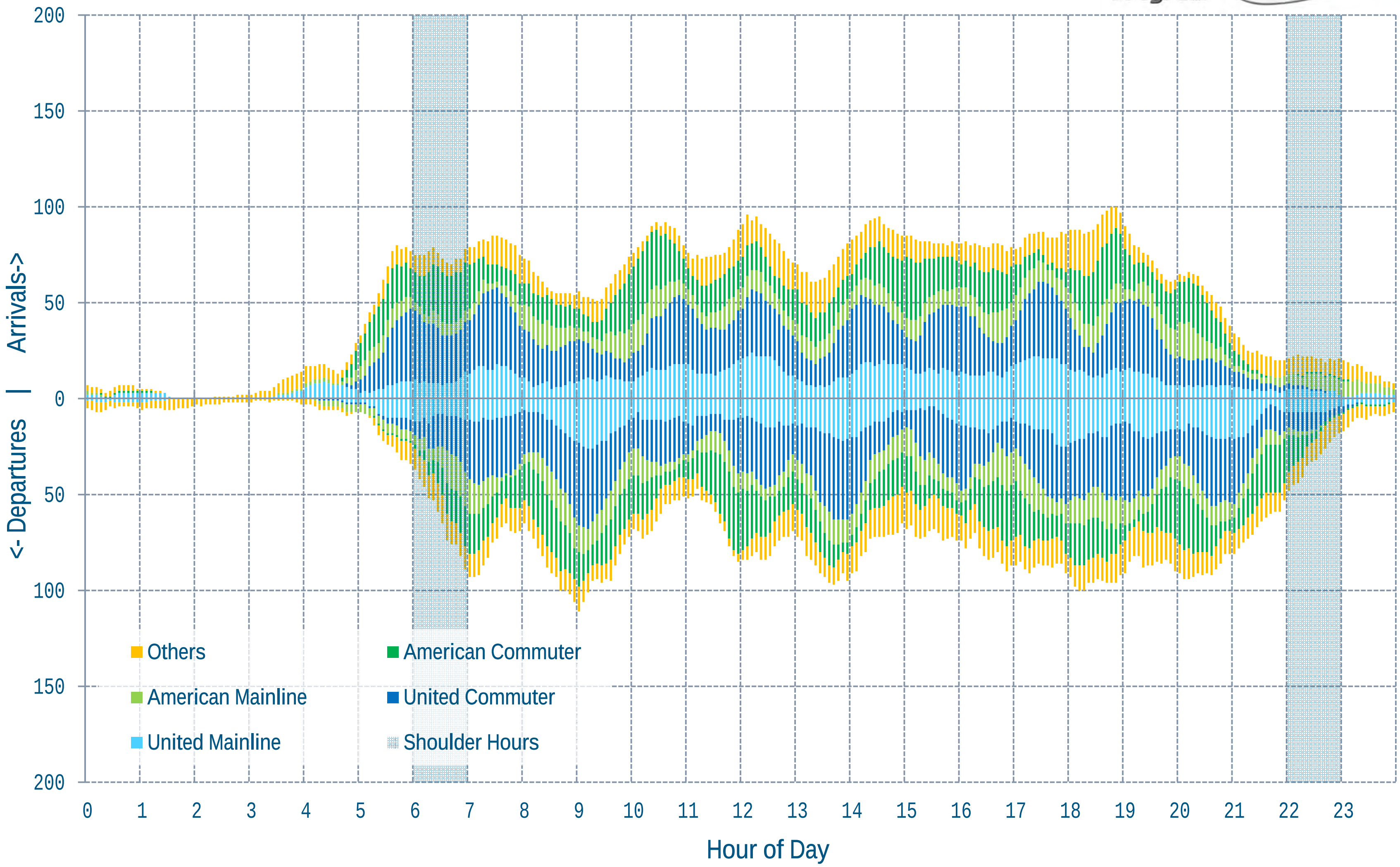
(FAA Record of Decision for O’Hare Modernization, Sept. 2005)


Runway 9L/27R - Commissioned on 11/20/2008
Runway 10L/28R - Extended on 9/25/2008
Runway 10C/28C - Commissioned on 10/17/2013
Runway 10R/28L - Commissioned on 10/15/2015

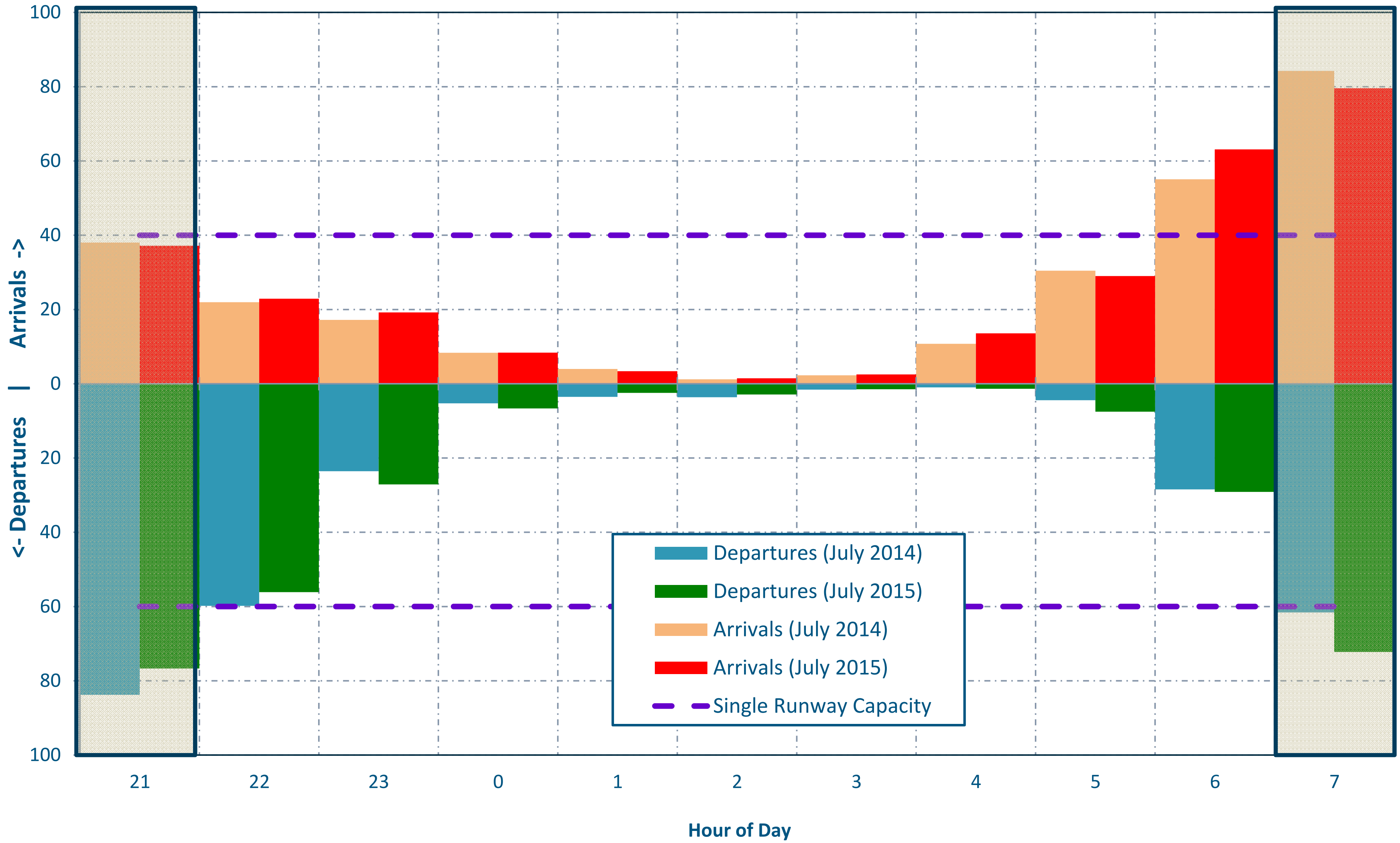
O'HARE ANNUAL OPERATIONS



AIRLINE OPERATIONS BY HOUR

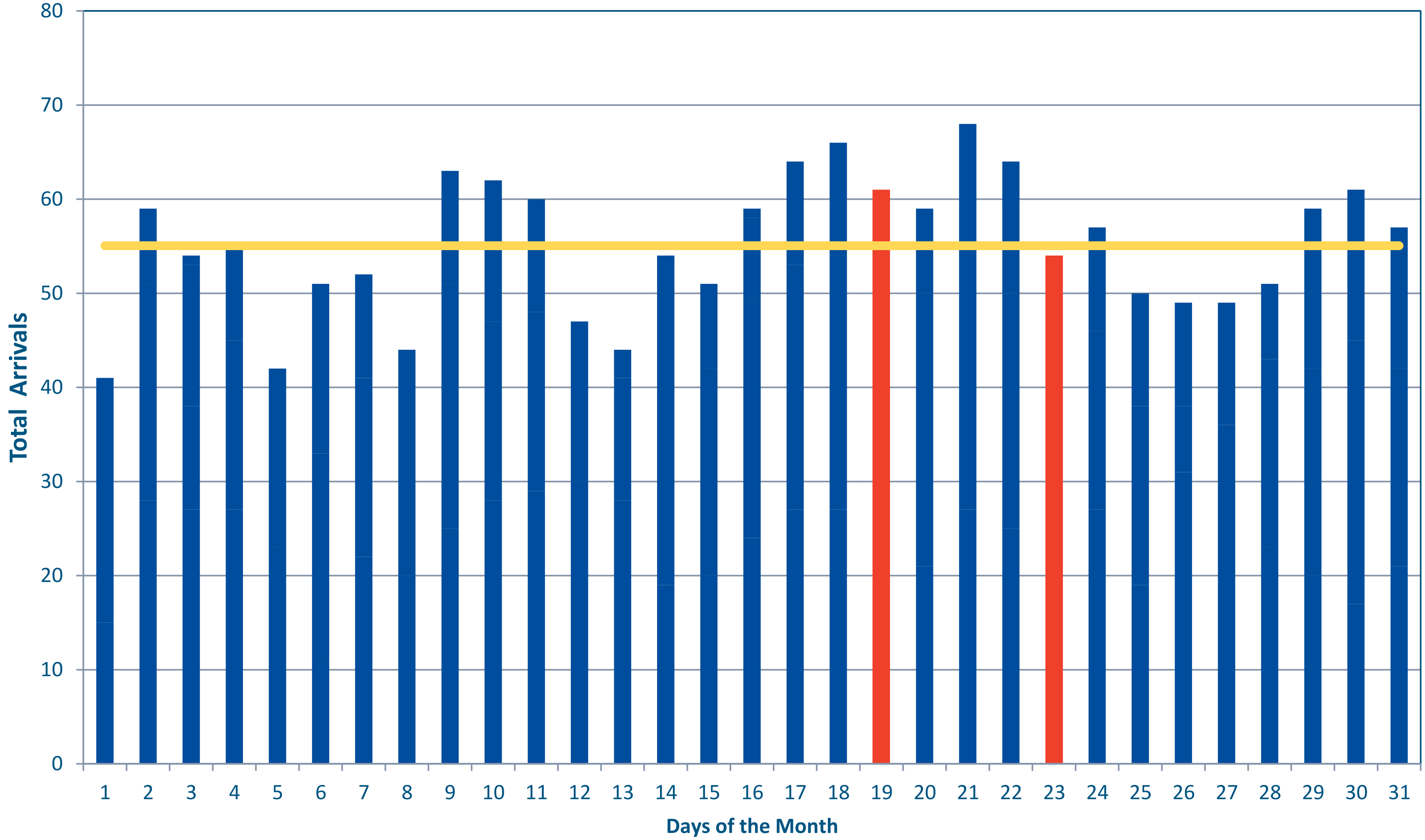


OPERATIONS BY HOUR



O'HARE & MIDWAY INTERNATIONAL AIRPORTS

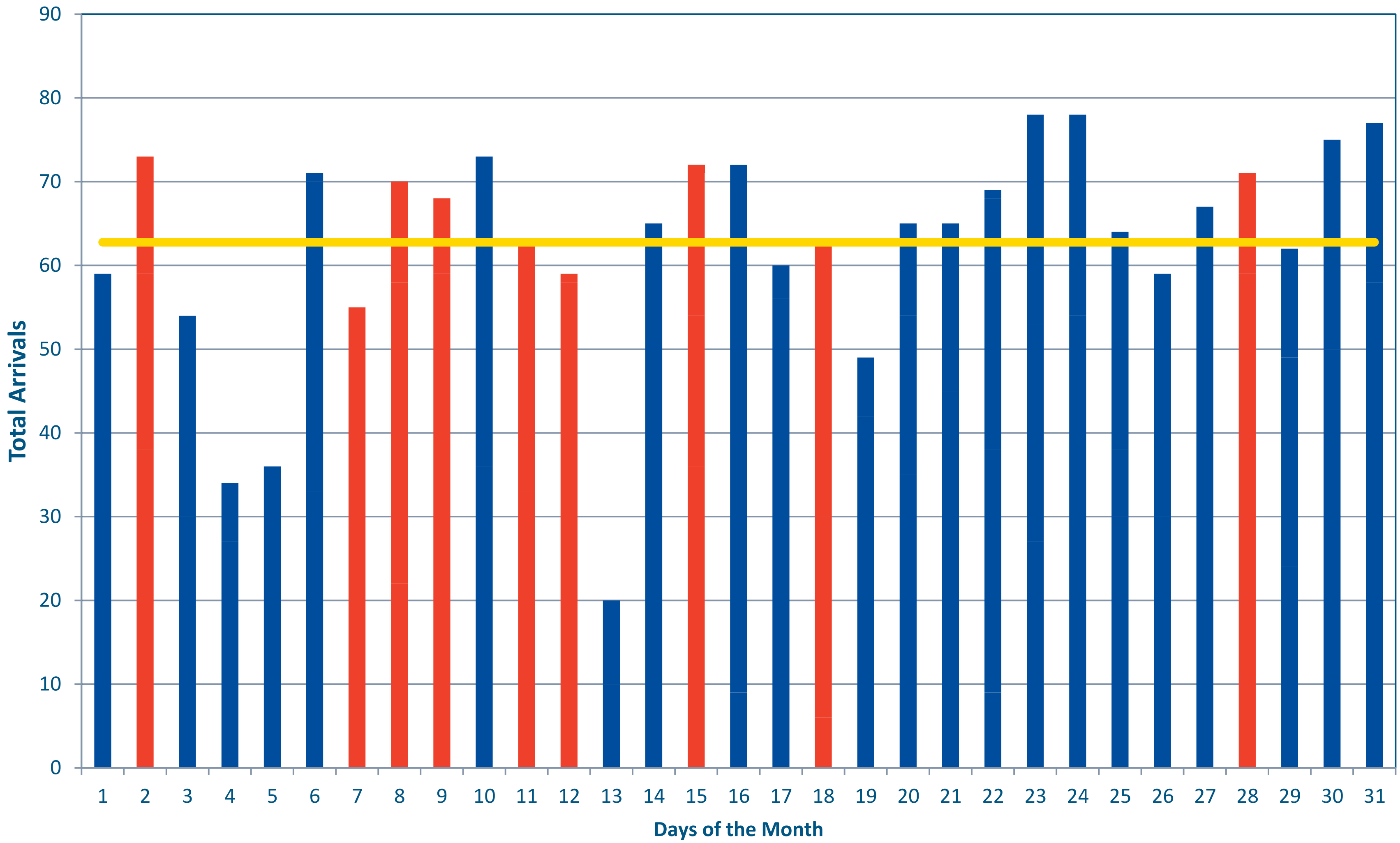
JULY 2014 ARRIVALS (6:00 A.M. – 6:59 A.M.)



Blue Represents West Flow **Gold Represents Average** **Red Represents East Flow**

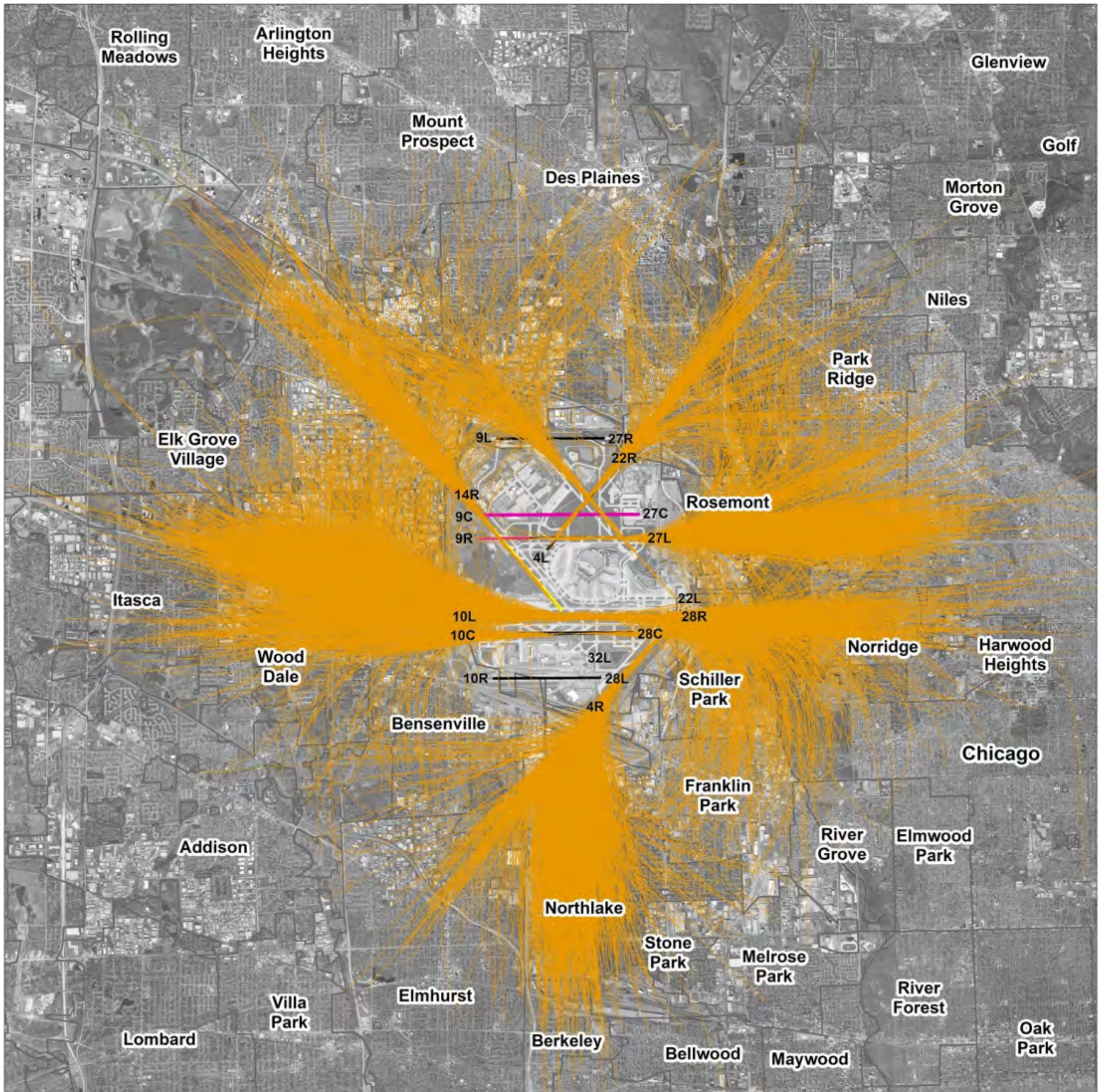
O'HARE & MIDWAY INTERNATIONAL AIRPORTS

JULY 2015 ARRIVALS (6:00 A.M. – 6:59 A.M.)



Blue Represents West Flow **Gold Represents Average** **Red Represents East Flow**

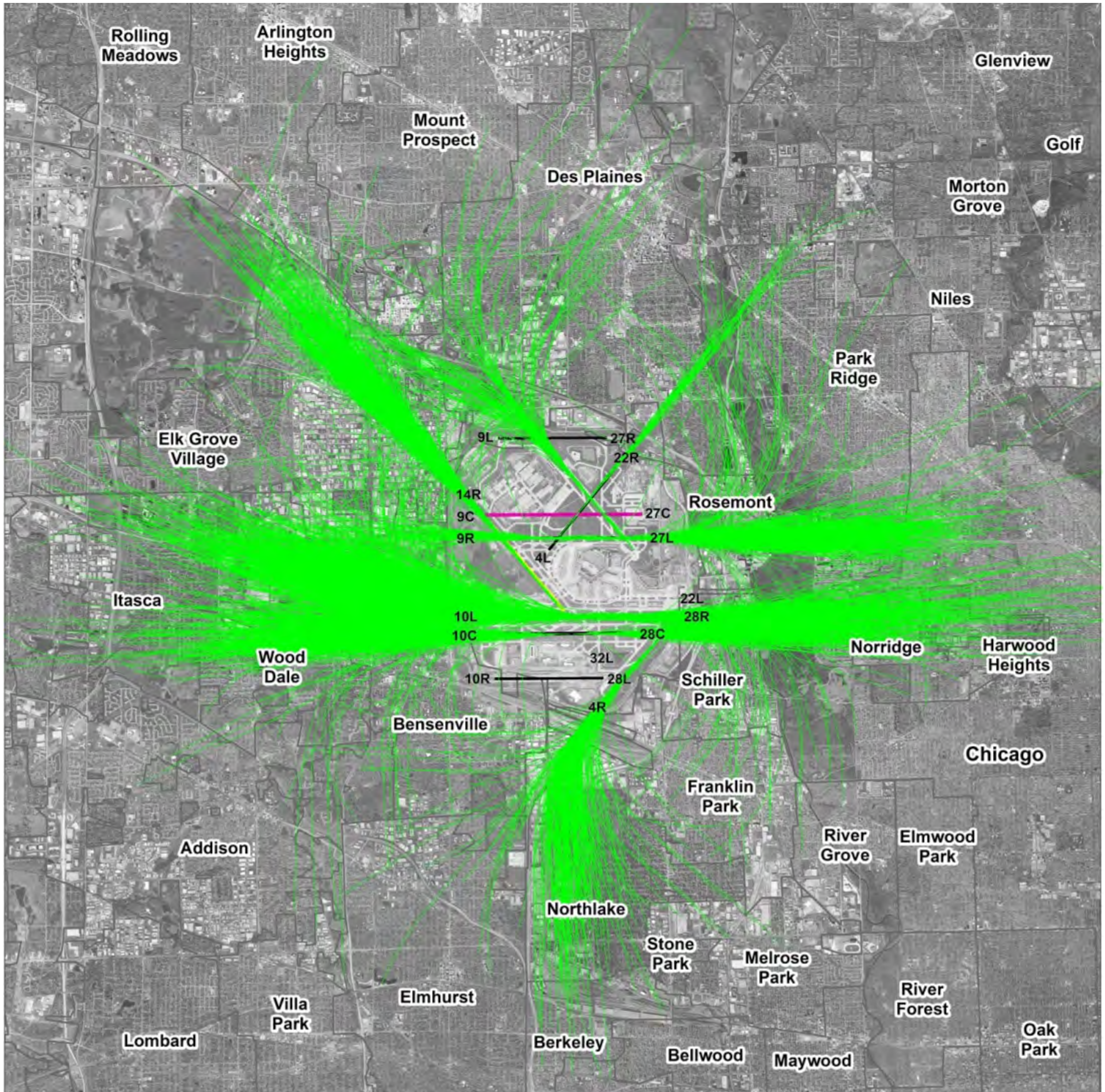
O'HARE & MIDWAY INTERNATIONAL AIRPORTS



Fly Quiet Program

Nighttime Departures By Time of Day

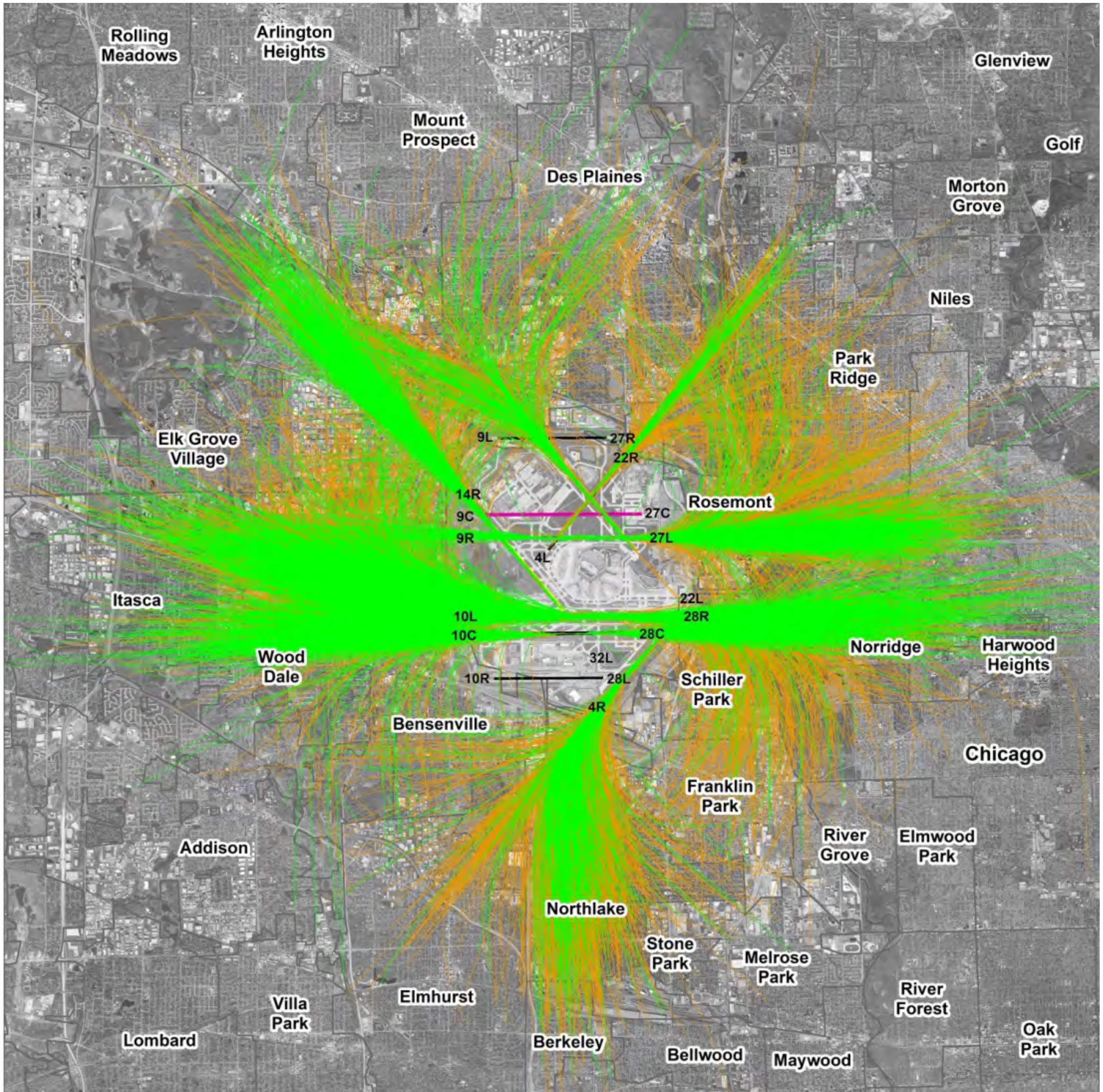
Shoulder Hours 2200 – 2300 & 0600 – 0700



Fly Quiet Program

Nighttime Departures By Time of Day

Overnight Hours 2300 – 0600



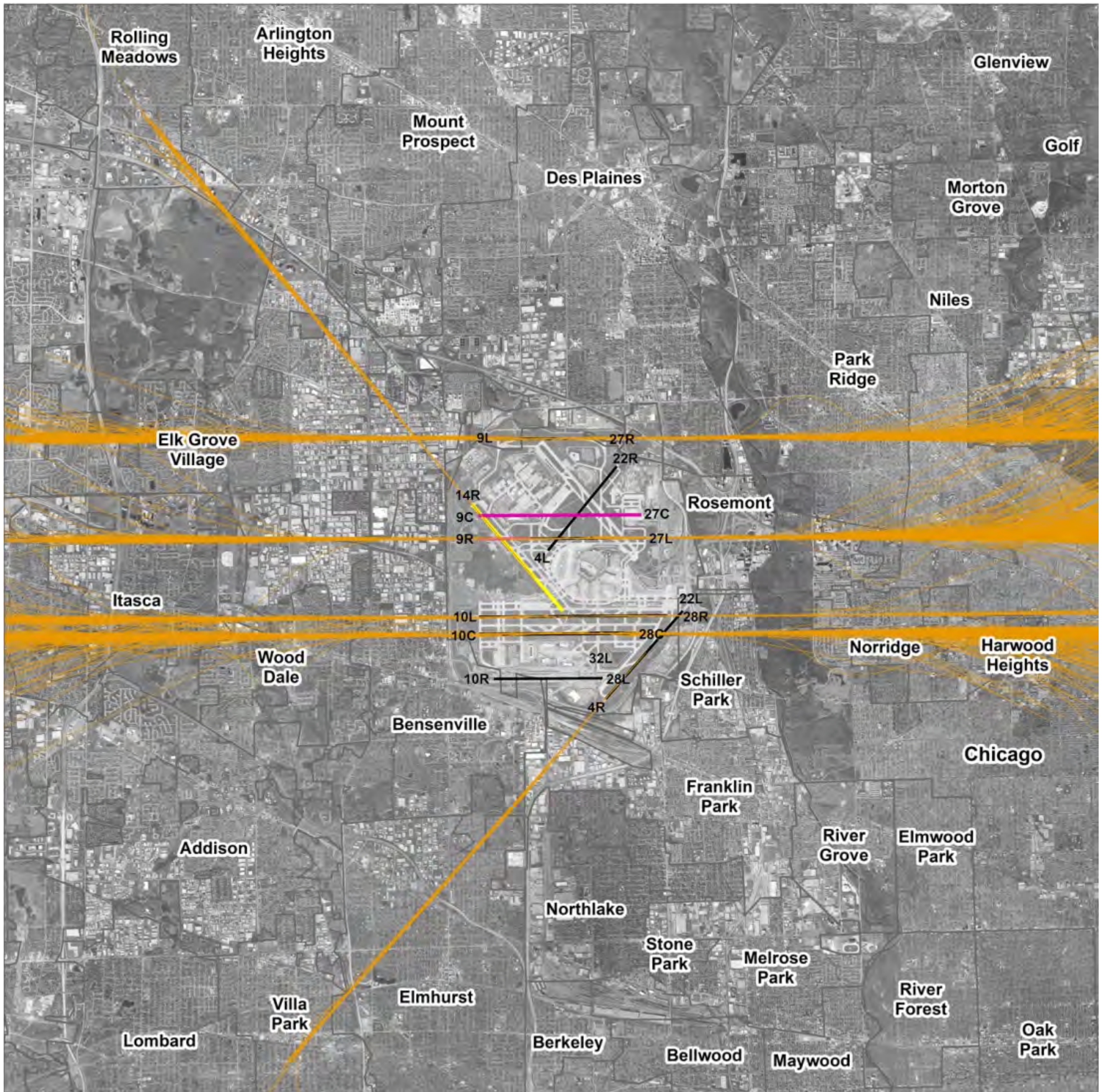
Fly Quiet Program

Nighttime Departures By Time of Day

Shoulder Hours 2200 – 2300 & 0600 – 0700

Overnight Hours 2300 – 0600

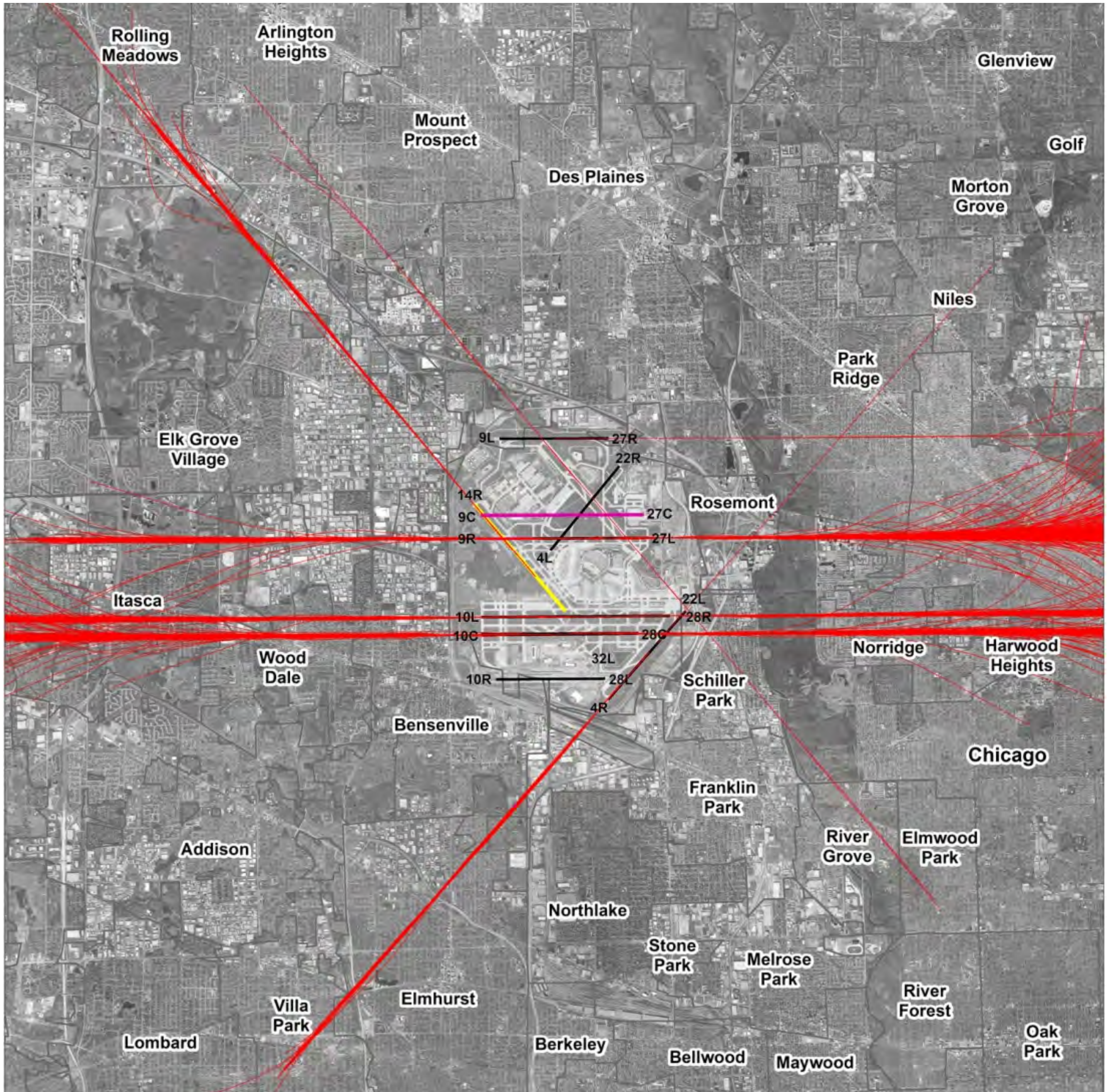
O'HARE & MIDWAY INTERNATIONAL AIRPORTS



Fly Quiet Program

Nighttime Arrivals By Time of Day

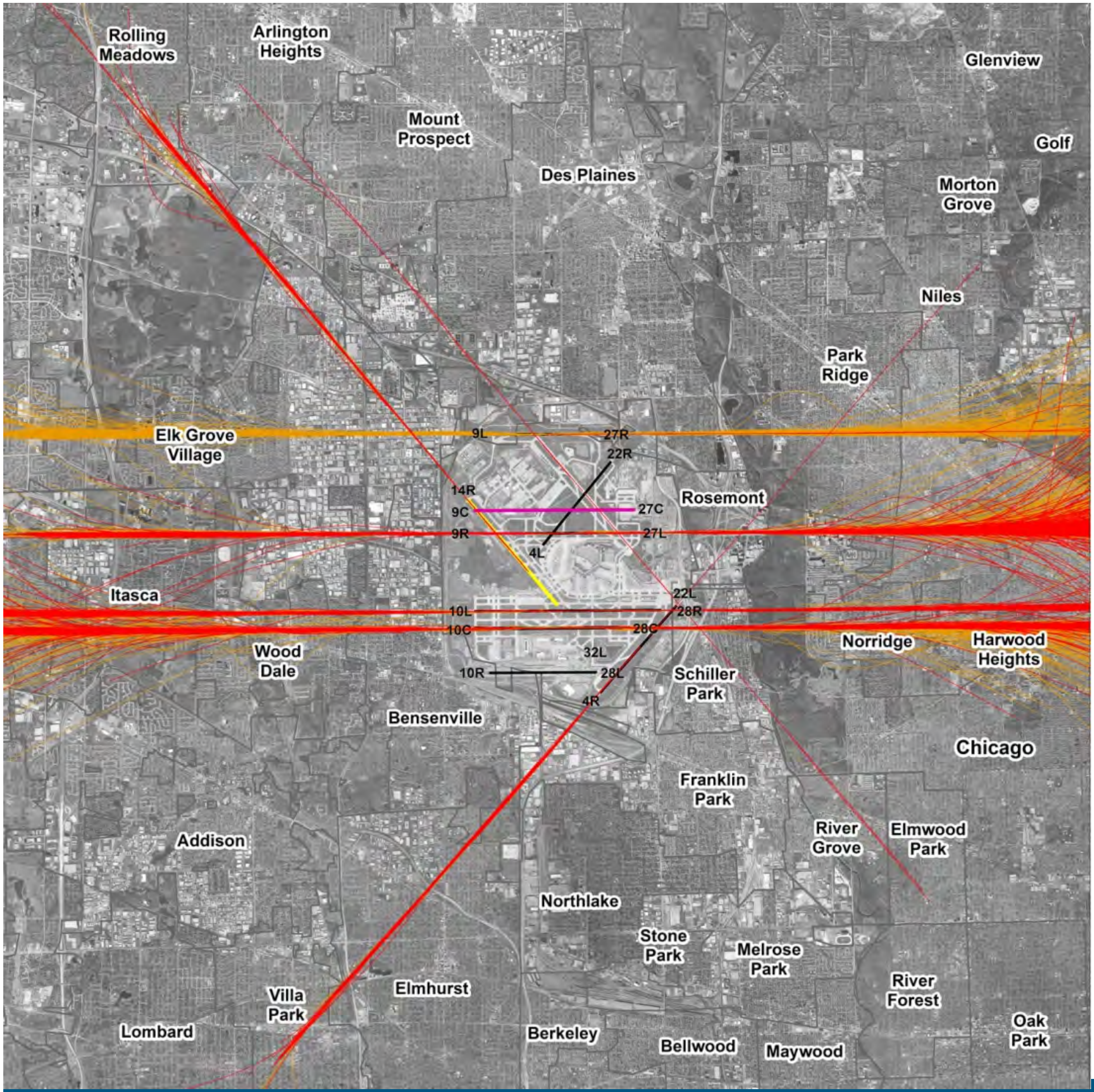
Shoulder Hours 2200 – 2300 & 0600 – 0700



Fly Quiet Program

Nighttime Arrivals By Time of Day

Overnight Hours 2300 – 0600



Nighttime Arrivals By Time of Day

Shoulder Hours 2200 – 2300 & 0600 – 0700

Overnight Hours 2300 – 0600

Alternatives for Consideration

FLY QUIET COMMITTEE INITIATIVES

Issue	Potential Solution
Desire to Balance Noise Impacts by Community	Fly Quiet Rotation
OMP Runway Configuration	Preferential Flight Tracks/Corridors
Increased Demand During Shoulder Hours	Adapt Fly Quiet for Shoulder Hour Demand

HOMEWORK

Potential Solution

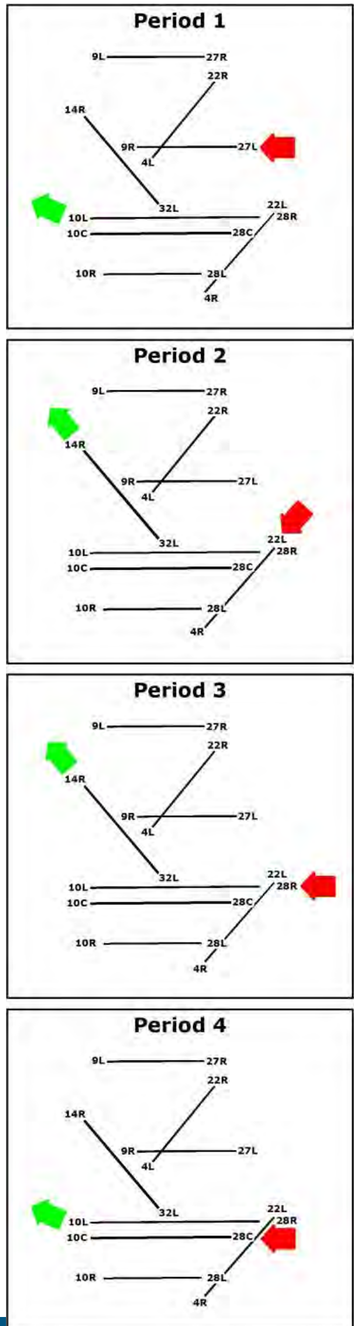
How

Fly Quiet Rotation → Frequency (daily, weekly, or monthly)

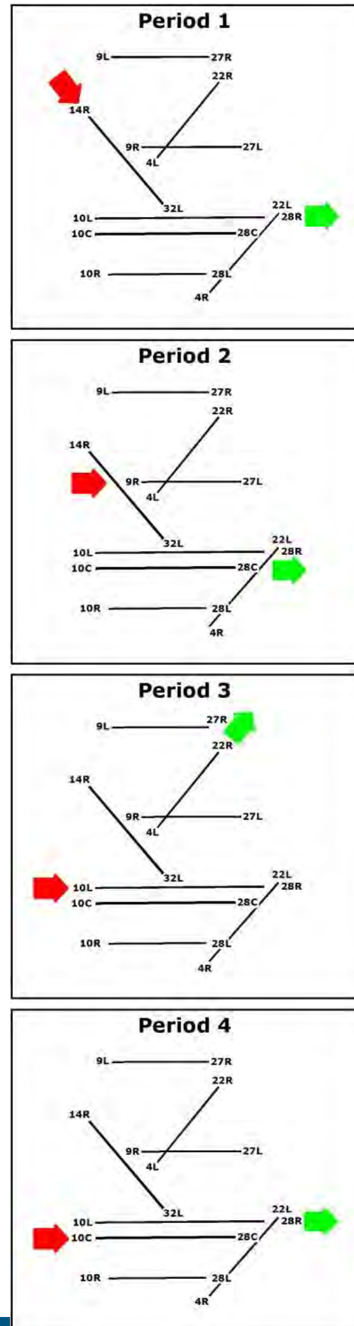
Preferential Flight Tracks/Corridors → Metric (population, noise level, land use, other)

Adapt Fly Quiet for Shoulder Hour Demand → Second Fly Quiet Program (Yes or No)

FLY QUIET WEST FLOW CONCEPT



FLY QUIET EAST FLOW CONCEPT



Fly Quiet Program

Redevelop the Fly Quiet Program

1. Develop & Study Alternatives with ONCC Fly Quiet Committee Input
2. Obtain ONCC Recommendations
3. Submit to FAA and seek appropriate approvals

O'HARE NOISE COMPATIBILITY COMMISSION

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

Questions

NEWSROOM

First Ad Hoc Fly Quiet Committee Meeting Held

October 19, 2015

The ONCC Ad Hoc Fly Quiet Committee met on Monday, October 19, 2015. Committee Chair Joseph Annunzio welcomed committee members, FAiR representatives, Chicago Department of Aviation and Suburban O'Hare Commission consultants.

Annunzio told members that there would be many discussions on ways to modify Fly Quiet procedures, but their goal of modifying Fly Quiet procedures could only be accomplished if all the members understood and stayed focused on the objectives.

CDA consultants reviewed current Fly Quiet conditions and outlined potential alternatives for consideration by the ad hoc committee.

View presentation

News Archives

» 2016

» 2015

» 2014

» 2013

» 2012

APPENDIX 6

O'HARE NOISE COMPATIBILITY COMMISSION

O'HARE NOISE COMPATIBILITY COMMISSION
FLY QUIET COMMITTEE MEETING
MONDAY, NOVEMBER 16, 2015 9:00 A.M.
Chicago Department of Aviation
Conference Room 1, 2nd Floor
10510 W. Zemke Road, Chicago, IL 60666

AGENDA

1. Call to Order – Mr. Joseph J. Annunzio, Chair
2. Roll Call
3. Review Operational Data
4. Departure Procedures
5. Fly Quiet I (Evening)
6. Fly Quiet II (Overnight)
7. Fly Quiet III (Morning)
8. FAiR Allocation Presentation
9. Next ONCC Fly Quiet Committee Meeting:
   December 14, 2015, Chicago Department of Aviation,
   10510 W. Zemke Road, Chicago, IL. 9:00 a.m.
10. Comments from ONCC Members:
11. Comments from the Audience

The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:

- Questions or comments should be limited to items placed on the meeting agenda, or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.
- Before making comments or asking questions, identify yourself to the Commission Chair and members by providing them with your name and address.

12. Adjournment

ONCC Meeting: Friday, January 8, 2016, Café la Cave, 2777 S. Mannheim Road, Des Plaines, IL, 8:00 a.m.

ONCC Technical Committee Meeting: Tuesday, January 19, 2016 Mount Prospect Village Hall, 50 S. Emerson, Mount Prospect, IL 9:00 a.m.

O'Hare Fly Quiet Committee #2

November 16, 2015

Ginger S. Evans, Commissioner

City of Chicago, Department of Aviation

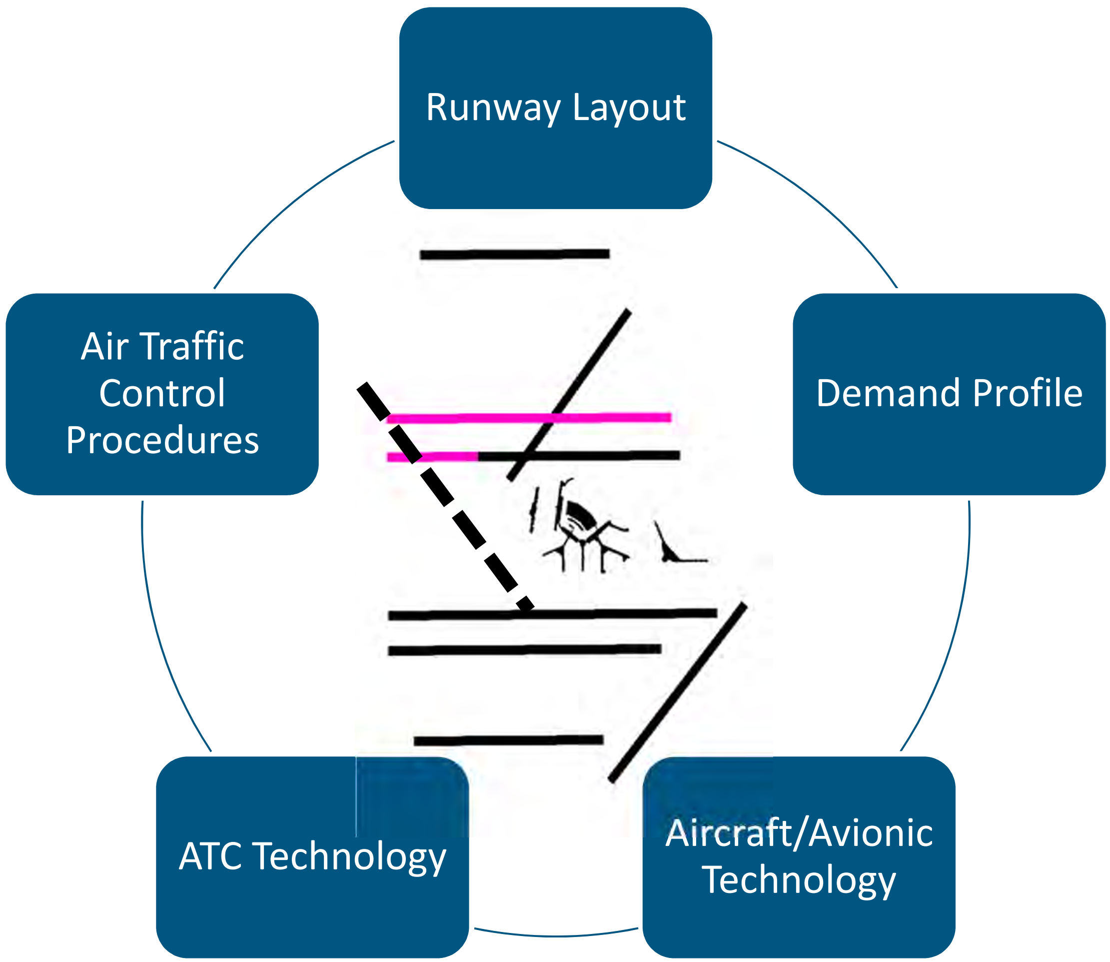
CHICAGO

AGENDA

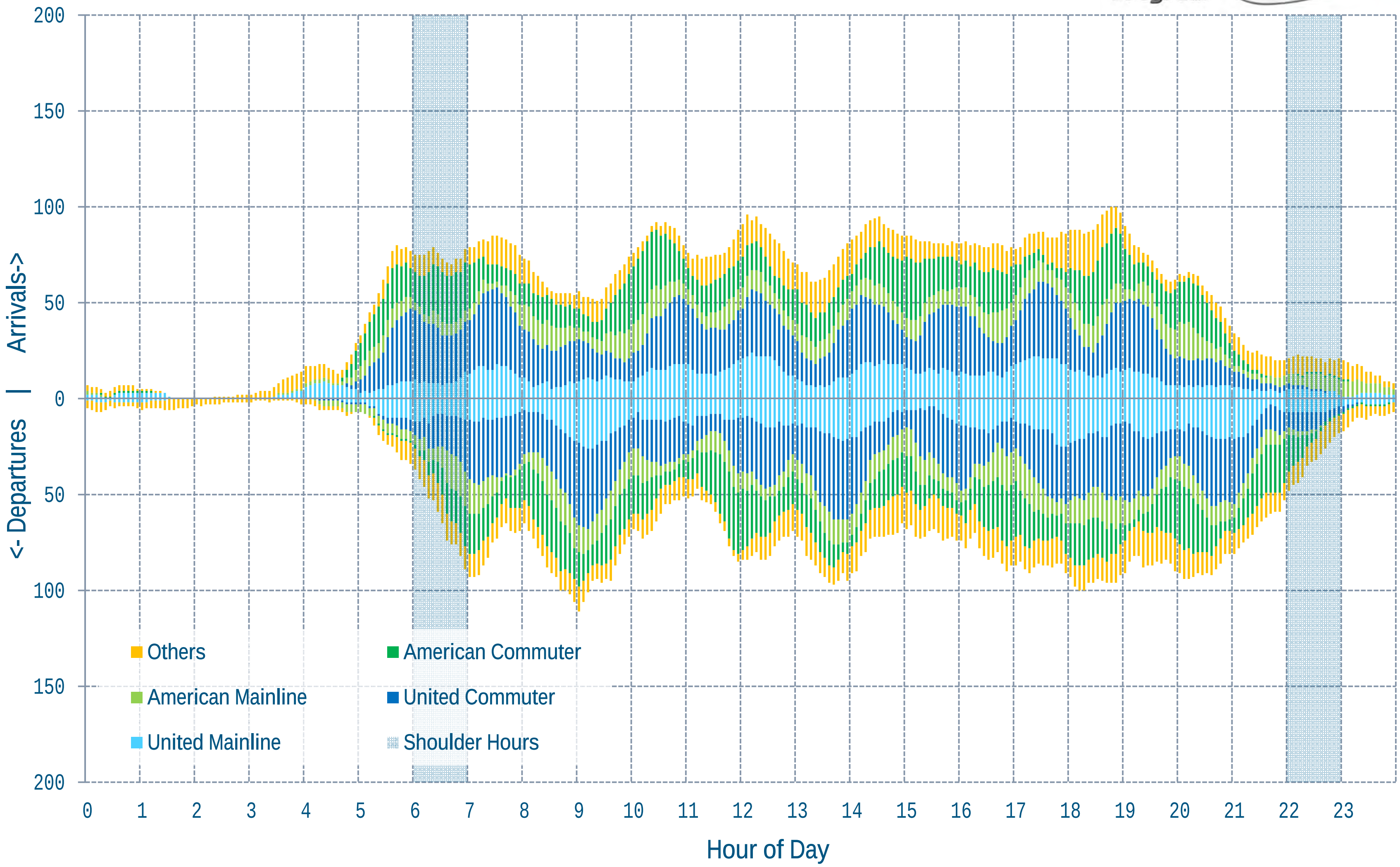
- Review Operational Data
- Departure Procedures
- Fly Quiet I (Evening)
- Fly Quiet II (Overnight)
- Fly Quiet III (Morning)

Review Operational Data/Changes since 1997

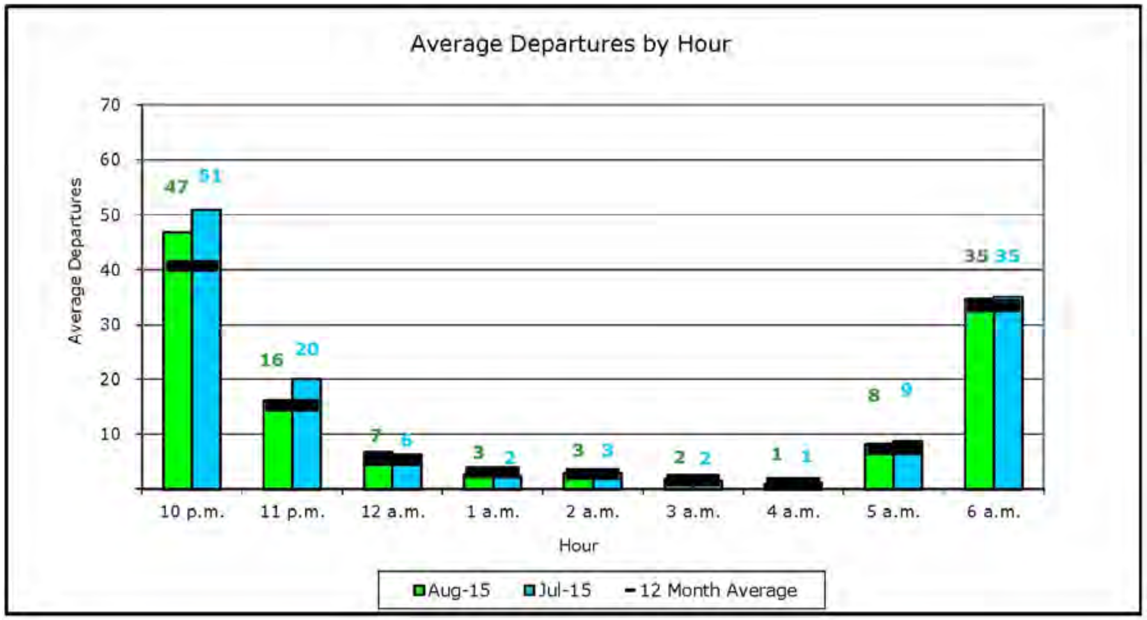
Changes Since 1997 Fly Quiet Inception



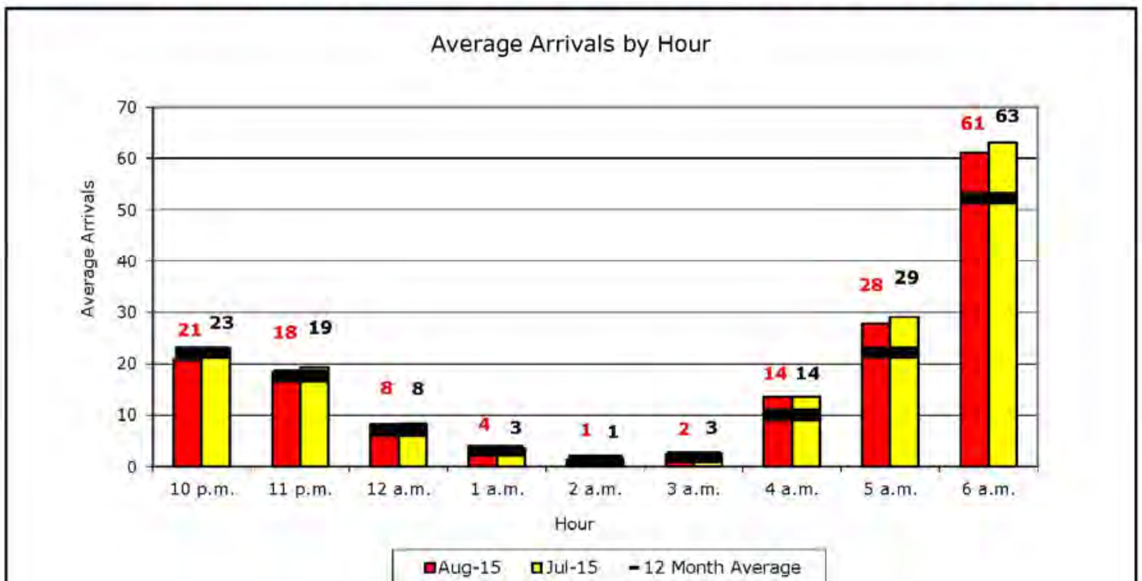
Airline Operations by Hour (August 6, 2015)



Nighttime Hourly Operations



Operations by Hour (%)										
Aug-15	10 p.m.	11 p.m	12 a.m.	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	**Total**
Departures	38.9%	13.3%	5.6%	2.2%	2.4%	1.5%	0.7%	6.7%	28.7%	100%
Arrivals	13.2%	11.6%	5.2%	2.5%	0.9%	1.5%	8.6%	17.7%	38.8%	100%



Source: Chicago Airport Noise Management System (ANMS), August 2015

Fly Quiet Program

Nighttime Aircraft Fleet Mix

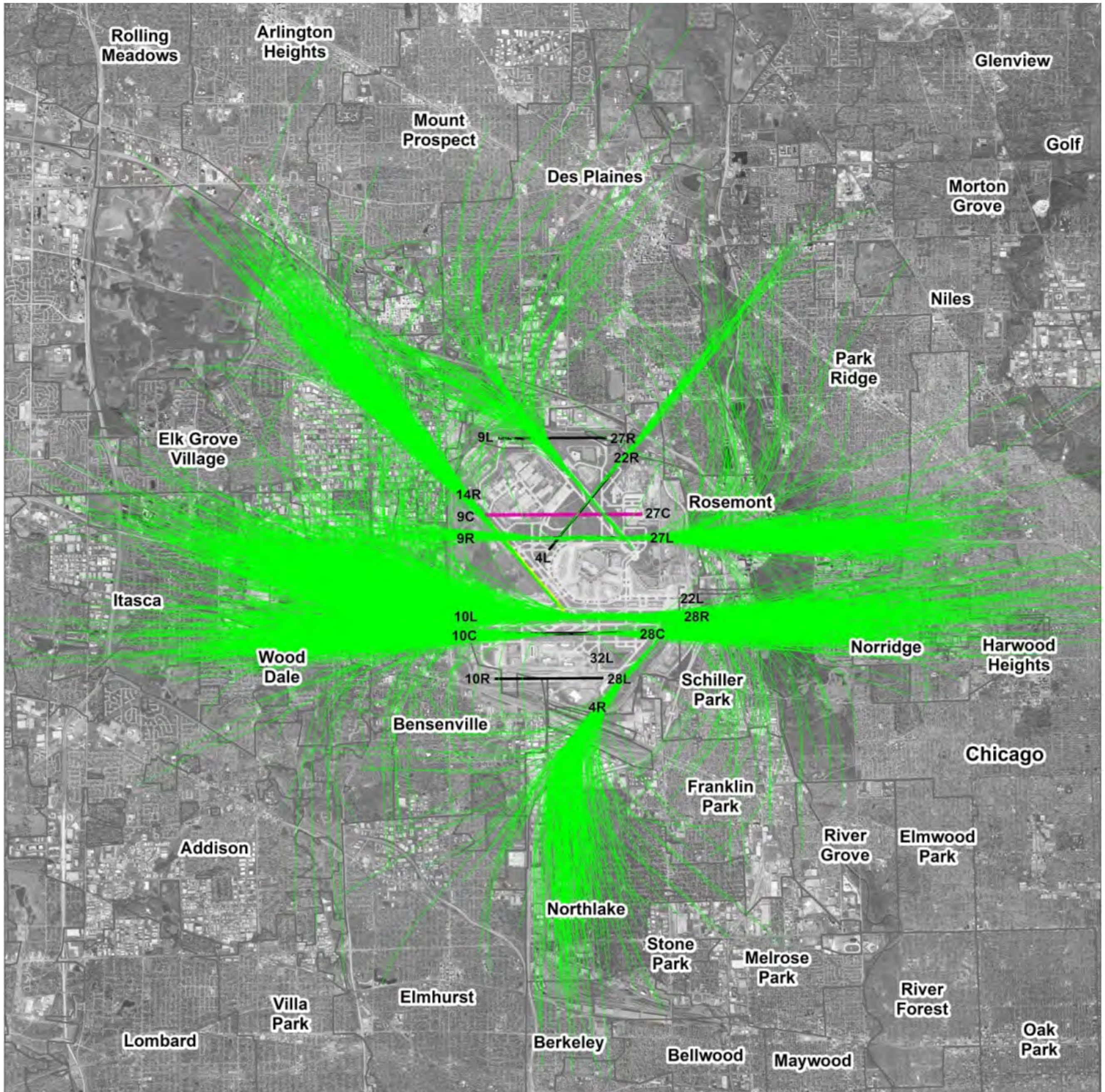
Aircraft	Average Operations Daytime (7 a.m. to 10 p.m.)	Average Operations Evening (10 p.m. to 11 p.m.)	Average Operations Overnight (11 p.m. to 6 a.m.)	Average Operations Morning (6 a.m. to 7 a.m.)
Regional Aircraft				
CRJ200/700/900	363	9	8	18
E135/E145	540	12	10	23
E170	302	11	9	15
E190	11	1	0	1
C208	16	0	0	0
Subtotal	**1,232**	**33**	**27**	**57**
Narrow-Body Aircraft				
A319/320/321	267	10	19	10
B717	12	0	0	0
B737	382	12	34	20
B757	26	1	3	0
MD80	88	3	4	2
MD90	7	0	0	0
Subtotal	**782**	**26**	**60**	**32**
Wide-Body Aircraft				
A300	0	1	3	0
A330	20	0	0	0
A340	5	1	0	0
B747	28	2	10	1
B767	28	0	2	0
B777	51	2	7	2
B787	11	0	0	0
DC10	3	1	3	0
MD11	3	0	1	0
Subtotal	**149**	**7**	**26**	**3**
General Aviation	**27**	**1**	**2**	**1**
Total	**2,190**	**67**	**115**	**93**

Source: Chicago Airport Noise Management System (ANMS), August 2015

Nighttime Aircraft Fleet Mix

Aircraft	Average Operations Daytime (7 a.m. to 10 p.m.)	Average Operations Evening (10 p.m. to 11 p.m.)	Average Operations Overnight (11 p.m. to 6 a.m.)	Average Operations Morning (6 a.m. to 7 a.m.)
Regional Aircraft				
CRJ200/700/900	17%	13%	7%	19%
E135/E145	25%	18%	9%	25%
E170	14%	16%	8%	16%
E190	1%	1%	0%	1%
C208	1%	0%	0%	0%
Subtotal	**56%**	**49%**	**23%**	**61%**
Narrow-Body Aircraft				
A319/320/321	12%	15%	17%	11%
B717	1%	0%	0%	0%
B737	17%	18%	30%	22%
B757	1%	1%	3%	0%
MD80	4%	4%	3%	2%
MD90	0%	0%	0%	0%
Subtotal	**36%**	**39%**	**52%**	**34%**
Wide-Body Aircraft				
A300	0%	1%	3%	0%
A330	1%	0%	0%	0%
A340	0%	1%	0%	0%
B747	1%	3%	9%	1%
B767	1%	0%	2%	0%
B777	2%	3%	6%	2%
B787	1%	0%	0%	0%
DC10	0%	1%	3%	0%
MD11	0%	0%	1%	0%
Subtotal	**7%**	**10%**	**23%**	**3%**
General Aviation	**1%**	**1%**	**2%**	**1%**
Total	**100%**	**100%**	**100%**	**100%**

Source: Chicago Airport Noise Management System (ANMS), August 2015



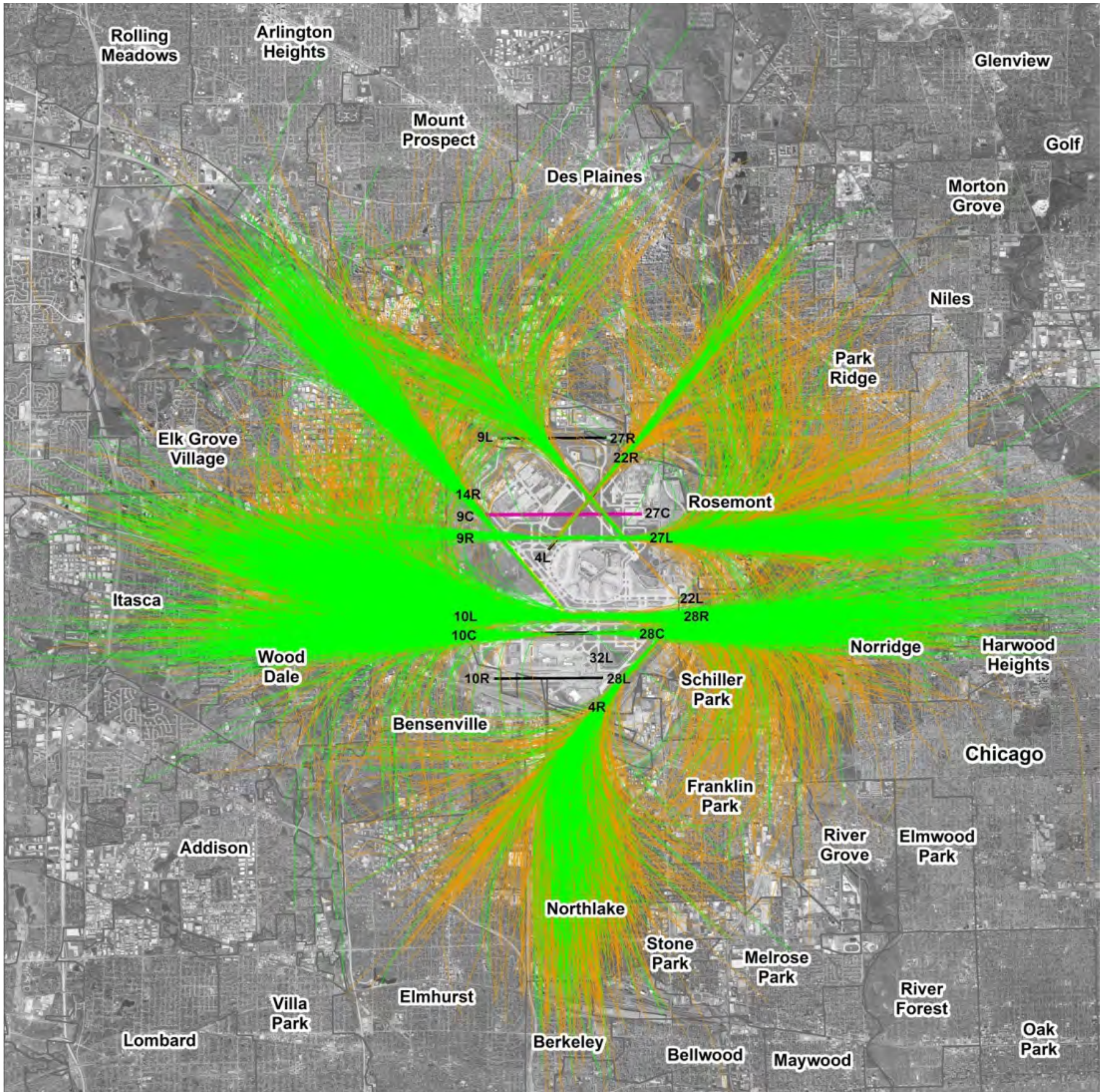
Fly Quiet Program

Nighttime Departures By Time of Day

Overnight Hours 2300 – 0600

Source: Chicago Airport Noise Management System (ANMS), 2nd Quarter 2015

O'HARE & MIDWAY INTERNATIONAL AIRPORTS



Fly Quiet Program

Nighttime Departures By Time of Day

Shoulder Hours 2200 – 2300 & 0600 – 0700

Overnight Hours 2300 – 0600

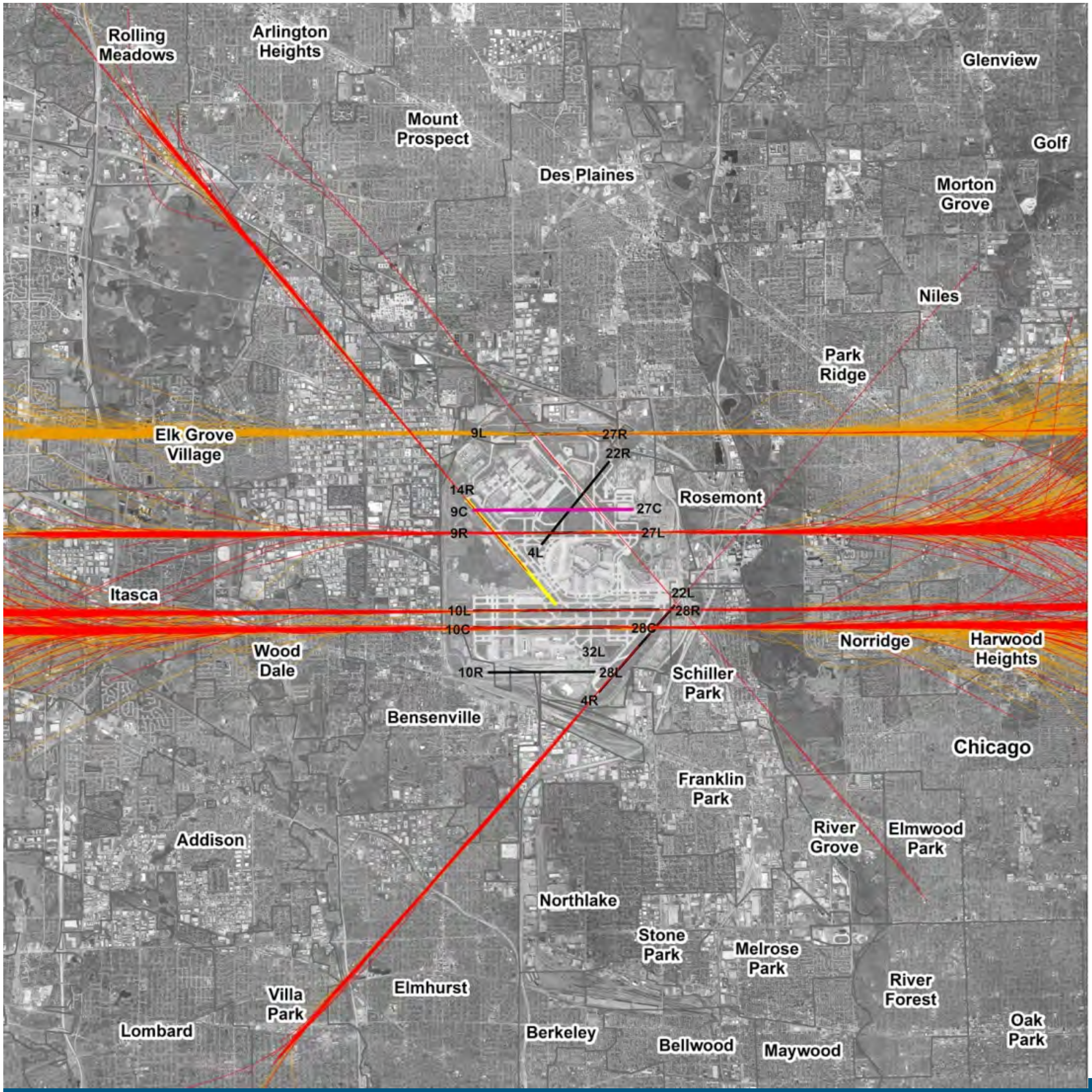
Source: Chicago Airport Noise Management System (ANMS), 2nd Quarter 2015

Fly Quiet Program

Nighttime Arrivals By Time of Day

Overnight Hours 2300 – 0600

Source: Chicago Airport Noise Management System (ANMS), 2nd Quarter 2015



Fly Quiet Program

Nighttime Arrivals By Time of Day

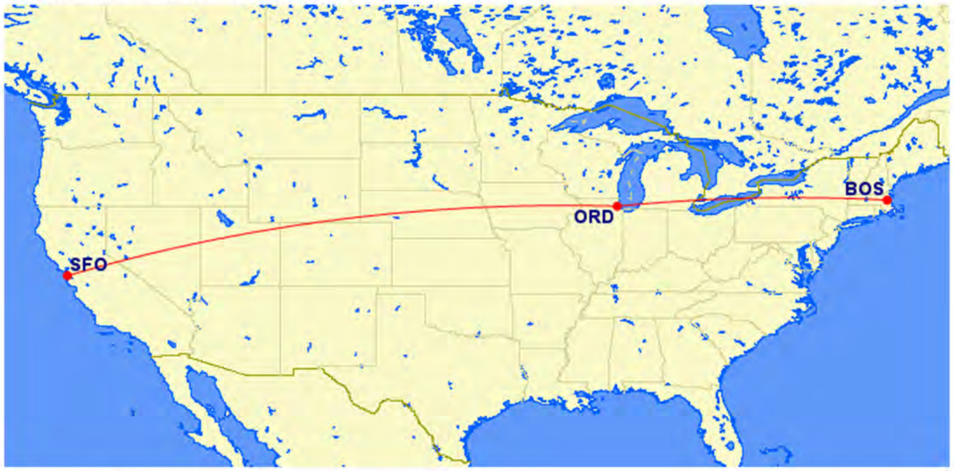
Shoulder Hours 2200 – 2300 & 0600 – 0700

Overnight Hours 2300 – 0600

Source: Chicago Airport Noise Management System (ANMS), 2nd Quarter 2015

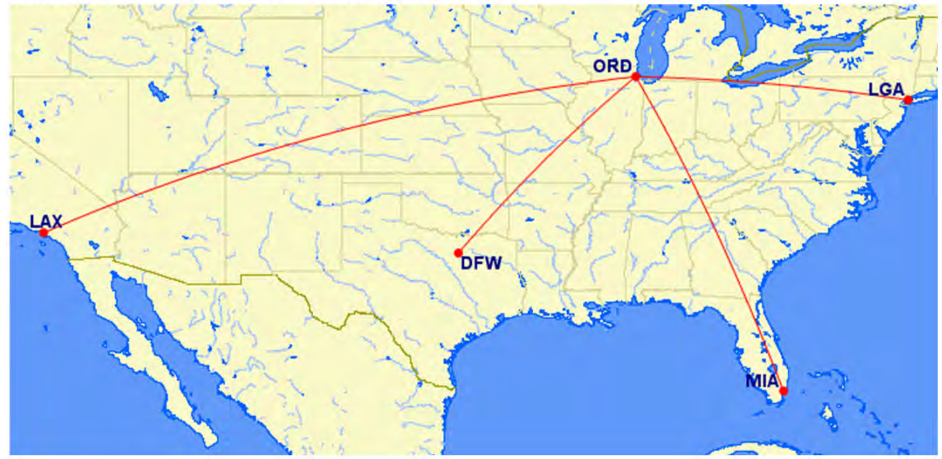
United and American Airlines Operations (10 p.m.)

United Airlines - 10pm arrivals (2200:2259)



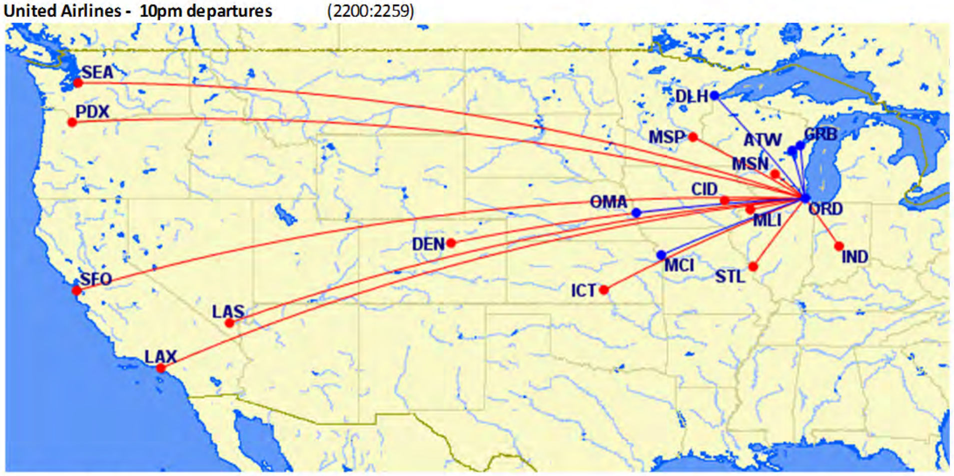
Red Air Carrier
Blue Commuter

American Airlines - 10pm arrivals (2200:2259)



Red Air Carrier
Blue Commuter

United Airlines - 10pm departures (2200:2259)



Red Air Carrier
Blue Commuter

American Airlines - 10pm departures (2200:2259)

Red Air Carrier
Blue Commuter

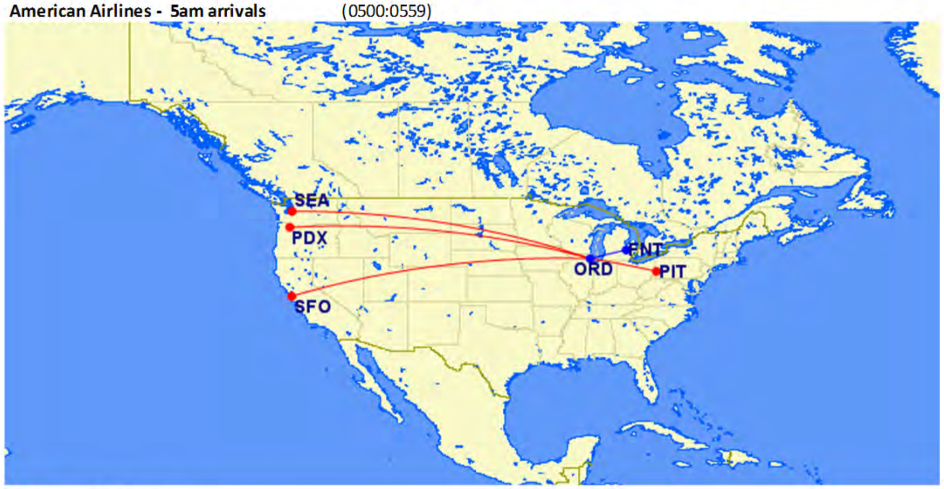
Source: Official Airline Guide (OAG) schedule data, August 6, 2015

United and American Airlines Operations (5 a.m.)

United Airlines - 5am arrivals (0500:0559)

Red Air Carrier
Blue Commuter

American Airlines - 5am arrivals (0500:0559)

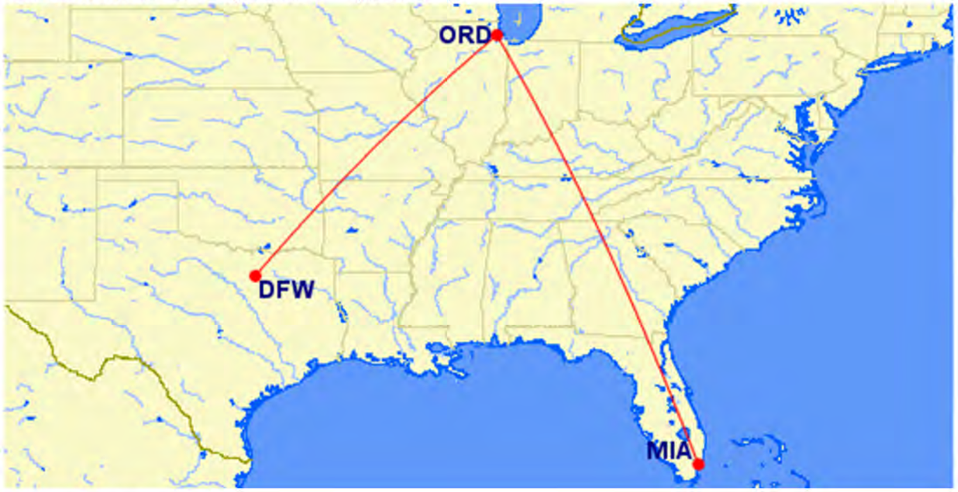


Red Air Carrier
Blue Commuter

United Airlines - 5am departures (0500:0559)

Red Air Carrier
Blue Commuter

American Airlines - 5am departures (0500:0559)



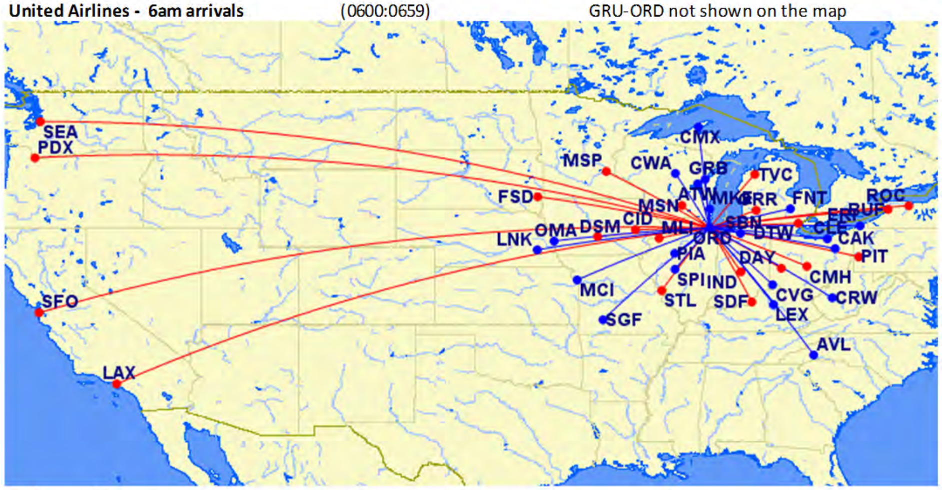
Red Air Carrier
Blue Commuter

Source: Official Airline Guide (OAG) schedule data, August 6, 2015

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

United and American Airlines Operations (6 a.m.)

United Airlines - 6am arrivals (0600:0659) GRU-ORD not shown on the map

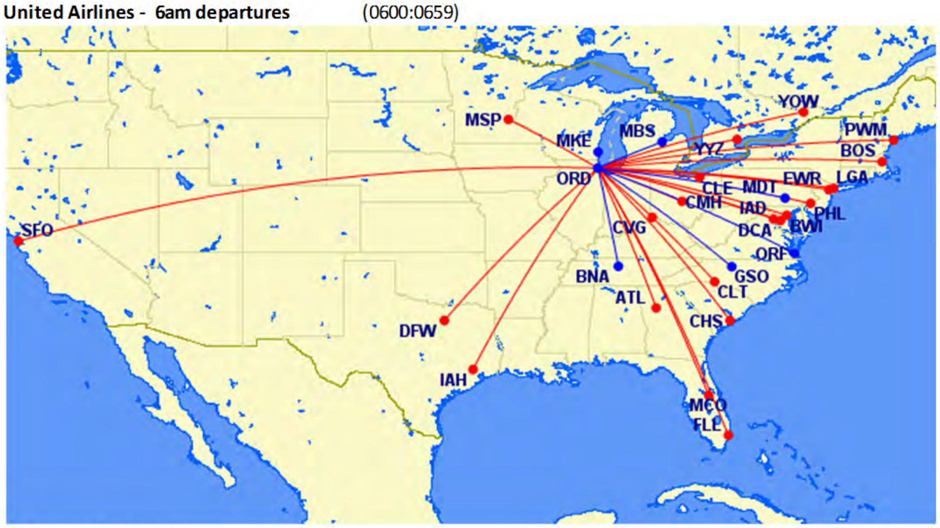


Red Air Carrier
Blue Commuter

American Airlines - 6am arrivals (0600:0659)

Red Air Carrier
Blue Commuter

United Airlines - 6am departures (0600:0659)



Red Air Carrier
Blue Commuter

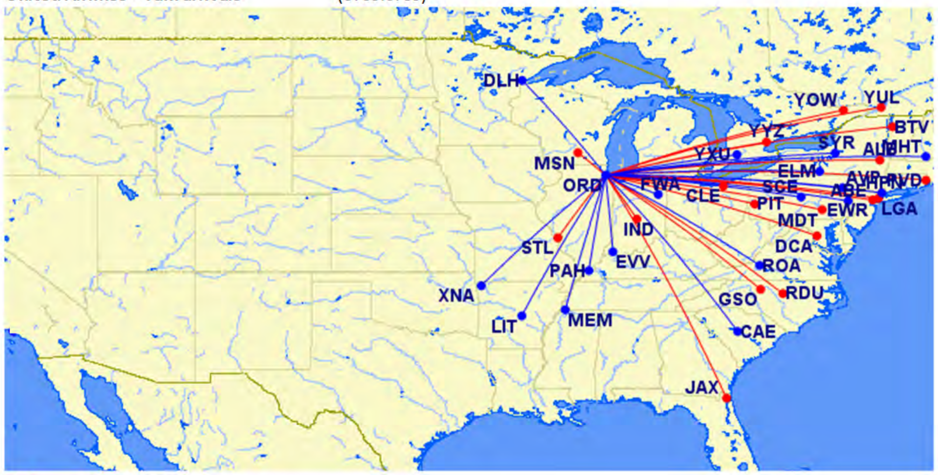
American Airlines - 6am departures (0600:0659)

Red Air Carrier
Blue Commuter

Source: Official Airline Guide (OAG) schedule data, August 6, 2015

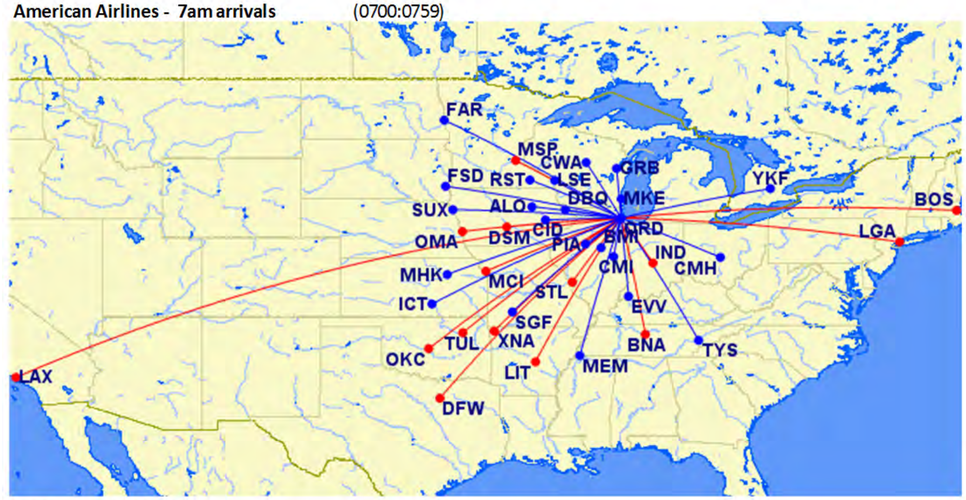
United and American Airlines Operations (7 a.m.)

United Airlines - 7am arrivals (0700:0759)



Red Air Carrier
Blue Commuter

American Airlines - 7am arrivals (0700:0759)



Red Air Carrier
Blue Commuter

United Airlines - 7am departures (0700:0759)

Red Air Carrier
Blue Commuter

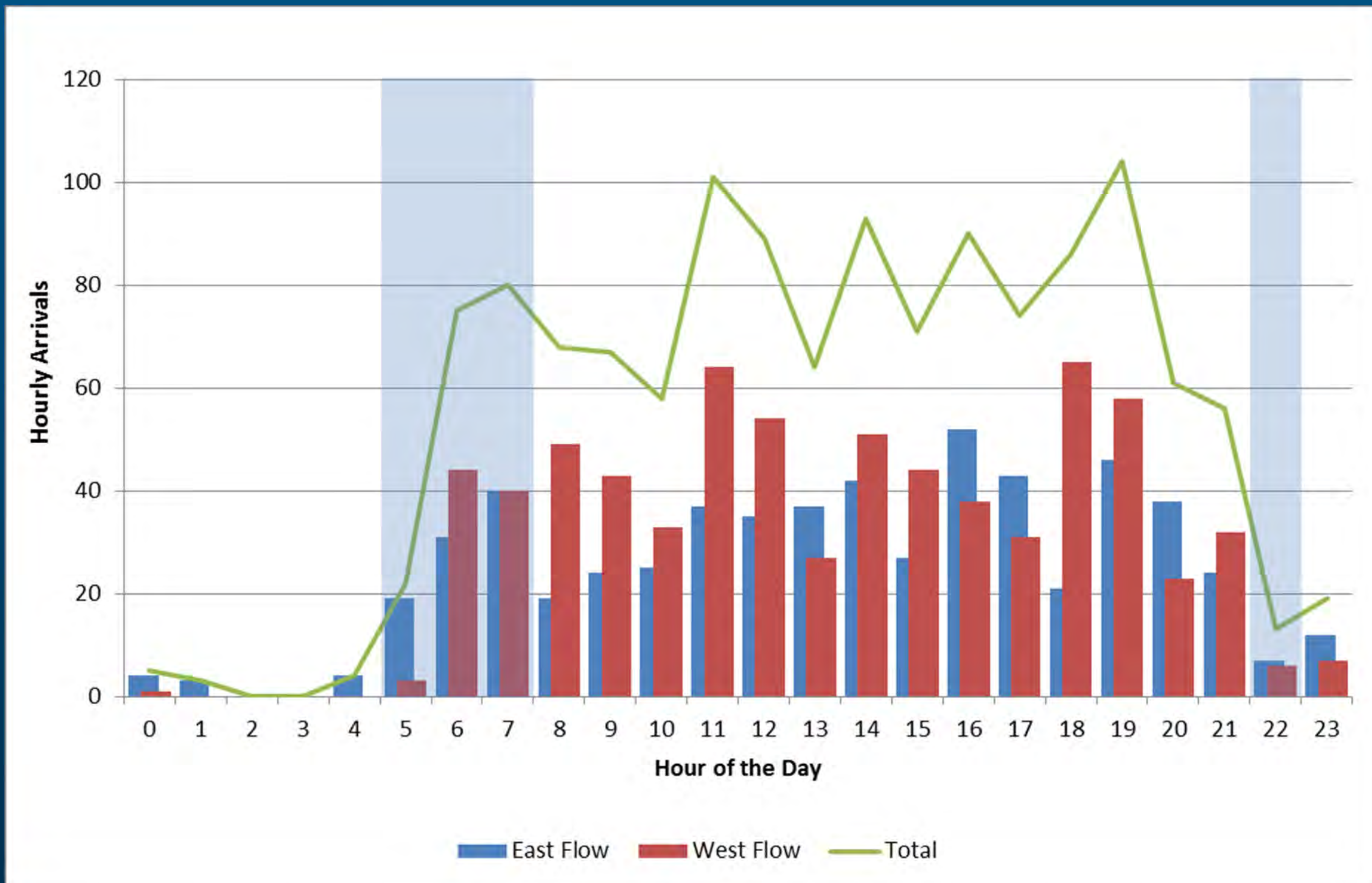
American Airlines - 7am departures (0700:0759)

Red Air Carrier
Blue Commuter

Source: Official Airline Guide (OAG) schedule data, August 6, 2015

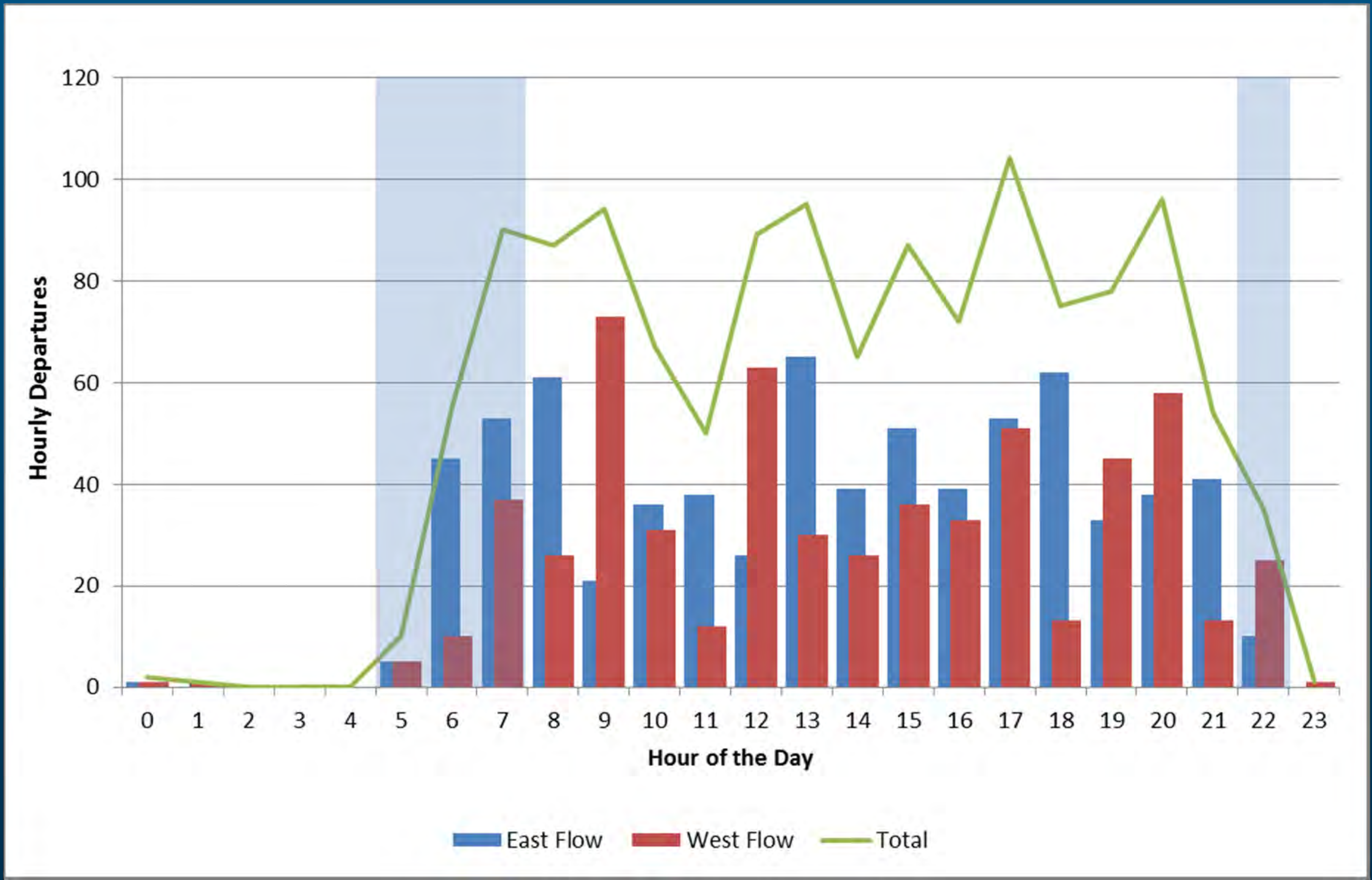
O'HARE & MIDWAY INTERNATIONAL AIRPORTS

Scheduled Hourly Arrivals



Source: Official Airline Guide (OAG) schedule data, August 6, 2015

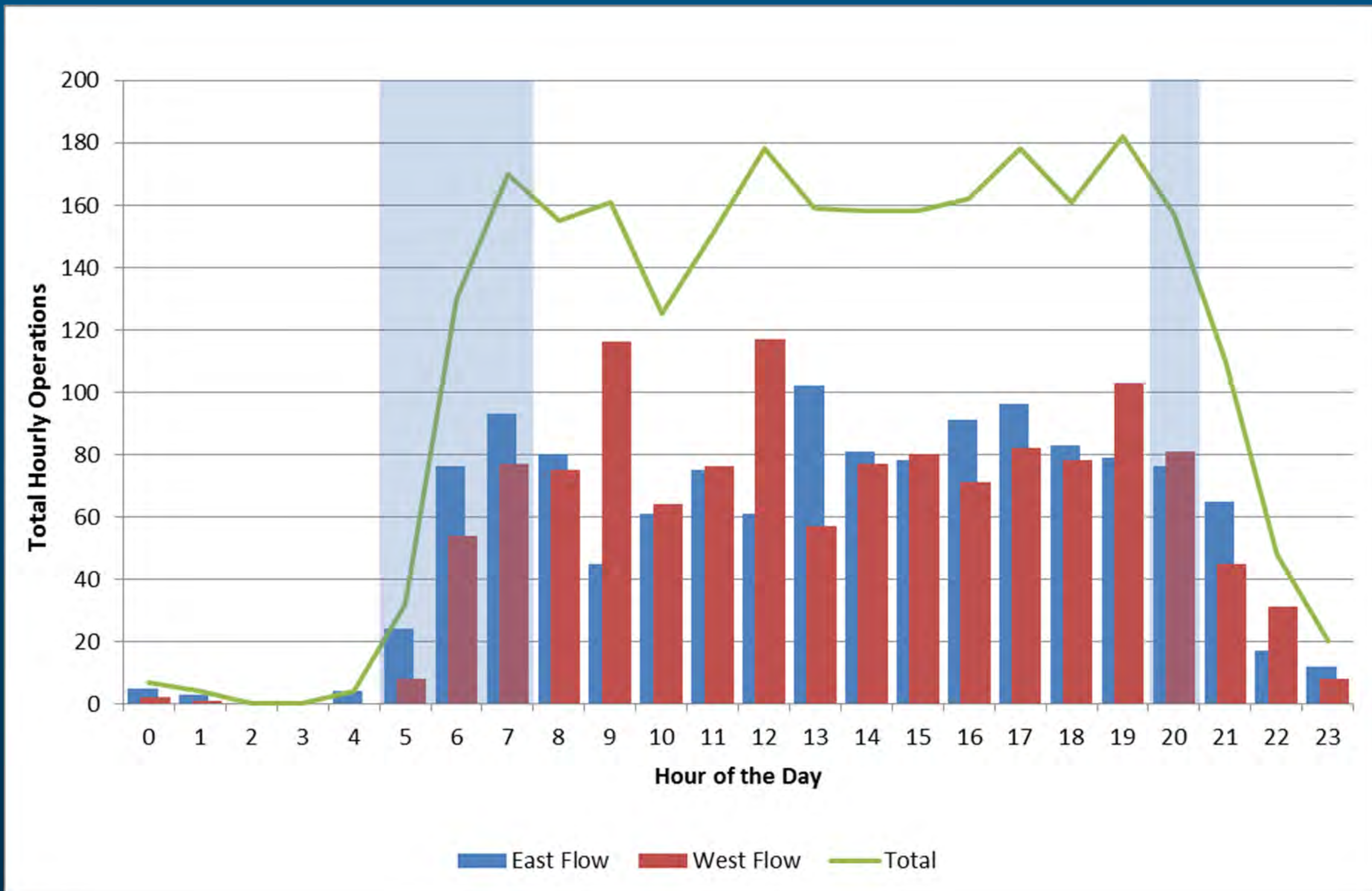
Scheduled Hourly Departures



Source: Official Airline Guide (OAG) schedule data, August 6, 2015

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

Scheduled Hourly Operations



Source: Official Airline Guide (OAG) schedule data, August 6, 2015

Scheduled Operations

	# of Flights				% of Flight per hour			
	5-6am	6-7am	7-8am	10-11pm	5-6am	6-7am	7-8am	10-11pm
East Flow - Arrivals from the West	19	31	40	7	86%	41%	50%	54%
West Flow - Arrivals from the East	3	44	40	6	14%	59%	50%	46%
Total Arrivals	**22**	**75**	**80**	**13**	**100%**	**100%**	**100%**	**100%**
East Flow - Departures to the East	5	45	53	10	50%	82%	59%	29%
West Flow - Departures to the West	5	10	37	25	50%	18%	41%	71%
Total Departures	**10**	**55**	**90**	**35**	**100%**	**100%**	**100%**	**100%**
East Flow - Arrivals from the West, departures to the East	8	89	93	16	25%	68%	55%	33%
West Flow - Arrivals from the East, departures to the West	24	41	77	32	75%	32%	45%	67%
Total	**32**	**130**	**170**	**48**	**100%**	**100%**	**100%**	**100%**

Source: Official Airline Guide (OAG) schedule data, August 6, 2015

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

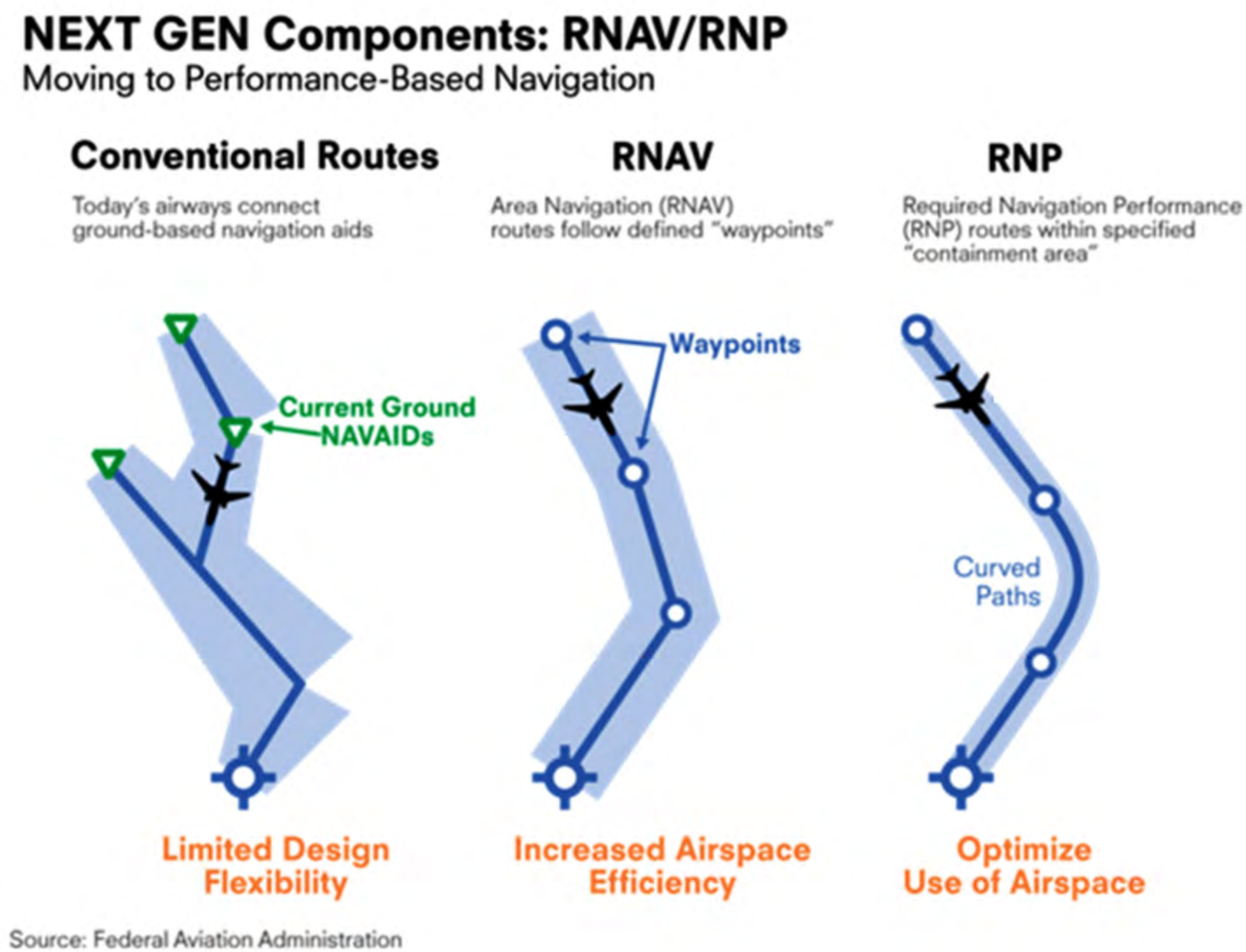
Performance Based Navigation (PBN)

- PBN delivers new routes and procedures that primarily use satellite-based navigation and on-board aircraft equipment to navigate with greater precision and accuracy. PBN is comprised of Area Navigation (RNAV) and Required Navigation Performance (RNP) and describes an aircraft's capability to navigate using performance standards.

- RNAV is a method of air traffic navigation which permits aircraft to operate on designated flight paths with the use of ground and/or space−based navigation aids.

- RNP is an enhanced application of RNAV which enables flying more precise flight tracks, including curved paths, but requires additional aircraft avionics, FAA procedures, and pilot training and certification.

Performance Based Navigation (PBN)



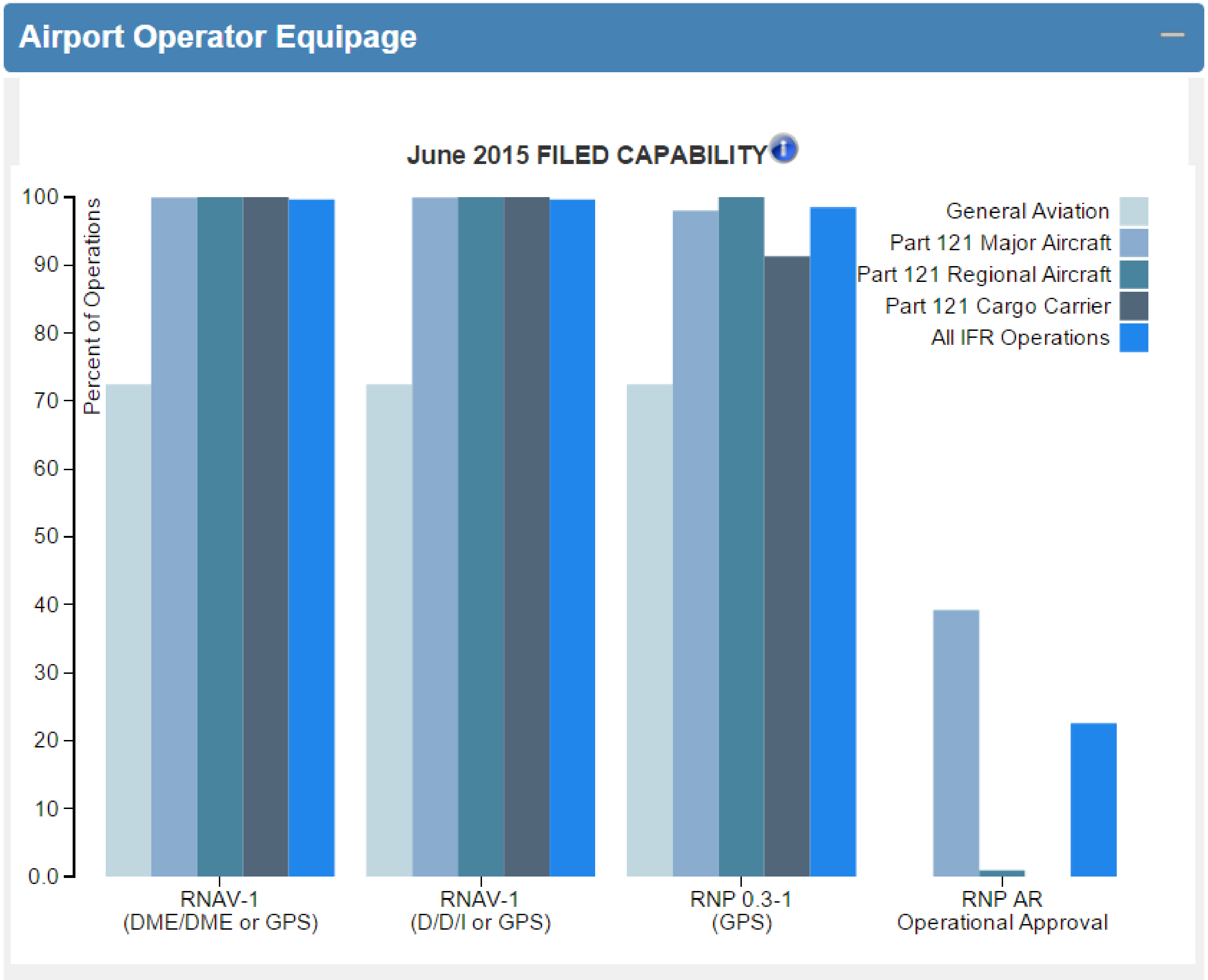
O’Hare PBN Fleet Equipage

RNAV-1

Almost 100%

RNP

Less than 25%



Source: FAA’s PBN Dashboard, June 2015

Overview of Opportunities

Fly Quiet Committee Initiatives

Issue	Potential Solution
Desire to Balance Noise Impacts by Community	Fly Quiet Rotation
OMP Runway Configuration	Preferential Flight Tracks/Corridors
Increased Demand During Shoulder Hours	Adapt Fly Quiet for Shoulder Hour Demand

Implementation of Initiatives

Potential Solution → How

Potential Solution	How
Fly Quiet Rotation	Frequency (weekly or monthly)
Preferential Flight Tracks/Corridors	Metric (population, noise level, NSF, other)
Adapt Fly Quiet for Shoulder Hour Demand	Second Fly Quiet Program (Yes or No)

Metrics

Potential Solution

Potential Metrics

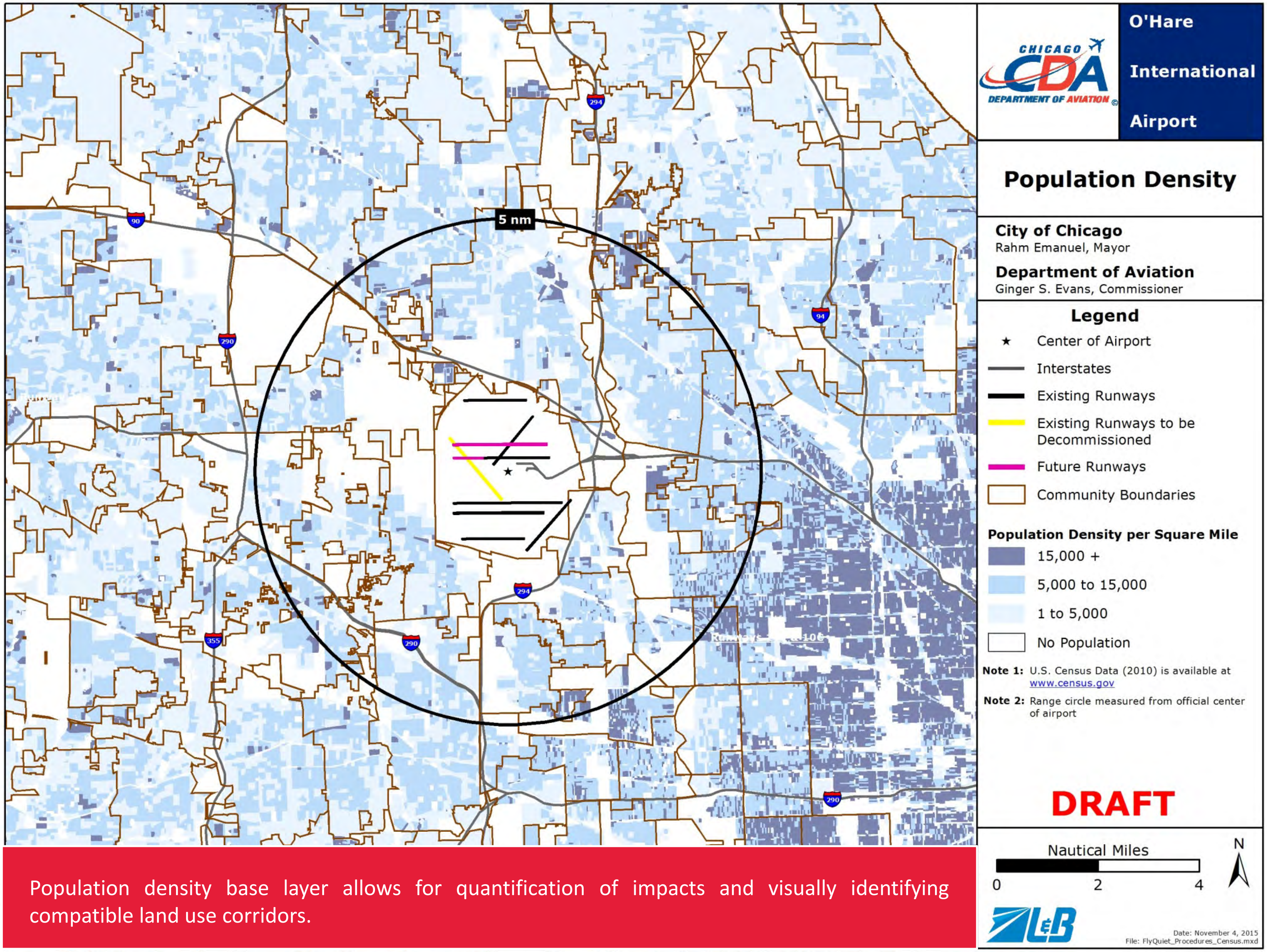
Fly Quiet Rotation

Preferential Flight Tracks/Corridors

Adapt Fly Quiet for Shoulder Hour Demand

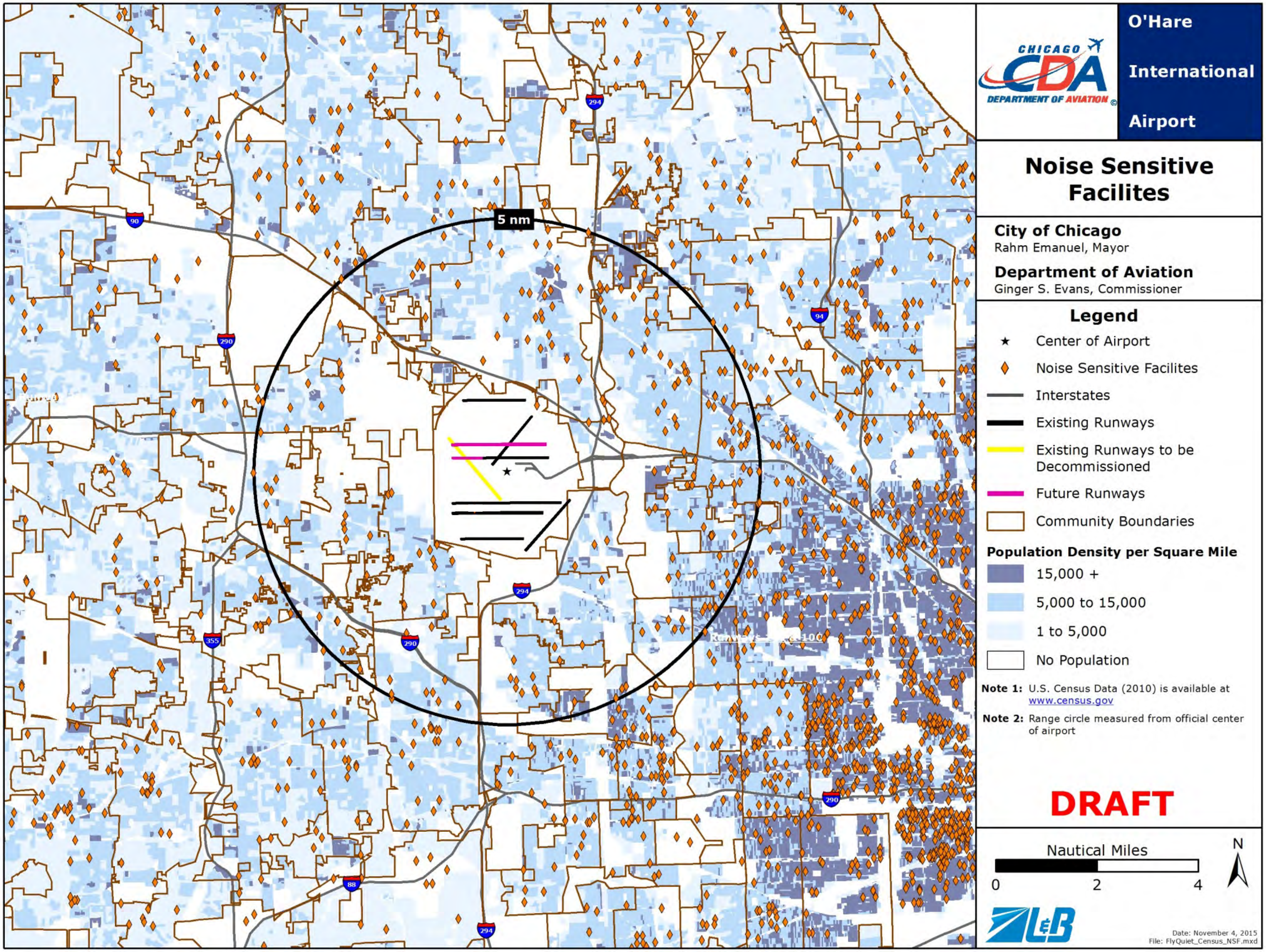
- Affected Population
- Number of Noise Sensitive Facilities (churches, health care facilities, etc.)
- Frequency of Use
- Number of Arrivals
- Number of Departures
- Average Noise Level
- Other?

Departure Procedures

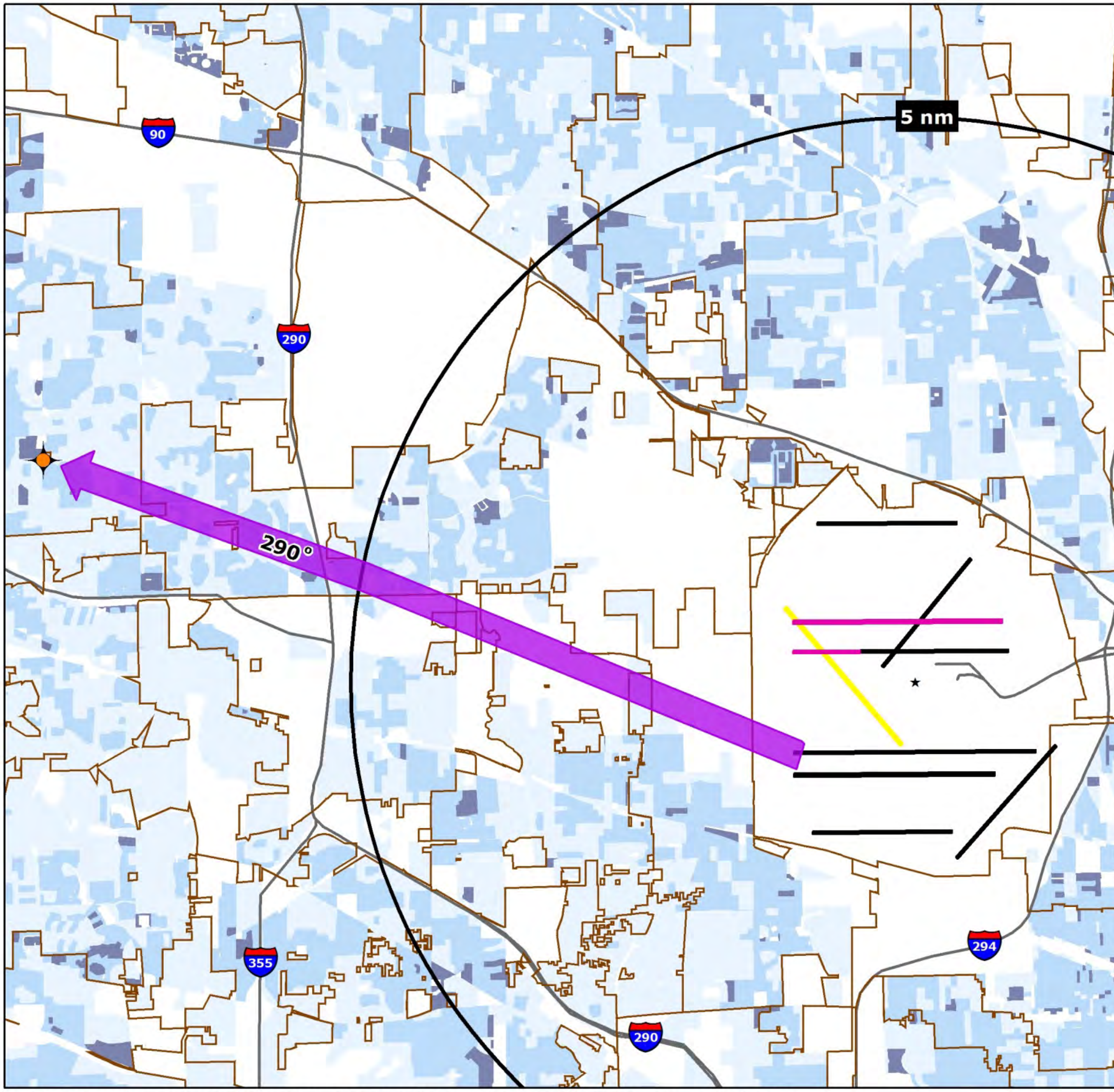


Population density base layer allows for quantification of impacts and visually identifying compatible land use corridors.

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.



Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.



O'Hare International Airport

CHICAGO CDA DEPARTMENT OF AVIATION

Fly Quiet Departure Track Alternatives

City of Chicago
Rahm Emanuel, Mayor

Department of Aviation
Ginger S. Evans, Commissioner

Legend

- Potential Waypoint
- Center of Airport
- Departure Track
- Interstates
- Existing Runways
- Existing Runways to be Decommissioned
- Future Runways
- Community Boundaries

Population Density per Square Mile

- 15,000 +
- 5,000 to 15,000
- 1 to 5,000
- No Population

Note 1: U.S. Census Data (2010) is available at www.census.gov

Note 2: Range circle measured from official center of airport

DRAFT

Nautical Miles

0 1 2

N

L&B

Date: November 15, 2015
File: FlyQuiet_Procedures_28R_290

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Impacts are based on a 0.5 mile radius to both sides of the procedure.

O'Hare International Airport

CHICAGO CDA DEPARTMENT OF AVIATION

Fly Quiet Departure Track Alternatives

City of Chicago
Rahm Emanuel, Mayor

Department of Aviation
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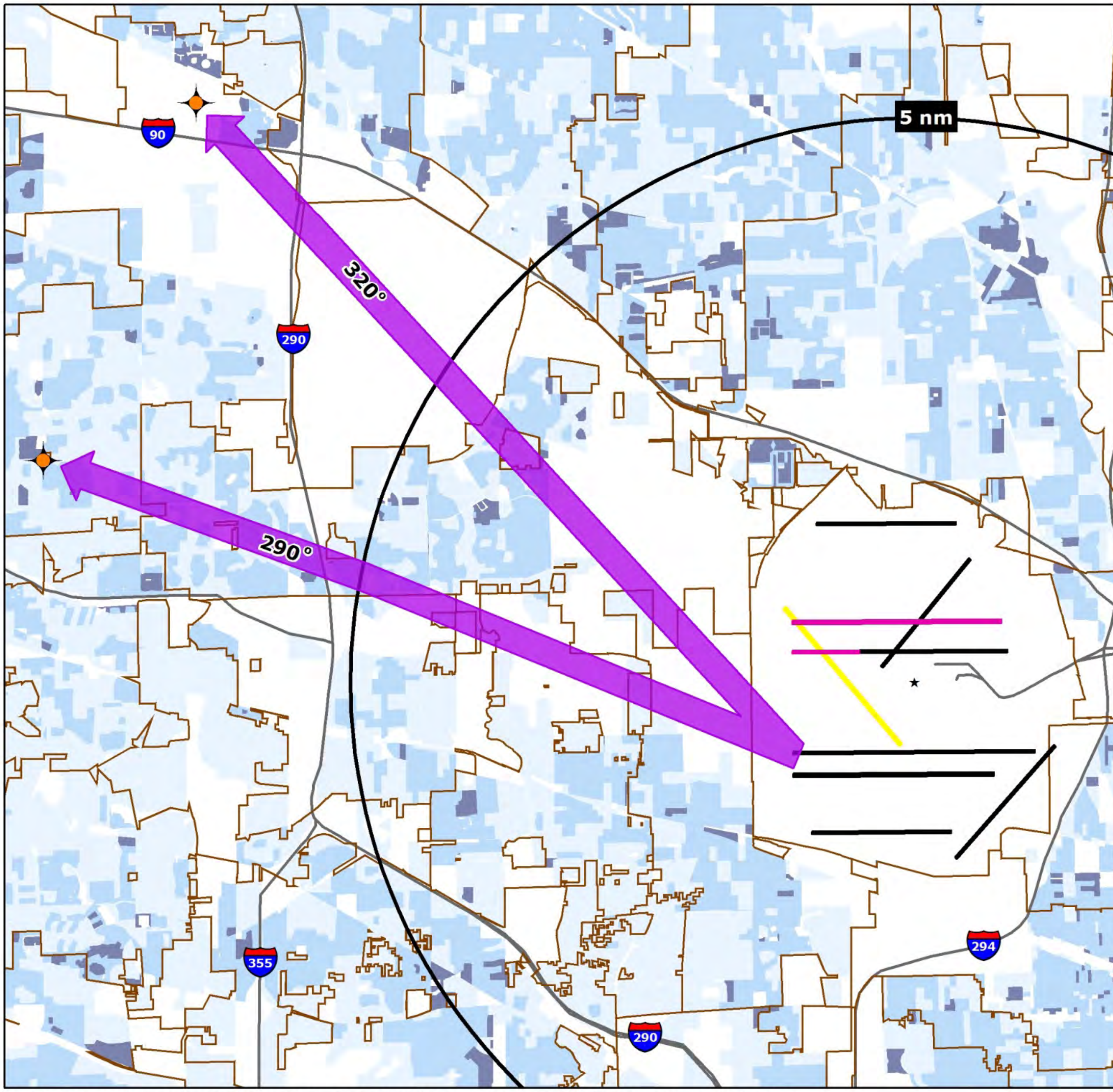


Legend

- Potential Waypoint
- Center of Airport
- Departure Track
- Interstates
- Existing Runways
- Existing Runways to be Decommissioned
- Future Runways
- Community Boundaries

Population Density per Square Mile

- 15,000 +
- 5,000 to 15,000
- 1 to 5,000
- No Population

Note 1: U.S. Census Data (2010) is available at www.census.gov

Note 2: Range circle measured from official center of airport

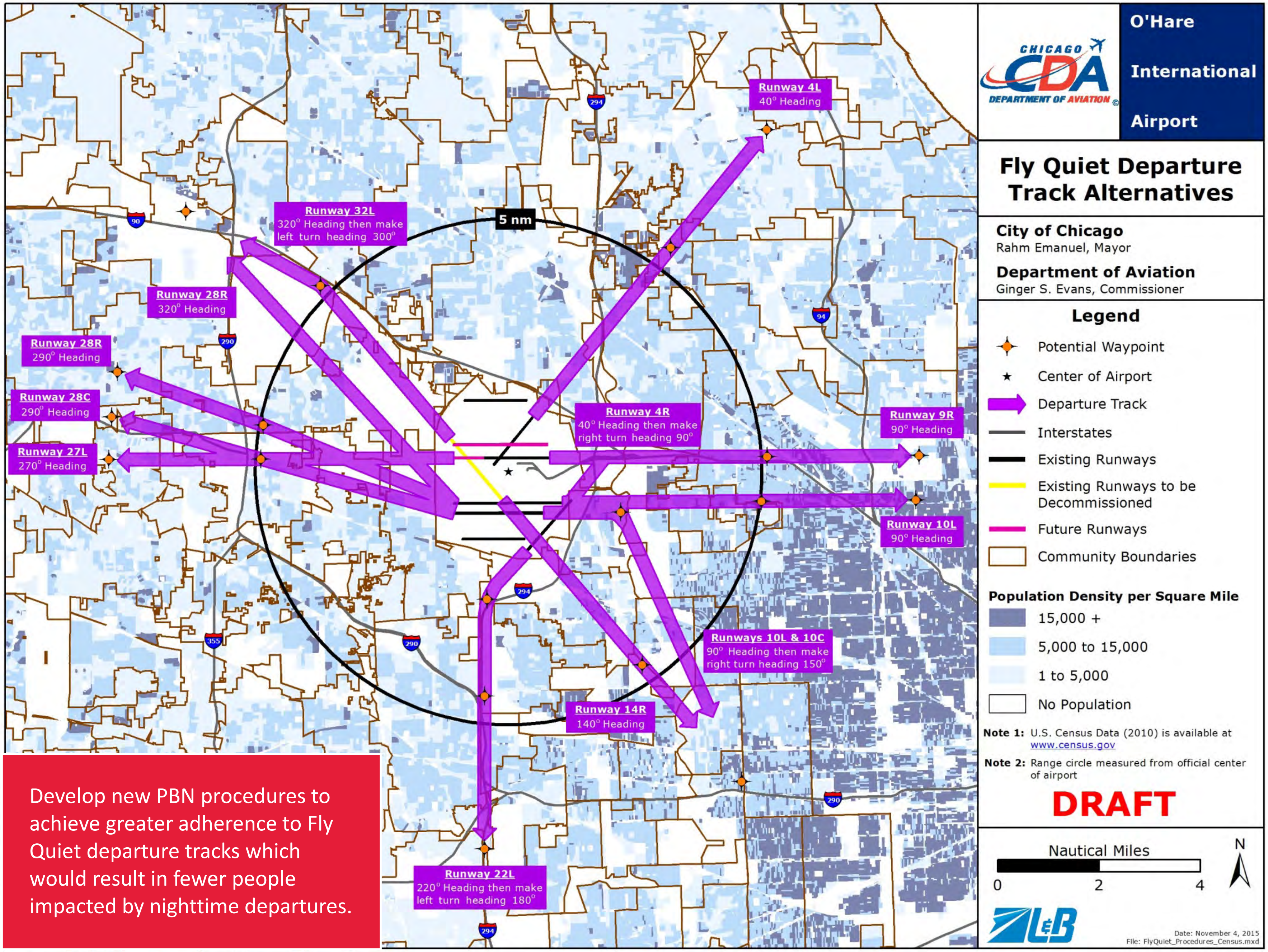
DRAFT

Nautical Miles
0 1 2
N

L&B

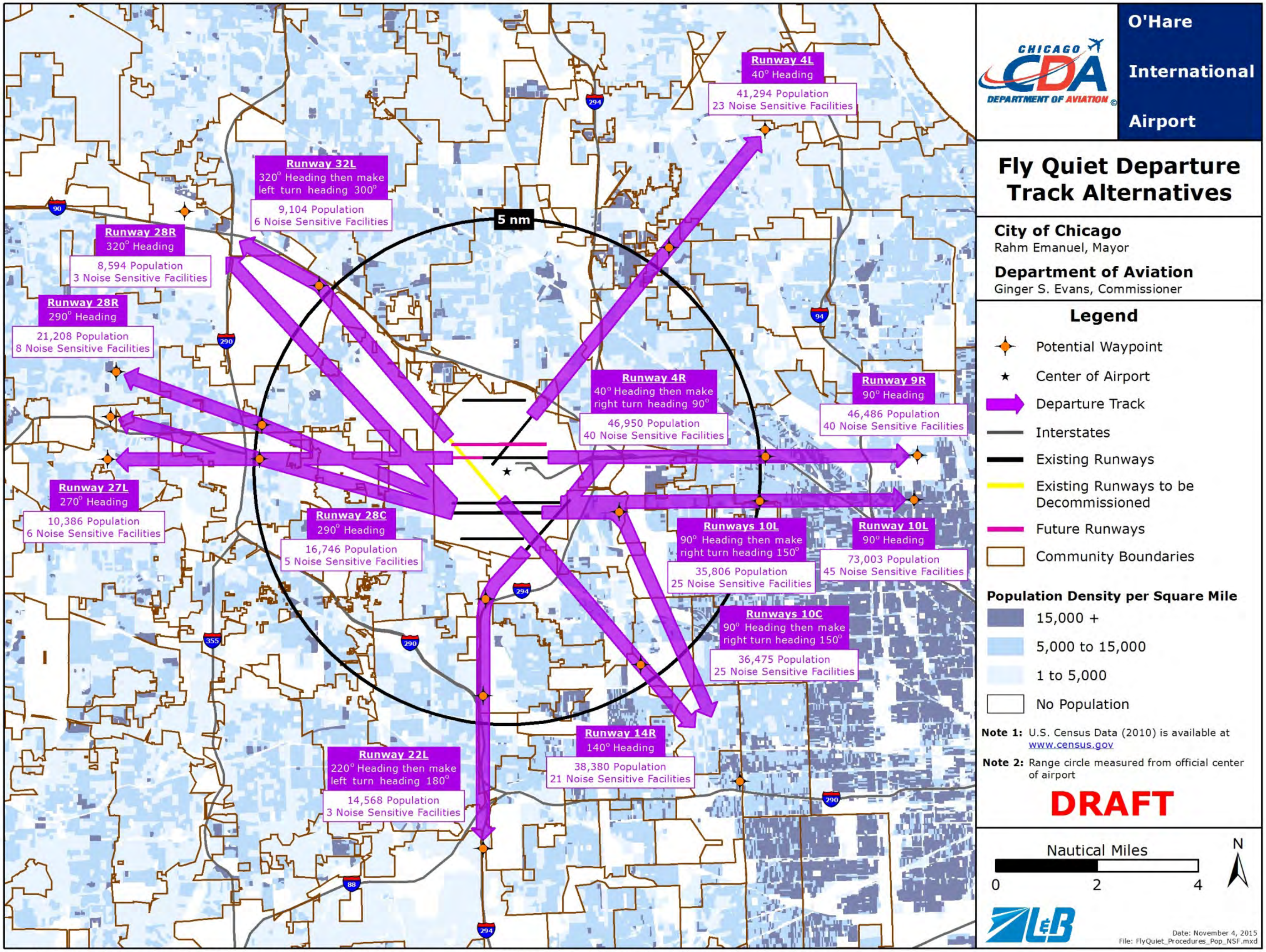
Date: November 15, 2015
File: FlyQuiet_Procedures_28R_290_320

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Impacts are based on a 0.5 mile radius to both sides of the procedure.



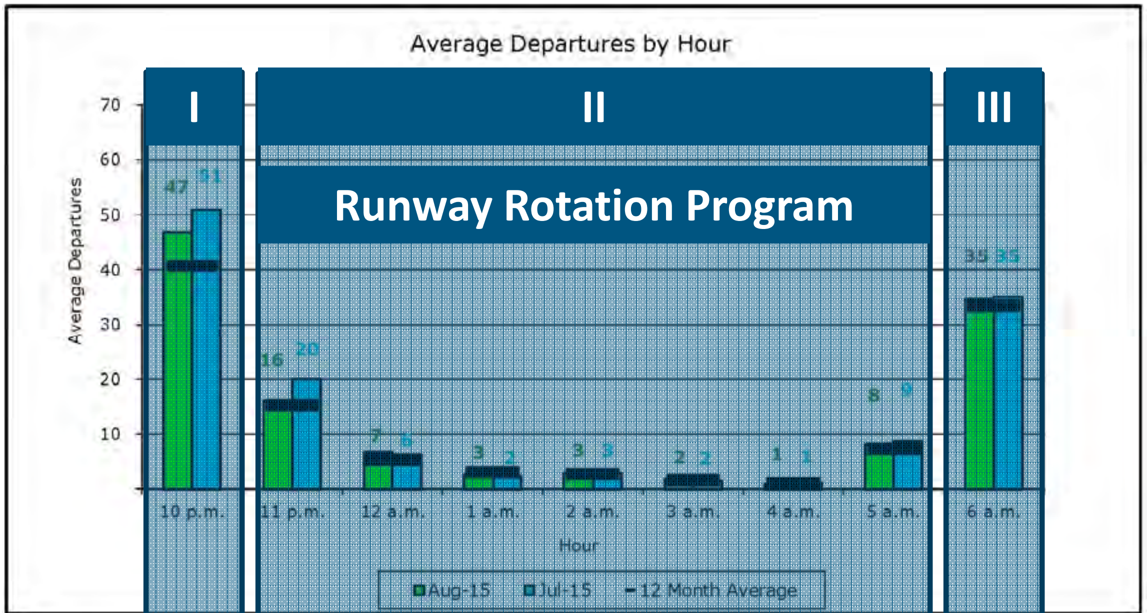
Develop new PBN procedures to achieve greater adherence to Fly Quiet departure tracks which would result in fewer people impacted by nighttime departures.

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.



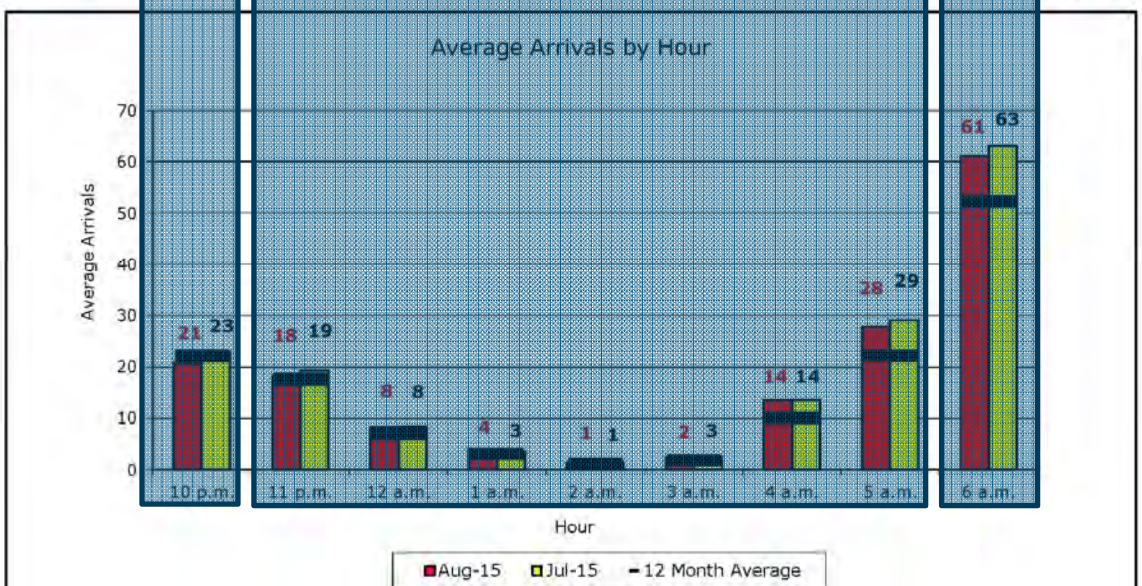
Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Impacts are based on a 0.5 mile radius to both sides of the procedure.

Fly Quiet I, II & III



Operations by Hour (%)

Aug-15	10 p.m.	11 p.m	12 a.m.	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m	6 a.m.	Total
Departures	38.9%	13.3%	5.6%	2.2%	2.4%	1.5%	0.7%	6.7%	28.7%	100%
Arrivals	13.2%	11.6%	5.2%	2.5%	0.9%	1.5%	8.6%	17.7%	38.8%	100%



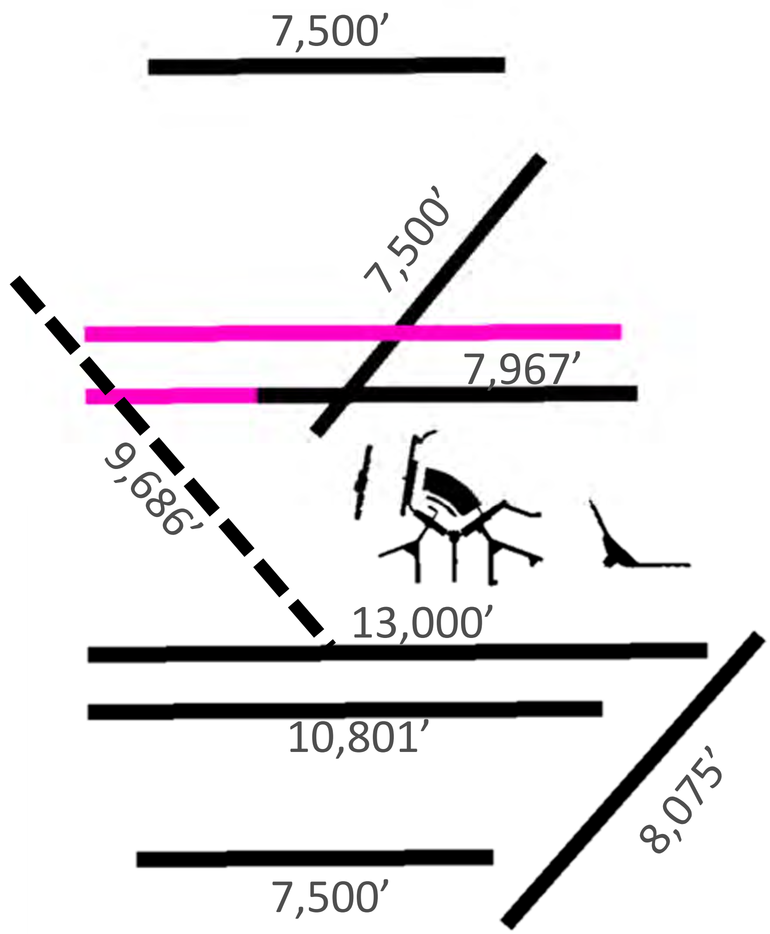
Fly Quiet Program

Nighttime Hourly Operations

Source: Chicago Airport Noise Management System (ANMS), August 2015

Runway Selection Considerations

- Runway Length
- Destination for Departures (Distance and location)
- Origin for Arrivals (Location)
- Airfield Parking Location
- Availability or North and South ATCT
- Weather Conditions
- Volume of Demand
- Converging Runway Operations



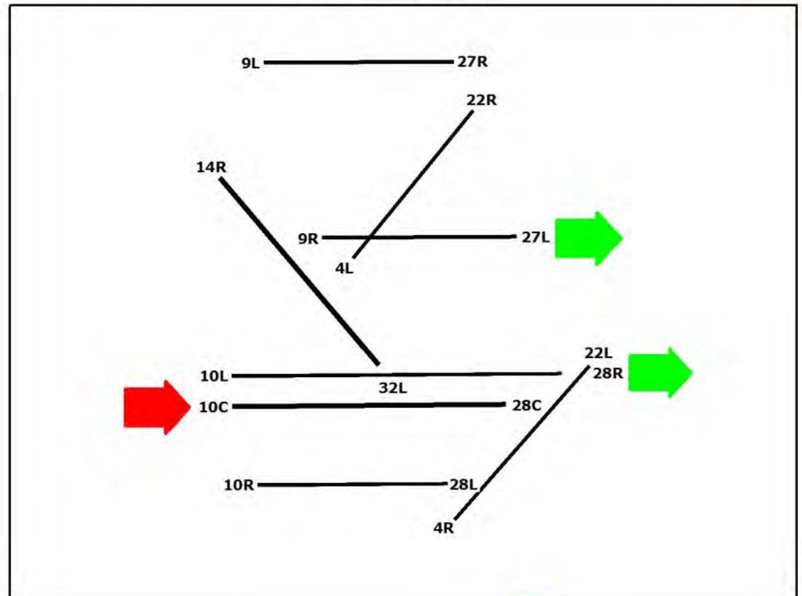
Fly Quiet I (Evening)

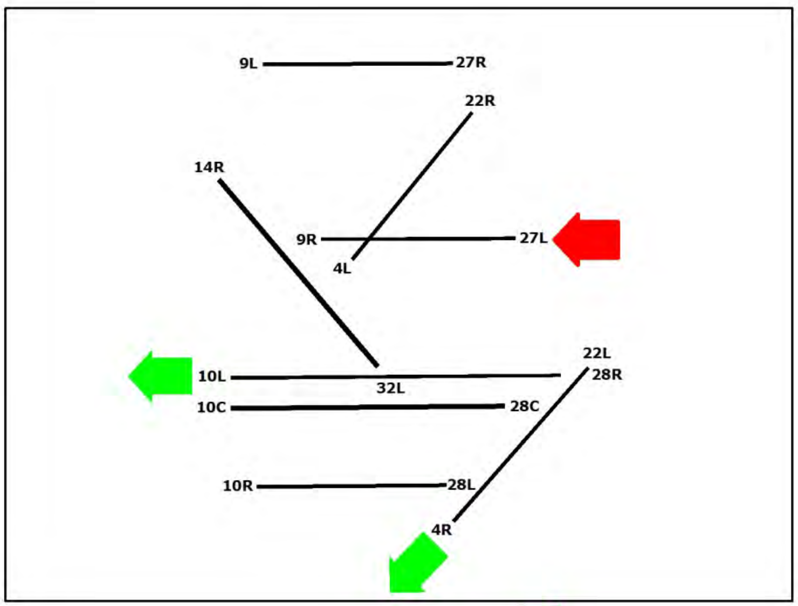
FLY QUIET I (EVENING) ALTERNATIVES

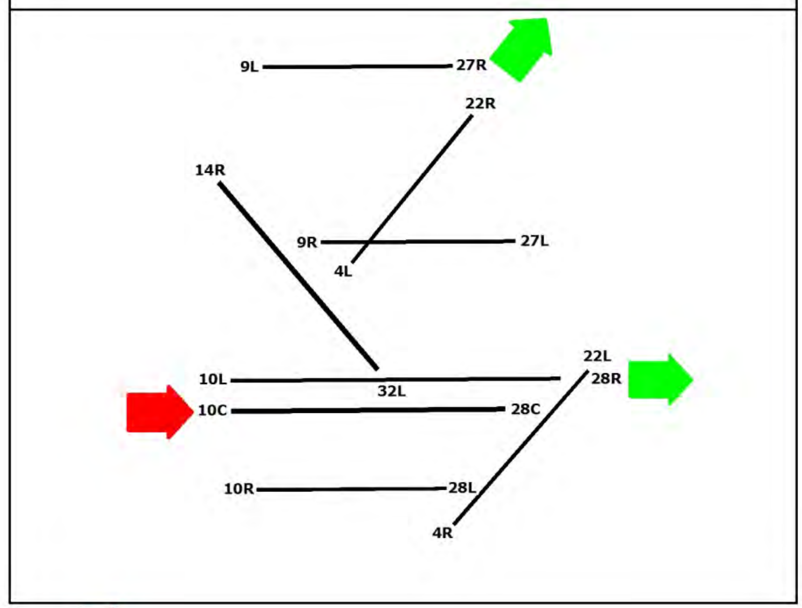
DRAFT

West Flow

East Flow







Primary Departures

Primary Arrivals

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: FAA will determine runway assignments based in part on the destination of each flight and the location of the initial departure fix.

Fly Quiet II (Overnight)

London Heathrow Runway Rotation

Runway alternation programme – 2015 landings

Night-time runway alternation

Since so few aircraft take off or land at night, there's more scope for runway alternation. It doesn't matter whether aircraft are coming in to land from the east or the west, we can still alternate runways.

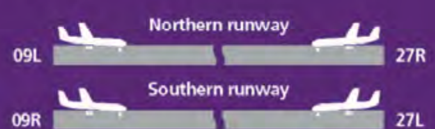
That flexibility gives us the ability to operate night-time runway alternation on a four-weekly cycle.

- **Week 1**: Aircraft fly in from the west to land on the northern runway
- **Week 2**: Aircraft fly in from the east to land on the northern runway
- **Week 3**: Aircraft fly in from the west to land on the southern runway
- **Week 4**: Aircraft fly in from the east to land on the southern runway.

Since the wind direction and strength could interfere with this pattern, we always specify a primary and a secondary (alternative) runway in our schedule. The secondary runway is not actually a different runway. It's the primary runway approached from the opposite direction.

Night-time runway codes

The night-time schedule uses the runway codes 09L, 27R, 09R and 27L.



09L = aircraft approaching the northern runway from the west
27R = aircraft approaching the northern runway from the east
09R = aircraft approaching the southern runway from the west
27L = aircraft approaching the southern runway from the east

Night-time runway alternation

Date (week commencing)	Runway to be used (primary)	Alternative (secondary)
5 Jan	27L	09R
12 Jan	09L	27R
19 Jan	27R	09L
26 Jan	09R	27L
2 Feb	27L	09R
9 Feb	09L	27R
16 Feb	27R	09L
23 Feb	09R	27L
2 Mar	27L	09R
9 Mar	09L	27R
16 Mar	27R	09L
23 Mar	09R	27L
30 Mar	27L	09R
6 Apr	09L	27R
13 Apr	27R	09L
20 Apr	09R	27L
27 Apr	27L	09R
4 May	09L	27R
11 May	27R	09L
18 May	09R	27L
25 May	27L	09R
1 Jun	09L	27R
8 Jun	27R	09L
15 Jun	09R	27L
22 Jun	27L	09R
29 Jun	09L	27R

Date (week commencing)	Runway to be used (primary)	Alternative (secondary)
6 Jul	27R	09L
13 Jul	09R	27L
20 Jul	27L	09R
27 Jul	09L	27R
3 Aug	27R	09L
10 Aug	09R	27L
17 Aug	27L	09R
24 Aug	09L	27R
31 Aug	27R	09L
7 Sep	09R	27L
14 Sep	27L	09R
21 Sep	09L	27R
28 Sep	27R	09L
5 Oct	09R	27L
12 Oct	27L	09R
19 Oct	09L	27R
26 Oct	27R	09L
2 Nov	09R	27L
9 Nov	27L	09R
16 Nov	09L	27R
23 Nov	27R	09L
30 Nov	09R	27L
7 Dec	27L	09R
14 Dec	09L	27R
21 Dec	27R	09L
28 Dec	09R	27L

Heathrow
Making every journey better

Fly Quiet Rotation

Fly Quiet Rotation Guiding Principles

1. Establish a Rotation Plan that can be implemented to achieve the goals of the ONCC and meet the needs of the FAA and the CDA
2. Fly Quiet Rotation applies during overnight hours when demand requires one arrival or one departure runway.
3. Accommodate FAA requirements for maximizing safety and efficiency for various demand, wind and weather conditions.
4. Accommodate CDA requirements for runway maintenance.
5. Avoid the need to staff the north or south ATCT during overnight hours.
6. Accommodate airline requirements for runway length.
7. Strive to provide direct taxi routes and minimum taxi distances to reduce fuel burn and emissions.
8. Provide an opportunity for balancing noise exposure by community on regular and predictable intervals.
9. Provide a reasonable opportunity for communities to anticipate noise exposure over periods of time.
10. Facilitate the ability to monitor and track the rotational program.

Fly Quiet Rotation Options

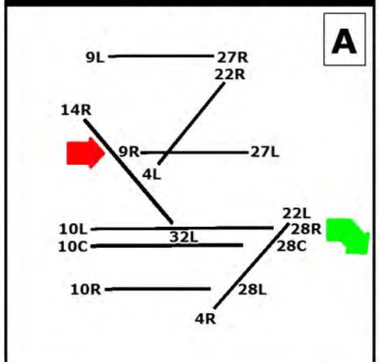
Option	Description	Considerations for Communities	Operational Considerations	Feasibility
Fly Quiet II Weekly	Rotate preferred runway use plan and associated departure headings during overnight hours on a **weekly** basis, subject to operational requirements	1. Provides opportunity for more frequent rotation 2. Provides less wait time for next period of relief for some communities 3. Provides less time in favorable configuration for some communities 4. Weekly rotation schedule published in advance	1. More frequent rotation may capture seasonal variability better than less frequent rotation 2. May be more compatible with regular runway maintenance schedules 3. More frequent rotation requires more frequent communication among parties for notification of changes	Possible Candidate for Consideration
Fly Quiet II Monthly	Rotate preferred runway use plan and associated departure headings during overnight hours on a **monthly** basis, subject to operational requirements	1. Provides opportunity for longer period within a given configuration 2. Required longer wait time for next period of relief for some communities 3. Provides longer time in favorable configuration for some communities 4. Monthly rotation schedule published in advance	1. Less frequent rotation may not capture seasonal weather variability 2. Monthly rotation may be negatively affected by runway maintenance schedules 3. Less frequent rotation requires less frequent communication among parties for notification of changes	Possible Candidate for Consideration

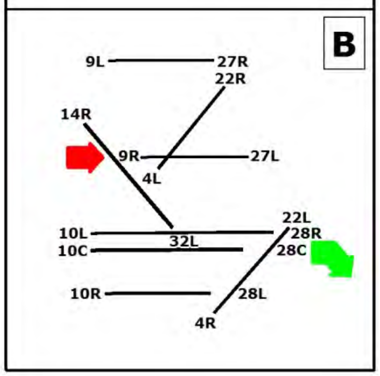
FLY QUIET II (OVERNIGHT) ROTATION

East Flow

Period 1

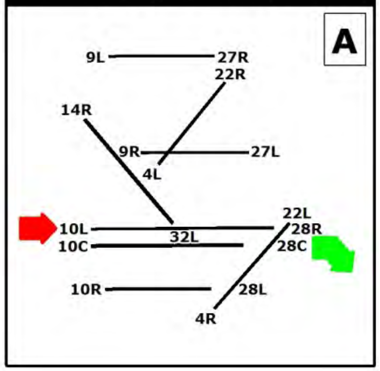
9R Arrivals





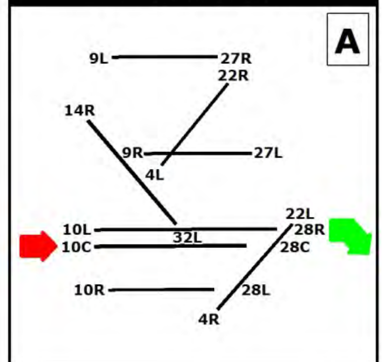
Period 2

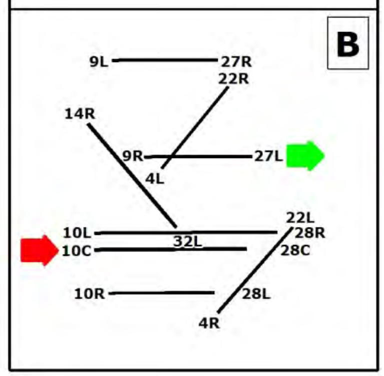
10L Arrivals



Period 3

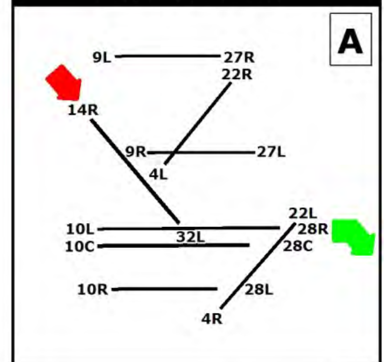
10C Arrivals

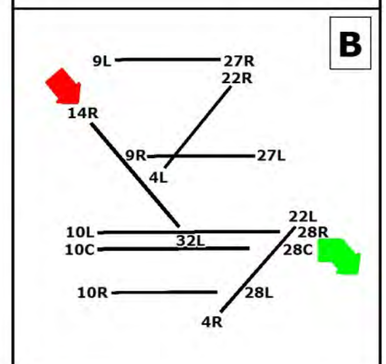


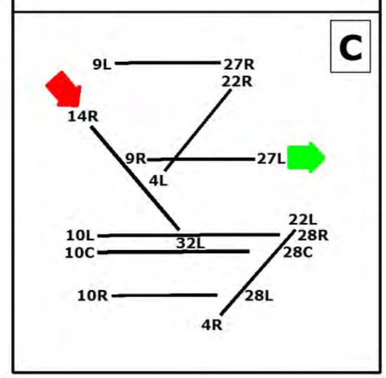


Period 4

14R Arrivals



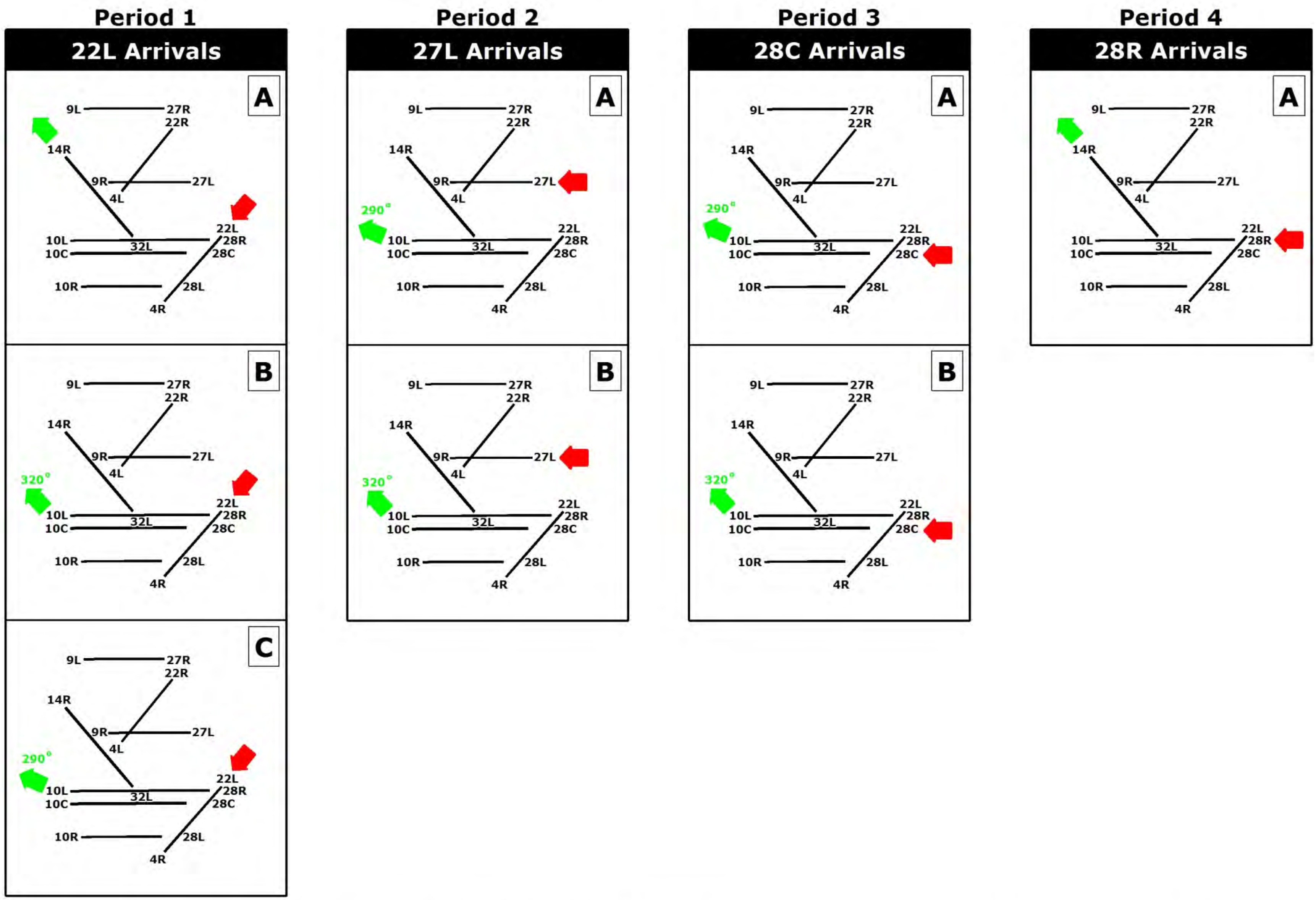




Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Alternatives that include 14R arrivals or 32L departures are interim until the decommissioning of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

FLY QUIET II (OVERNIGHT) ROTATION

West Flow

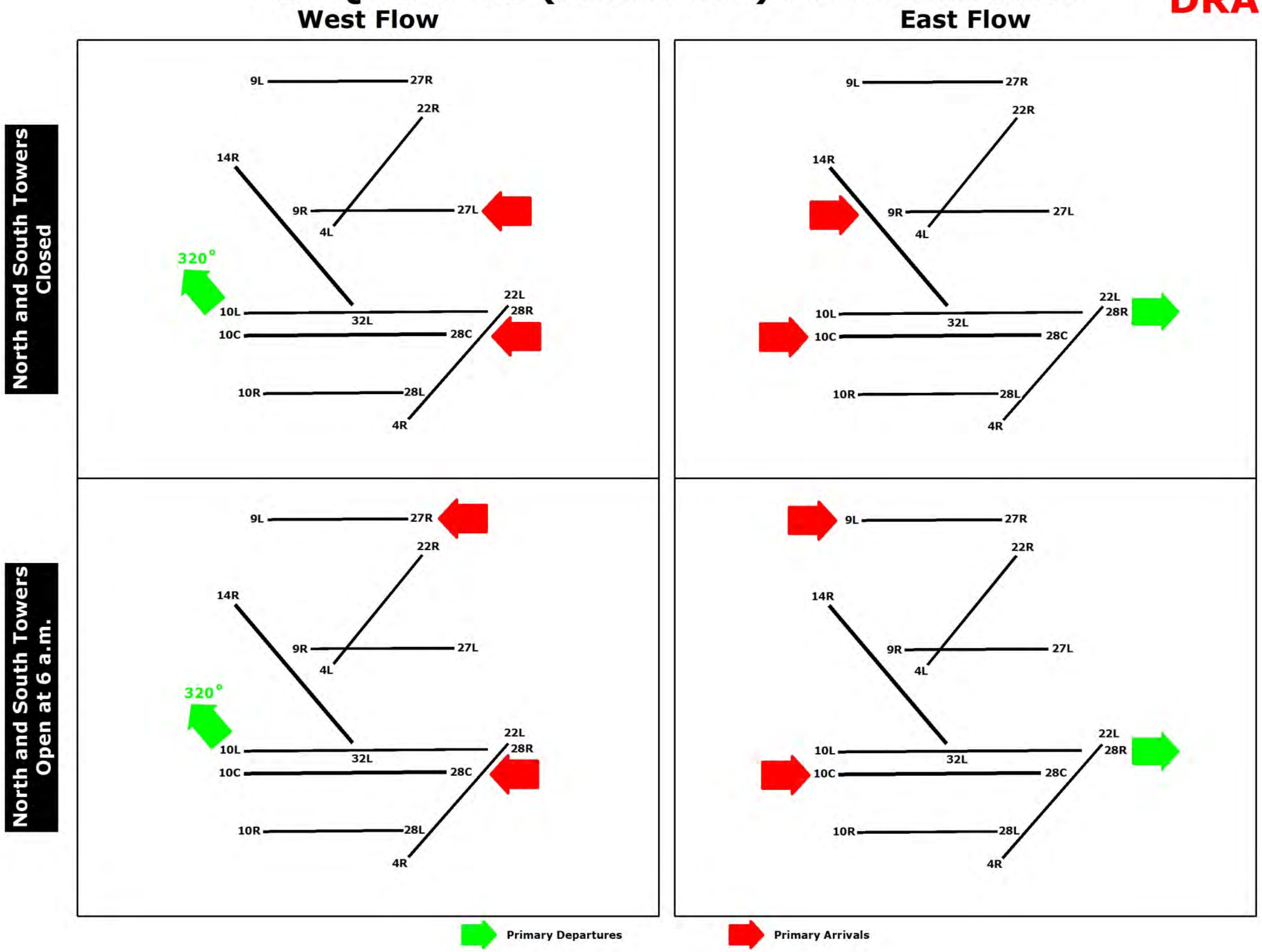


Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Alternatives that include 14R arrivals or 32L departures are interim until the decommissioning of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

Fly Quiet III (Morning)

FLY QUIET III (MORNING) ALTERNATIVES

DRAFT



Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

Questions

NEWSROOM

Ad Hoc Fly Quiet Committee Hears Presentation on Proposed Fly Quiet Scenarios

November 17, 2015

The O'Hare Noise Compatibility Commission Fly Quiet Ad Hoc Committee met on November 16, 2015.

The committee received a presentation from Chicago Department of Aviation (CDA) consultants Landrum & Brown regarding the Fly Quiet program. The presentation reviewed operational data as well as departure procedures. The committee was presented with three Fly Quiet Scenarios for Evening, Overnight and Morning and alternatives within each operational period.

As CDA Commissioner Ginger Evans stated in a letter to Ad Hoc Committee Chair Annunzio in advance of the meeting, the goal of the committee is to "provide relief for the most impacted residents as soon as possible." The options proposed by the CDA were the "most feasible for implementation by the FAA and pilots." She went on to say that whatever initial recommendations were made, they were not set in stone and she committed to "monitoring, refining and improving operations to improve noise impacts."

CDA Presentation   FAiR Presentation

News Archives

- » 2016
- » 2015
- » 2014
- » 2013
- » 2012

APPENDIX 7

O'HARE NOISE COMPATIBILITY COMMISSION

O'HARE NOISE COMPATIBILITY COMMISSION
FLY QUIET COMMITTEE MEETING
MONDAY, DECEMBER 14, 2015 9:00 A.M.
Chicago Department of Aviation
Conference Room 1, 2nd Floor
10510 W. Zemke Road, Chicago, IL 60666

AGENDA

1. Call to Order – Mr. Joseph J. Annunzio, Chair
2. Roll Call
3. Approval of November 16, 2015 Meeting Minutes
4. Committee Objectives
5. Points of Clarification
6. SOC Presentation
7. Discussion
8. Next ONCC Fly Quiet Committee Meeting:
   January 25, 2016, Chicago Department of Aviation,
   10510 W. Zemke Road, Chicago, IL. 9:00 a.m.
9. Comments from the Audience

The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:

- Questions or comments should be limited to items placed on the meeting agenda, or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.
- Before making comments or asking questions, identify yourself to the Commission Chair and members by providing them with your name and address.

10. Adjournment

ONCC Meeting: Friday, January 8, 2016, Café la Cave, 2777 S. Mannheim Road, Des Plaines, IL, 8:00 a.m.

ONCC Technical Committee Meeting: Tuesday, January 19, 2016
Mount Prospect Village Hall, 50 S. Emerson, Mount Prospect, IL 9:00 a.m.

O’Hare Fly Quiet Committee #3

December 14, 2015

Ginger S. Evans, Commissioner

City of Chicago, Department of Aviation

CHICAGO

Points of Clarification

POINTS OF CLARIFICATION

1. Fly Quiet I is a new program aimed at the evening hours when demand requires two departure runways.

2. Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out the noise.

3. Fly Quiet III is a new program aimed at the morning hours when demand requires two arrival runways.

4. Implementation of each Fly Quiet initiative will depend on the FAA, and the federal review process which will be identified once the CDA submits that initiative to the FAA.

5. Once the ONCC makes formal recommendations to the CDA, the CDA will submit Fly Quiet Revisions to the FAA for review.

POINTS OF CLARIFICATION

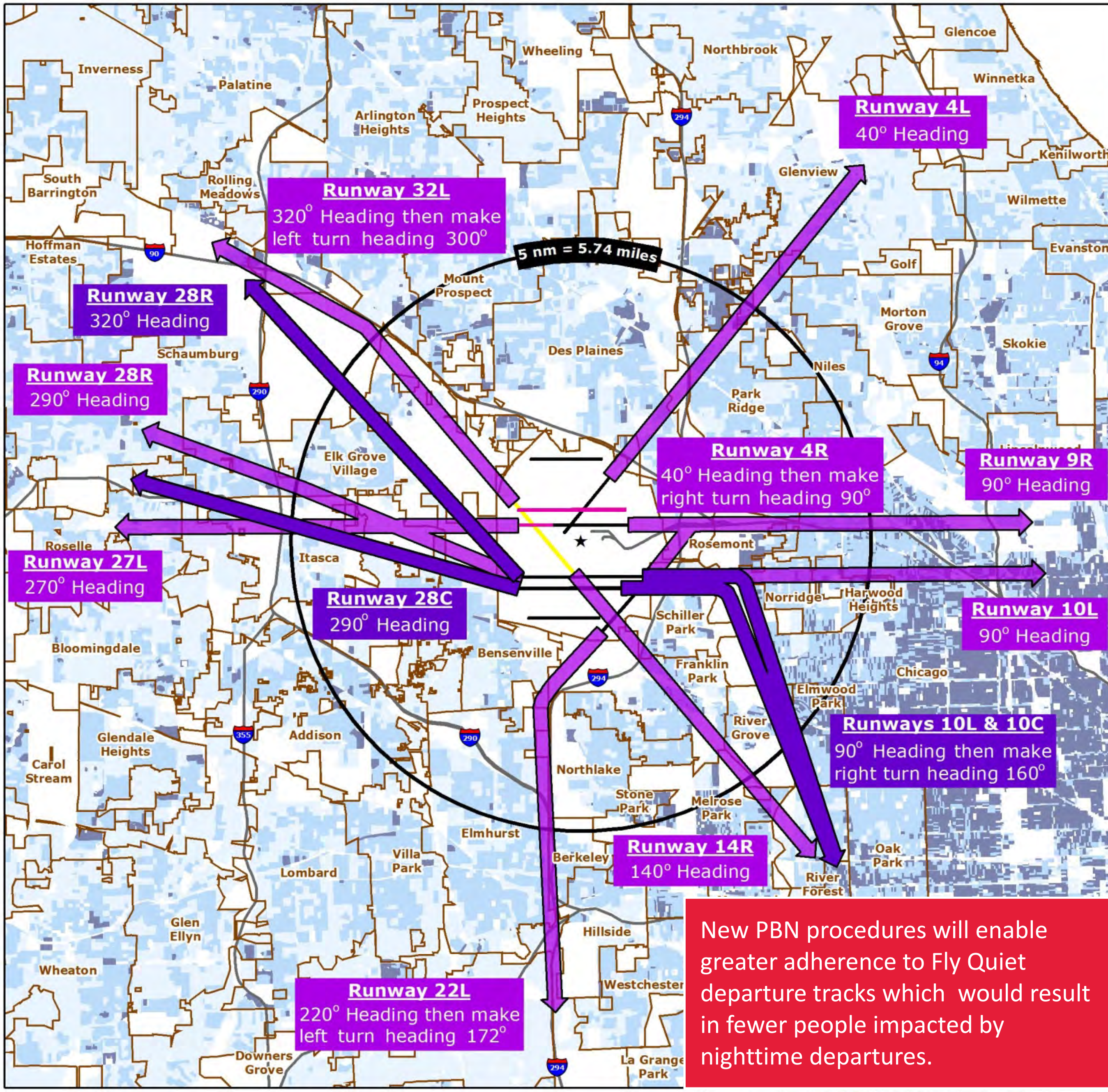
6. Rotation of arrival and departure runways is only feasible during the overnight hours when demand can be served with a single arrival and a single departure runway.

7. The North and South Control Towers are closed at night (10 p.m. to 6 a.m.) and neither is included in the Fly Quiet Program.

8. Runway 9C/27C is scheduled to open in 2020, which requires the closure of Runway 14R/32L.
   - Runway 27C will utilize the same departure corridor as Runway 32L.
   - Runway 14R/32L closure is also required to enable the construction of Western Access to O'Hare.

9. No recommendations shall require additional controllers, controller hours, or increased controller workload.

PBN Departures



New PBN procedures will enable greater adherence to Fly Quiet departure tracks which would result in fewer people impacted by nighttime departures.

CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

Fly Quiet Departure Track Alternatives

City of Chicago
Rahm Emanuel, Mayor
Department of Aviation
Ginger S. Evans, Commissioner

Legend

★ Center of Airport
Departure Track (Existing Vector Heading)
Departure Track (New)
Interstates
Existing Runways
Existing Runways to be Decommissioned
Future Runways
Community Boundaries

Population Density per Square Mile
15,000 +
5,000 to 15,000
1 to 5,000
No Population

Note 1: U.S. Census Data (2010) is available at www.census.gov
Note 2: Range circle measured from official center of airport
Note 3: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

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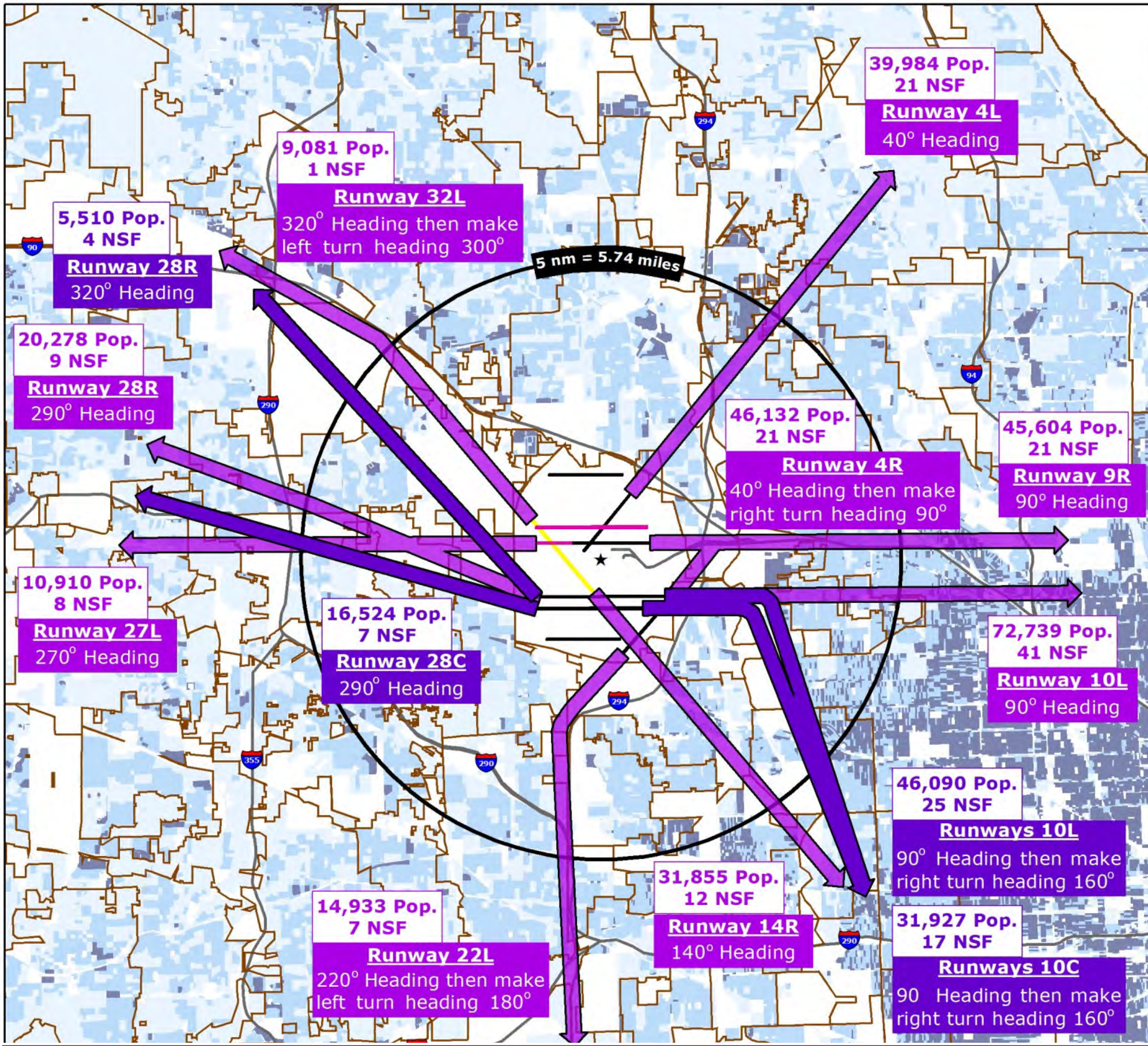
Nautical Miles
0 2 4
N

L&B

Date: December 7, 2015
File: FlyQuiet_Procedures_Census_EVH.mxd



CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

Fly Quiet Departure Track Alternatives

City of Chicago
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Department of Aviation
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Legend

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- Departure Track (New)
- Interstates
- Existing Runways
- Existing Runways to be Decommissioned
- Future Runways
- Community Boundaries

Population Density per Square Mile

- 15,000 +
- 5,000 to 15,000
- 1 to 5,000
- No Population

Note 1: U.S. Census Data (2010) is available at www.census.gov
Note 2: Range circle measured from official center of airport
Note 3: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

DRAFT

Nautical Miles
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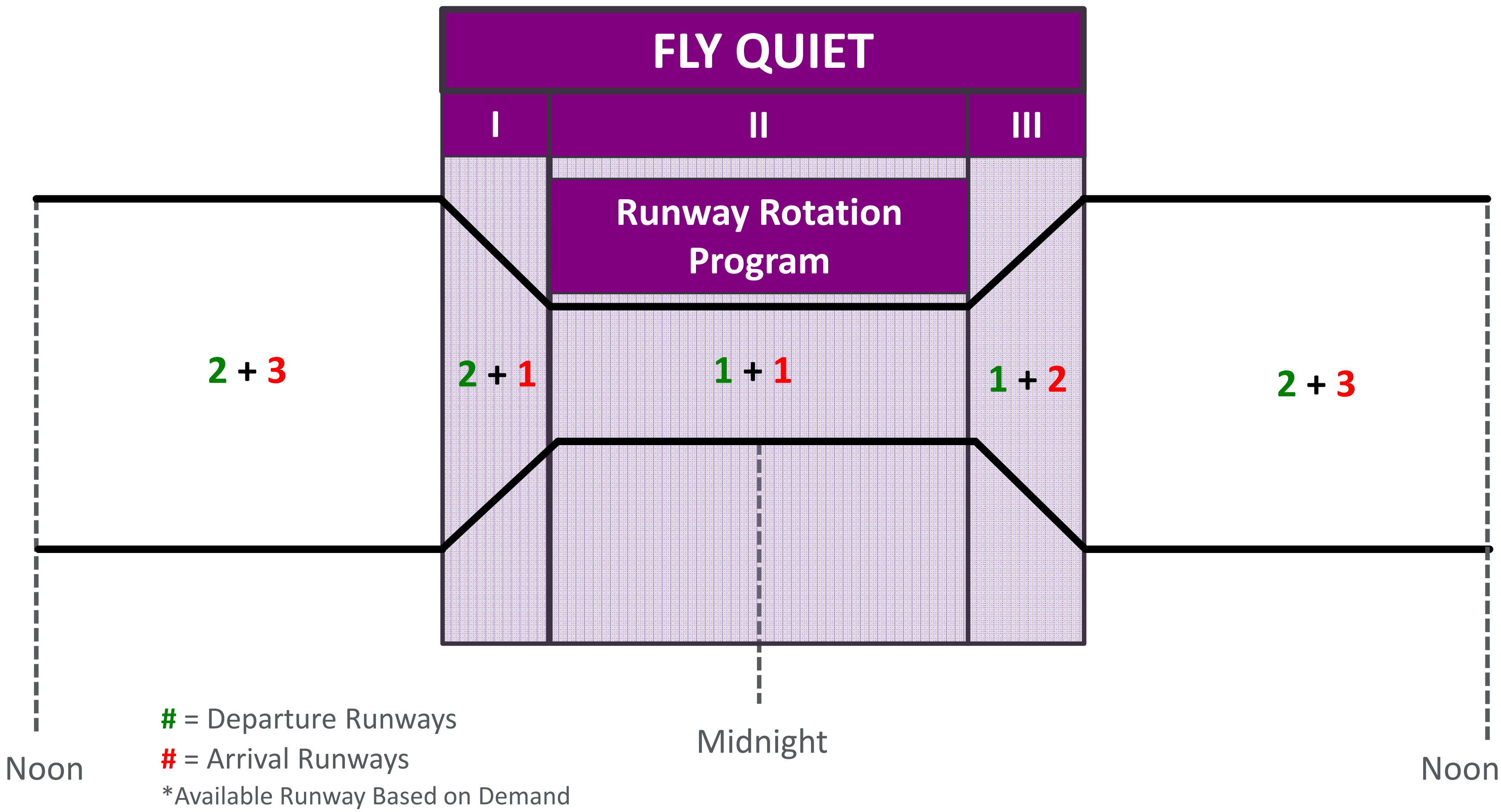
L&B

Date: December 11, 2015
File: FlyQuiet_Procedures_Pop_NSF.mxd

Population and noise sensitive facilities were calculated based on 8.0 statute miles from runway end and 0.5 statute miles from each procedure centerline. Noise sensitive facilities included health care facilities, firehouses, and churches.

RUNWAY DEMAND TIMELINE



Fly Quiet I (Evening)

Fly Quiet I is a new program aimed at the evening hours when demand requires two departure runways.

FLY QUIET I (EVENING) ALTERNATIVES

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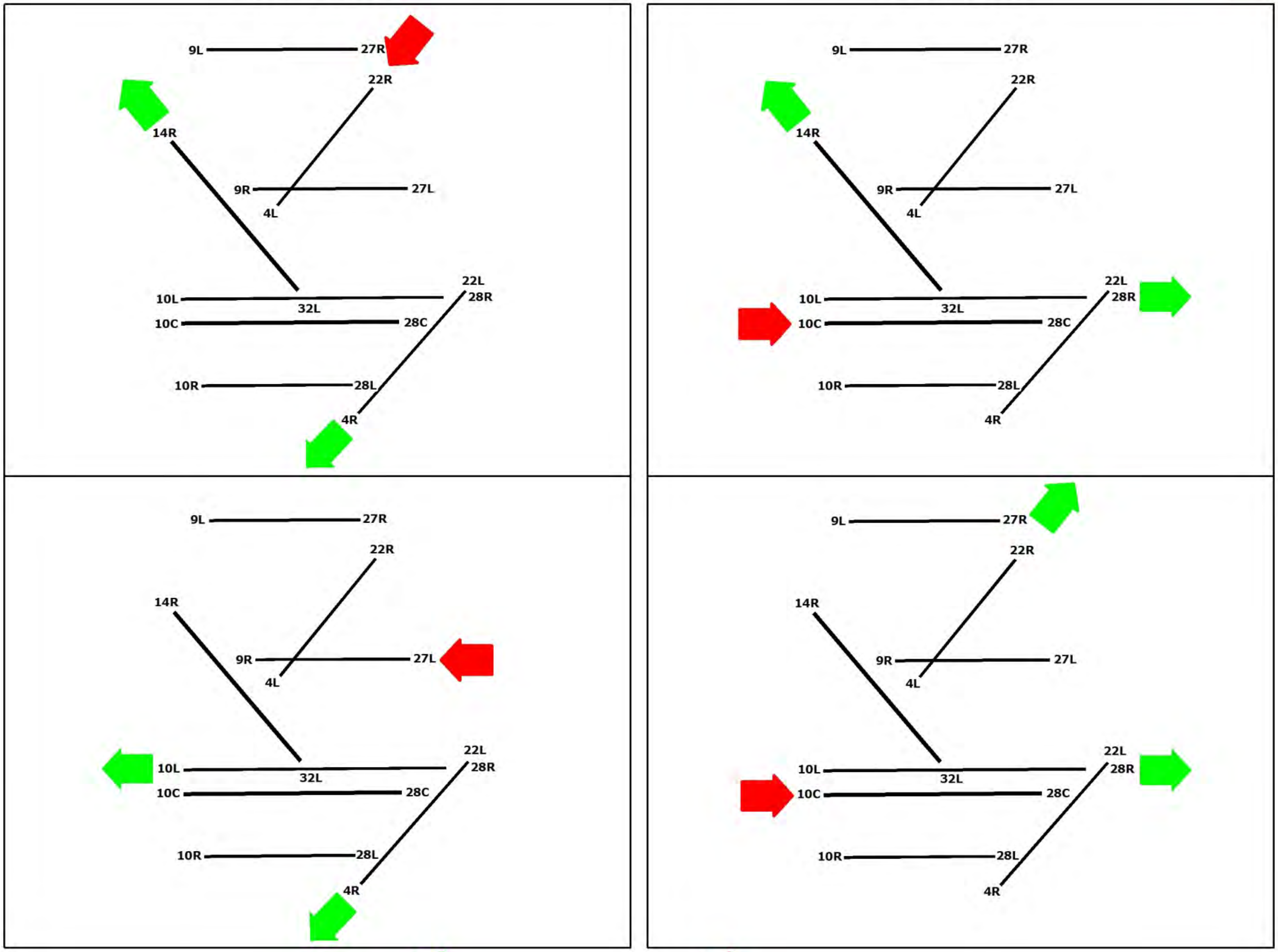
West Flow | East Flow



Primary Departures

Primary Arrivals

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: FAA will determine runway assignments based in part on the destination of each flight and the location of the initial departure fix.

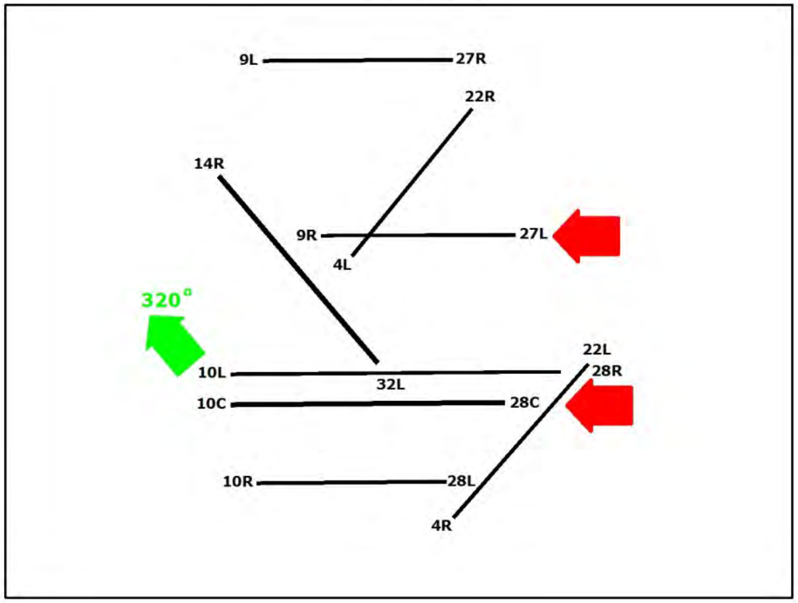
Fly Quiet III (Morning)

Fly Quiet III is a new program aimed at the morning hours when demand requires two arrival runways.

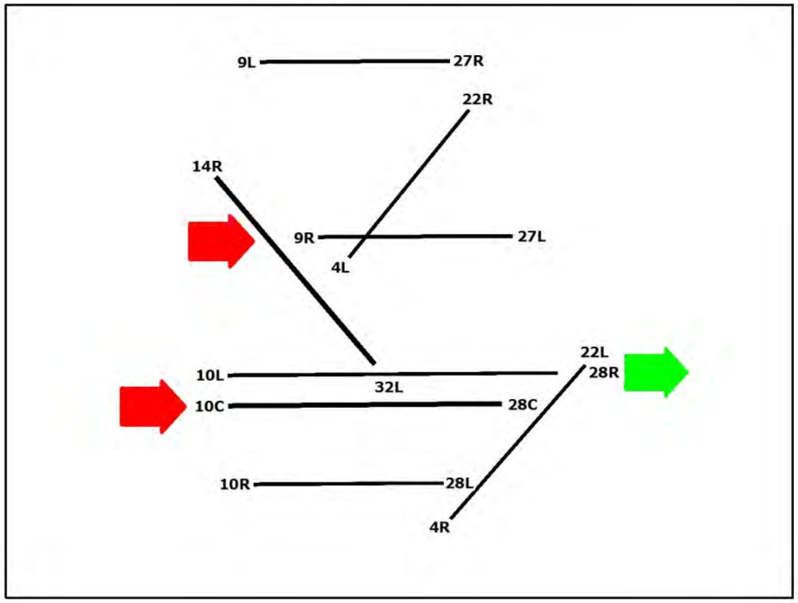
FLY QUIET III (MORNING) ALTERNATIVES

DRAFT

West Flow



East Flow



Primary Departures

Primary Arrivals

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

Fly Quiet II (Overnight)

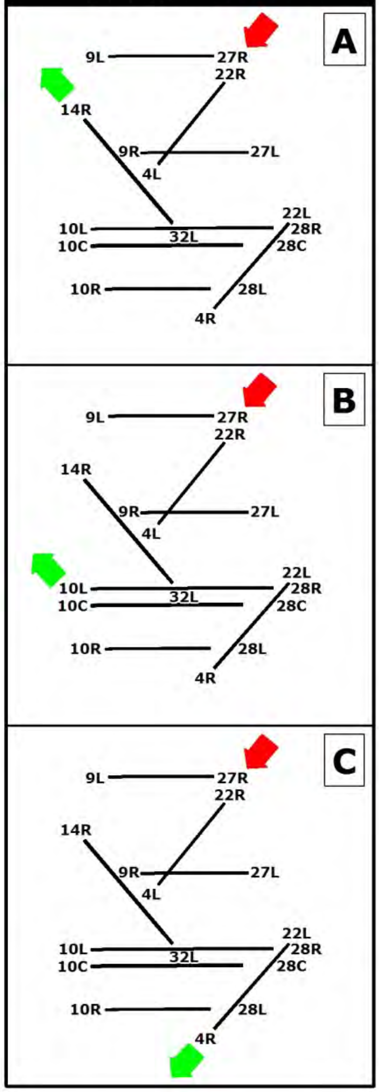
Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out the noise.

FLY QUIET II (OVERNIGHT) ROTATION

West Flow

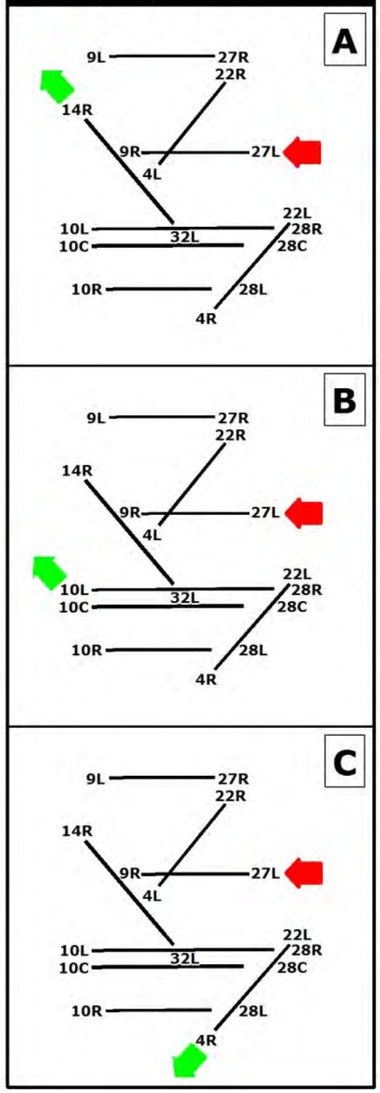
Period 1

22R Arrivals



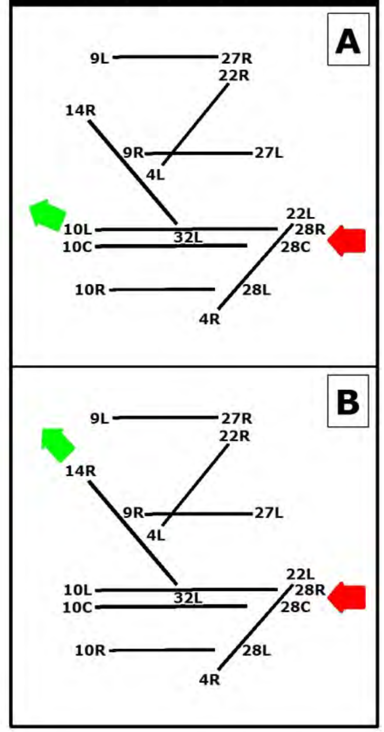
Period 2

27L Arrivals



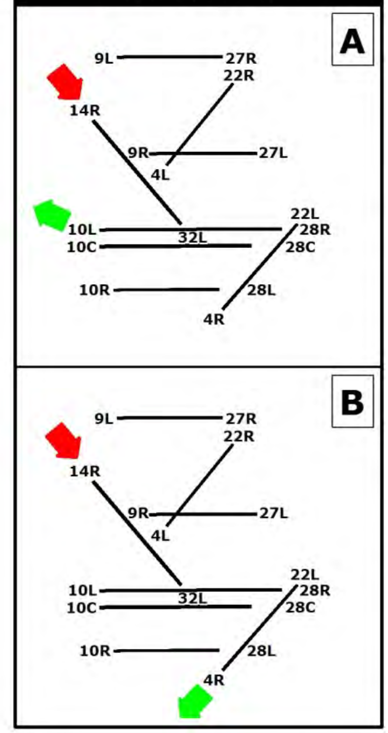
Period 3

28C & 28R Arrivals



Period 4

14R Arrivals



Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Alternatives that include 14R arrivals or 32L departures are interim until the decommissioning of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

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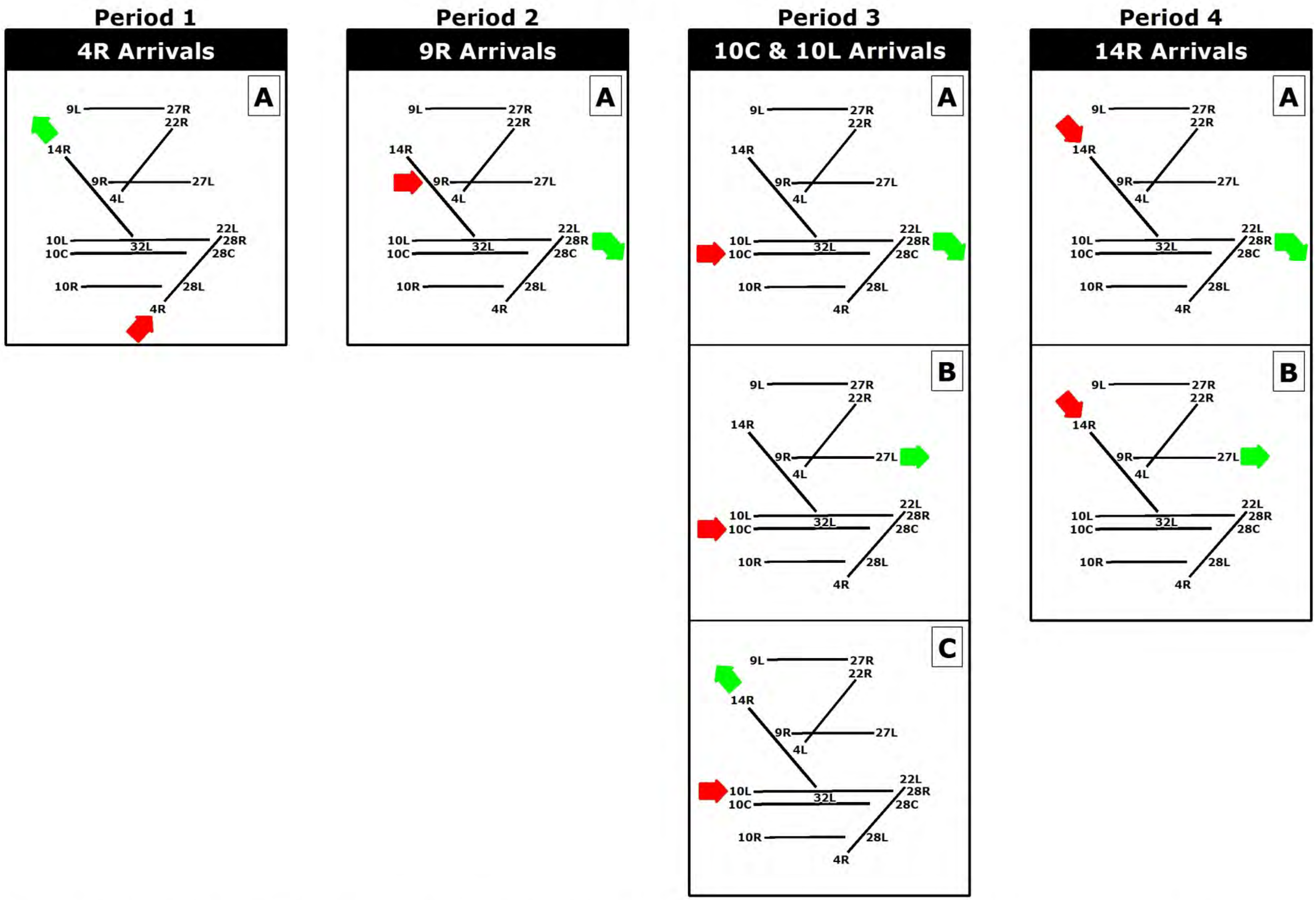
FLY QUIET II (OVERNIGHT) ROTATION

East Flow



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Note 2: Alternatives that include 14R arrivals or 32L departures are interim until the decommissioning of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

FLY QUIET II ROTATION METHOLOGY

1. Rotate configurations every period.

2. Don't impact communities with the same operation type two periods in a row to the extent possible.

3. Coordinate runway closings with maintenance and inspection schedules to reduce unexpected changes.

4. Alternatives that include 14R arrivals or 32L departures are interim until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

5. Alternative runways may need to be used to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs.

6. Periods are subject to change based on ONCC Review.

FLY QUIET II OVERNIGHT ROTATION

Period	WEST			EAST		
	Configuration	Arrival	Depart	Configuration	Arrival	Depart
1	1C	22R	22L	3A	10C	10L
2	2B	27L	28R	1A	4R	32L
3	3B	28R	32L	2A	9R	10C
4	4A	14R	28R	4B	14R	9R
5	1A	22R	32L	2A	9R	10L
6	2C	27L	22L	3C	10L	32L
7	3A	28C	28R	4A	14R	10L
8	4B	14R	22L	3B	10L	9R

WEST				
Arrivals	14R	22R	27L	28C/28R
	2	2	2	2
Departures	22L	28R	32L	
	3	3	2	

EAST				
Arrivals	4R	9R	14R	10L/10C
	1	2	2	3
Departures	9R	10L/10C	32L	
	2	4	2	

FLY QUIET II OVERNIGHT ROTATION

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
January-03	22R	22L	10C	10L
January-10	27L	28R	4R	32L
January-17	28R	32L	9R	10C
January-24	14R	28R	14R	9R
January-31	22R	32L	9R	10L
February-07	27L	22L	10L	32L
February-14	28C	28R	14R	10L
February-21	14R	22L	10L	9R
February-28	22R	22L	10C	10L
March-06	27L	28R	4R	32L
March-13	28R	32L	9R	10C
March-20	14R	28R	14R	9R
March-27	22R	32L	9R	10L
April-03	27L	22L	10L	32L
April-10	28C	28R	14R	10L
April-17	14R	22L	10L	9R
April-24	22R	22L	10C	10L
May-01	27L	28R	4R	32L
May-08	28R	32L	9R	10C
May-15	14R	28R	14R	9R
May-22	22R	32L	9R	10L
May-29	27L	22L	10L	32L
June-05	28C	28R	14R	10L
June-12	14R	22L	10L	9R
June-19	22R	22L	10C	10L
June-26	27L	28R	4R	32L

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
July-03	28R	32L	9R	10C
July-10	14R	28R	14R	9R
July-17	22R	32L	9R	10L
July-24	27L	22L	10L	32L
July-31	28C	28R	14R	10L
August-07	14R	22L	10L	9R
August-14	22R	22L	10C	10L
August-21	27L	28R	4R	32L
August-28	28R	32L	9R	10C
September-04	14R	28R	14R	9R
September-11	22R	32L	9R	10L
September-18	27L	22L	10L	32L
September-25	28C	28R	14R	10L
October-02	14R	22L	10L	9R
October-09	22R	22L	10C	10L
October-16	27L	28R	4R	32L
October-23	28R	32L	9R	10C
October-30	14R	28R	14R	9R
November-06	22R	32L	9R	10L
November-13	27L	22L	10L	32L
November-20	28C	28R	14R	10L
November-27	14R	22L	10L	9R
December-04	22R	22L	10C	10L
December-11	27L	28R	4R	32L
December-18	28R	32L	9R	10C
December-25	14R	28R	14R	9R

Note 1: This alternative is proposed for consideration by the ONCC and has not been reviewed or approved by the FAA.
Note 2: Available runways are determined by CDA Operations, ATC, and prevailing winds.

Questions

NEWSROOM

Fly Quiet Ad Hoc Committee Begins Consensus Building; Vice Chair Elected

December 14, 2015

After meeting for the past three months, the O'Hare Noise Compatibility Commission's (ONCC) Ad Hoc Fly Quiet Committee has begun consensus building for a January vote to modify the Fly Quiet nighttime noise abatement program. The committee was formed following a series of meetings in the summer in response to concern from citizen groups.

"It is my hope that the Ad Hoc Fly Quiet Committee can reach a consensus on modifications to the Fly Quiet program that can be implemented in a relatively short time frame to provide the most immediate relief to residents," said Committee Chair and Village of Niles attorney, Joe Annunzio. "In order to accomplish those goals, recommendations must also be considered feasible to the Federal Aviation Administration (FAA) and to the pilots," Annunzio said.

Modifications to the program must also take into account changes that have occurred at O'Hare during the O'Hare Modernization Program (OMP), and the interim conditions that currently exist prior to full OMP buildout. Two important criteria that all options must meet are safety and efficiency. Committee recommendations will be presented to the full ONCC commission for a vote. The options must be approved by a super majority or two thirds of ONCC membership. The CDA will then submit the plan to the FAA for review and action.

At the December 14 meeting of the Ad Hoc Committee, members heard a presentation by JDA, consultants for the Suburban O'Hare Commission (SOC). Their recommendations included: adding a second departure runway during Fly Quiet Hours; avoid early termination of Fly Quiet departure procedures; assess departure flight paths from new runways and preferred departure headings for noise abatement; review existing noise headings; examine RNAV (GPS) procedures to determine how they can be better implemented; implement a runway rotation plan.

News Archives

- » 2016
- » 2015
- » 2014
- » 2013
- » 2012

The committee will focus discussion on three initiatives: Performance Based Navigation - utilizing existing and potentially new procedures and how it can be better implemented; consideration of having three Fly Quiet Programs – evening, overnight and morning; and implementing a Fly Quiet Rotation program and making a recommendation regarding the frequency of rotation, as well as a possible rotation schedule.

Chicago Department of Aviation (CDA) consultants Landrum & Brown (L&B) provided background and explanation on the initiatives and took questions from Committee members.

One modification that several committee members supported as a viable option were the RNAV departure procedures or heading modifications that would redirect departures over less populated areas. This concept was also presented and supported by JDA.

In other committee news, Schaumburg Director of Transportation Karyn Robles was selected to serve as committee vice chair.

"I want to keep the momentum for additional discussions and clarification of the options to continue throughout the coming months," said Annunzio. "For that reason I recommended Karyn for vice-chair. I was very pleased that the committee agreed with me and voted unanimously on her leadership role," he said.

"I look forward to serving the Committee," said Robles. "I am confident that we can work through the options and come to a consensus, through thoughtful discussion, and have some good initiatives that we can present to the full commission that meet the safety and efficiency criteria and can be approved by the FAA," she said.

Chairman Annunzio stated that he hoped that the Committee will continue to discuss the initiatives and alternatives and begin voting at the next Ad Hoc Committee meeting, scheduled for January 25, 2016.

According to the FAA 2005 Record of Decision, the FAA will give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago. "This is a great opportunity for the members of ONCC. We are being given a role in determining airport policy and we should not take that lightly. We will examine all of the options and choose the ones that can be implemented in the timeliest manner," said Annunzio. "The airport has changed since the Fly Quiet Program was developed 20 years ago. It is appropriate that we are reviewing it now so that it takes into account current conditions," he said.

ONCC Presentation (12/14/15)

JDA Presentation (12/14/15)

CDA Presentation (12/14/15)

FAiR Presentation (11/16/15)

APPENDIX 8

O'HARE NOISE COMPATIBILITY COMMISSION

O'HARE NOISE COMPATABILITY COMMISSION
AD HOC FLY QUIET COMMITTEE MEETING
MONDAY, JANUARY 25, 2016
Chicago Department of Aviation
Conference Room 1, 2nd Floor
10510 W. Zemke Road, Chicago, IL 60666

AGENDA

1. Call to Order – Mr. Joseph J. Annunzio, Chair
2. Roll Call
3. Approval of December 14, 2015 Meeting Minutes
4. Discussion of Fly Quiet Proposal
5. Next ONCC Ad Hoc Fly Quiet Committee Meeting

   February 15, 2016, 9 a.m.
   Chicago Department of Aviation
   10510 W. Zemke Road, Chicago, IL

6. Comments from the Audience

The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings.

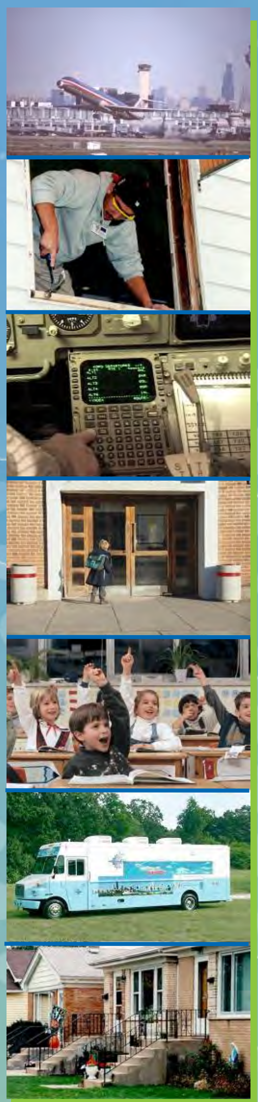
- Questions or comments should be limited to items placed on the meeting agenda or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.

- Before making comments or asking questions, identify yourself to the Commission Chair and members by providing them with your name and address.

7. Adjournment

ONCC Meeting: Friday, March 11, 2016, 8 a.m.
Café la Cave, 2777 S. Mannheim Rd., Des Plaines, IL

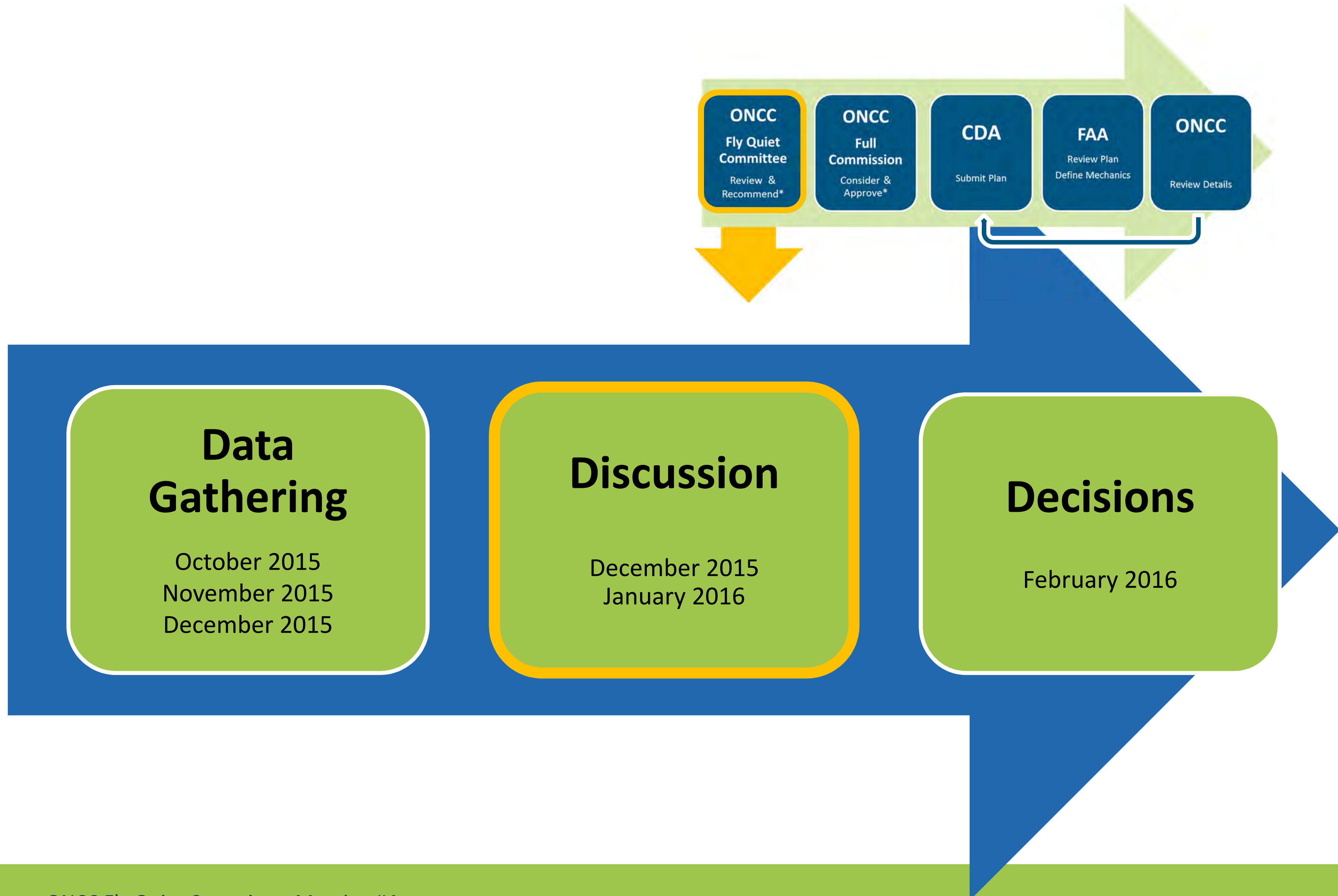
ONCC Technical Committee Meeting: Tuesday, March 22, 2016, 9 a.m.
Mount Prospect Village Hall, 50 South Emerson St., Mount Prospect, IL



Welcome to the O'Hare Noise Compatibility Commission Fly Quiet Committee Meeting

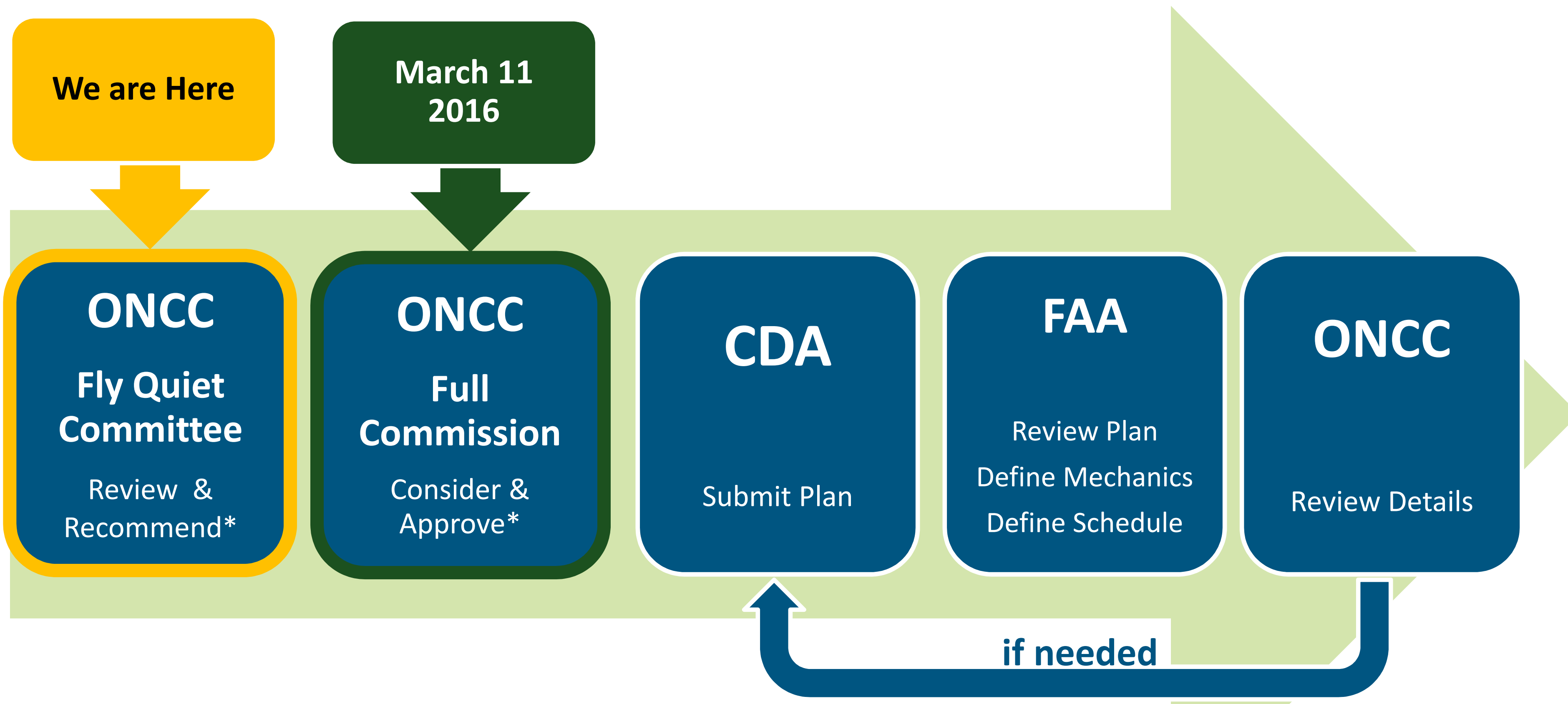
Monday, January 25, 2016

FLY QUIET COMMITTEE 3-STEP PROCESS



O'HARE NOISE COMPATIBILITY COMMISSION

FLY QUIET REDEVELOPMENT PROCESS



*ONCC recommendations shall be based on a supermajority (2/3) vote.

Discussion

FLY QUIET INITIATIVES – DECISION CRITERIA TO BE DISCUSSED

Refine Departure Procedures

- Review Existing Departure Headings
- Define New Departure Headings
- Require Full Runway Length

Define Three Fly Quiet Programs

- Establish Three Programs
- Establish Evening Program
- Redefine Overnight Program
- Establish Morning Program

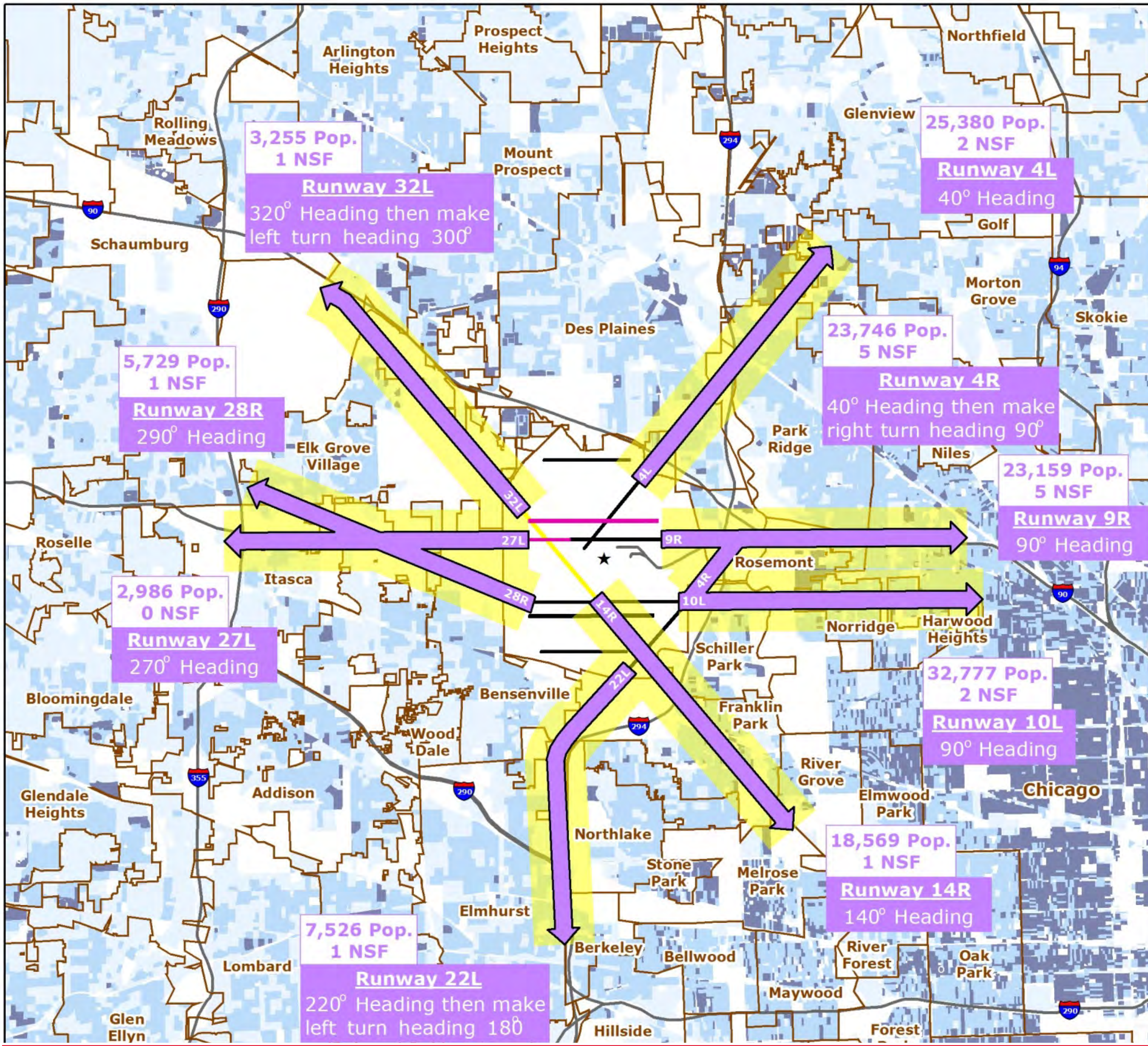
Establish Fly Quiet II Rotation Plan

- Establish Rotation Plan
- Rotate Weekly
- Avoid Consecutive Community Impacts
- Include 14R and 32L

Require ONCC Review

Other Criteria to be Defined by the Fly Quiet Committee?

Departure Procedures



CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

Existing Fly Quiet Departure Tracks

City of Chicago
Rahm Emanuel, Mayor

Department of Aviation
Ginger S. Evans, Commissioner

Legend

- ★ Center of Airport
- Departure Track (Existing Vector Heading)
- Impacted Areas (area within 0.5 miles from procedure centerline)
- Interstates
- Existing Runways
- Existing Runway to be Decommissioned
- Future Runways
- Community Boundaries

Population Density per Square Mile

- 15,000 +
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- 1 to 5,000
- No Population

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Note 2: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

DRAFT

Miles
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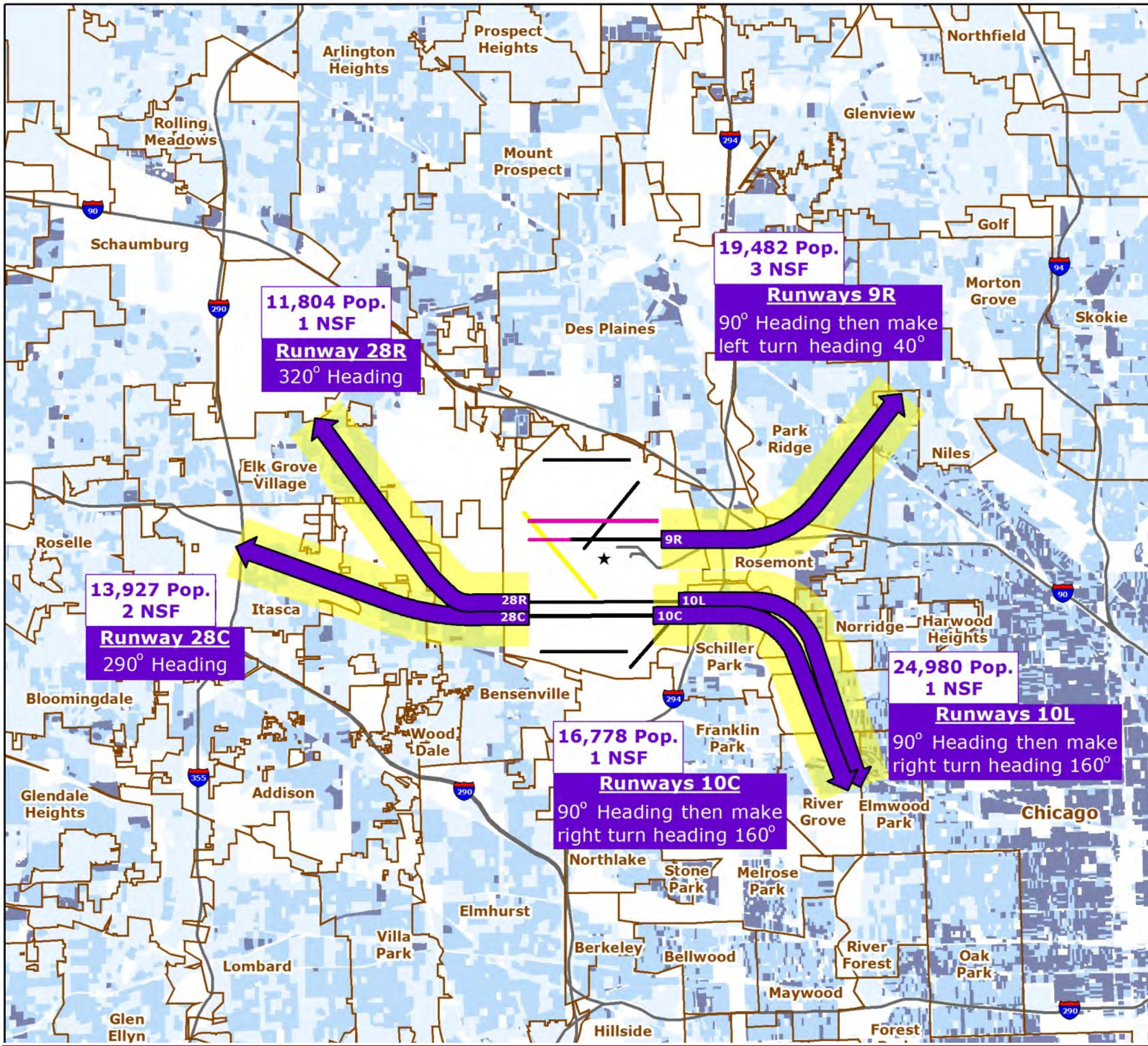
L&B

Date: January 25, 2016
File: FlyQuiet_Procedures_Pop_NSF_Existing.mxd

Population and noise sensitive facilities were calculated based on 5.0 statute miles from runway end and 0.5 statute miles from each procedure centerline. Noise sensitive facilities included health care facilities and firehouses.



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CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

Fly Quiet Departure Track Alternatives

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Department of Aviation
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L&B

Date: January 25, 2016
File: FlyQuiet_Procedures_Pop_NSF_New.mxd

DECISION CRITERIA

Departure Procedures | Three Fly Quiet Programs | Fly Quiet II Rotation

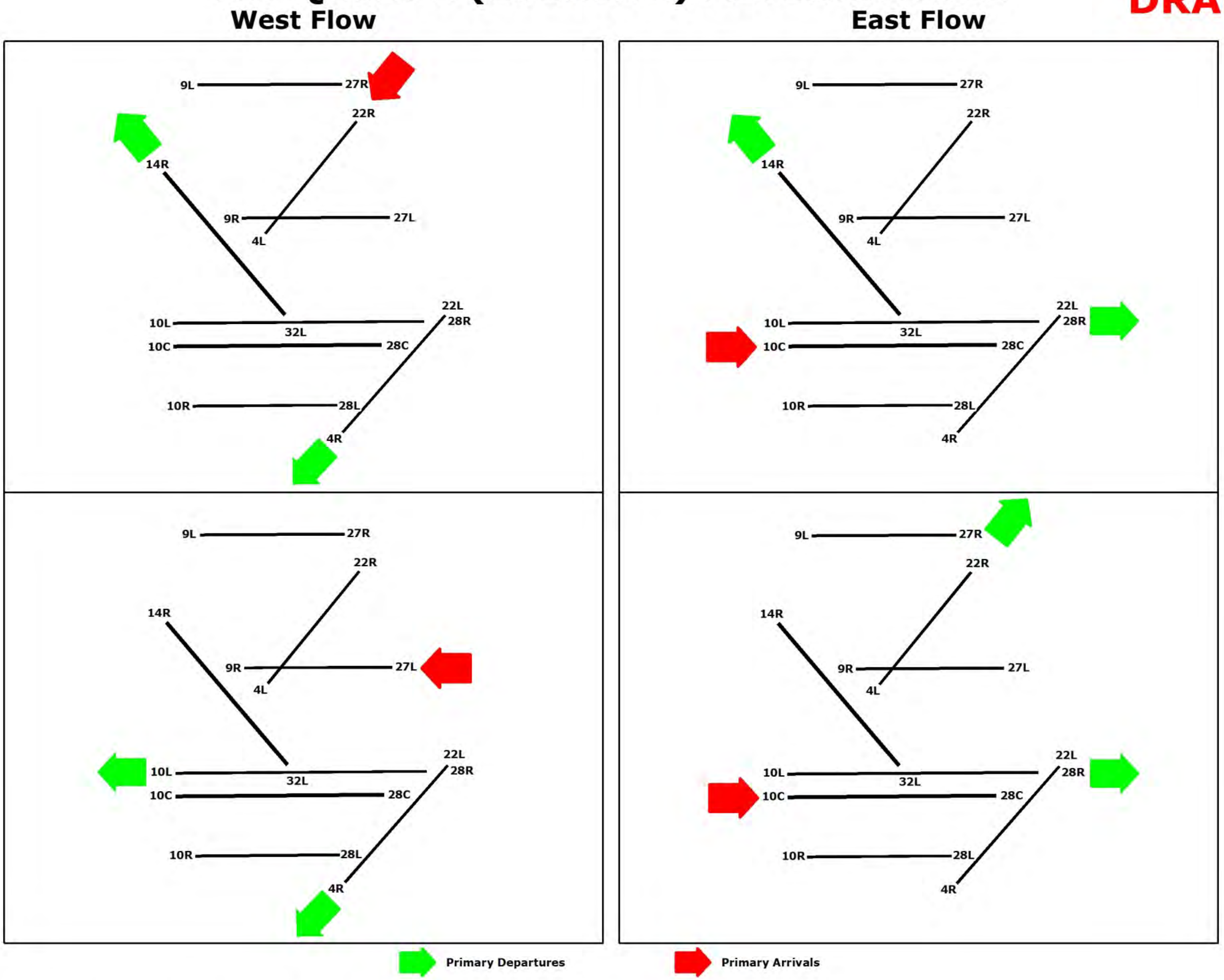
1. **Review Existing Departure Headings** – Review existing Fly Quiet departure procedures so flight tracks are aligned over compatible land use **(SOC FQ-8), (SOC FQ-10)**
2. **Define New Departure Headings** – Develop new departure procedures for new headings as follows: **(SOC FQ-7), (SOC FQ-10)**
   a) 9R – straight, then turn to northeast
   b) 10L – straight, then turn to southeast
   c) 10C – straight, then turn to southeast
   d) 28R – turn to northwest
   e) 28C – turn to northwest
3. **Require Full Runway Length** – All Departure should utilize the full-length of the runway. **(SOC FQ-19)**
4. **Require ONCC Review** – Final procedure designs are to be reviewed by ONCC prior to finalization and publication.
5. **Other?**

Fly Quiet I (Evening)

Fly Quiet I is a new program aimed at the evening hours when demand requires two departure runways.

FLY QUIET I (EVENING) ALTERNATIVES

DRAFT



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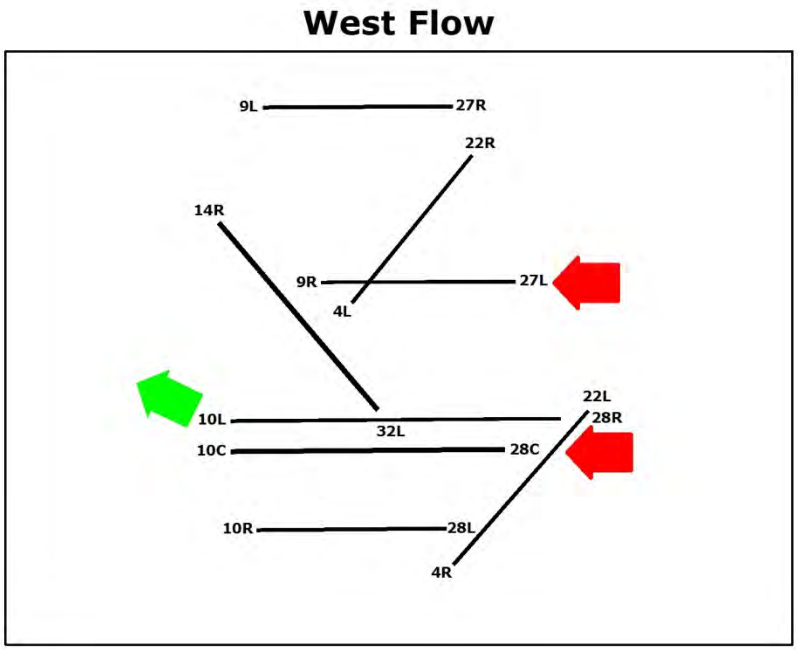
Note 2: FAA will determine runway assignments based in part on the destination of each flight and the location of the initial departure fix.

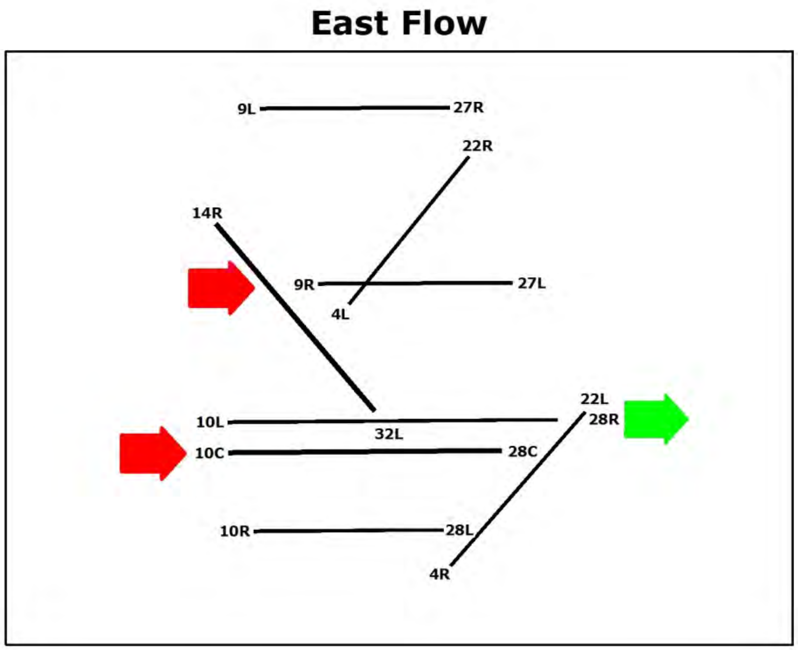
Fly Quiet III (Morning)

Fly Quiet III is a new program aimed at the morning hours when demand requires two arrival runways.

FLY QUIET III (MORNING) ALTERNATIVES

DRAFT



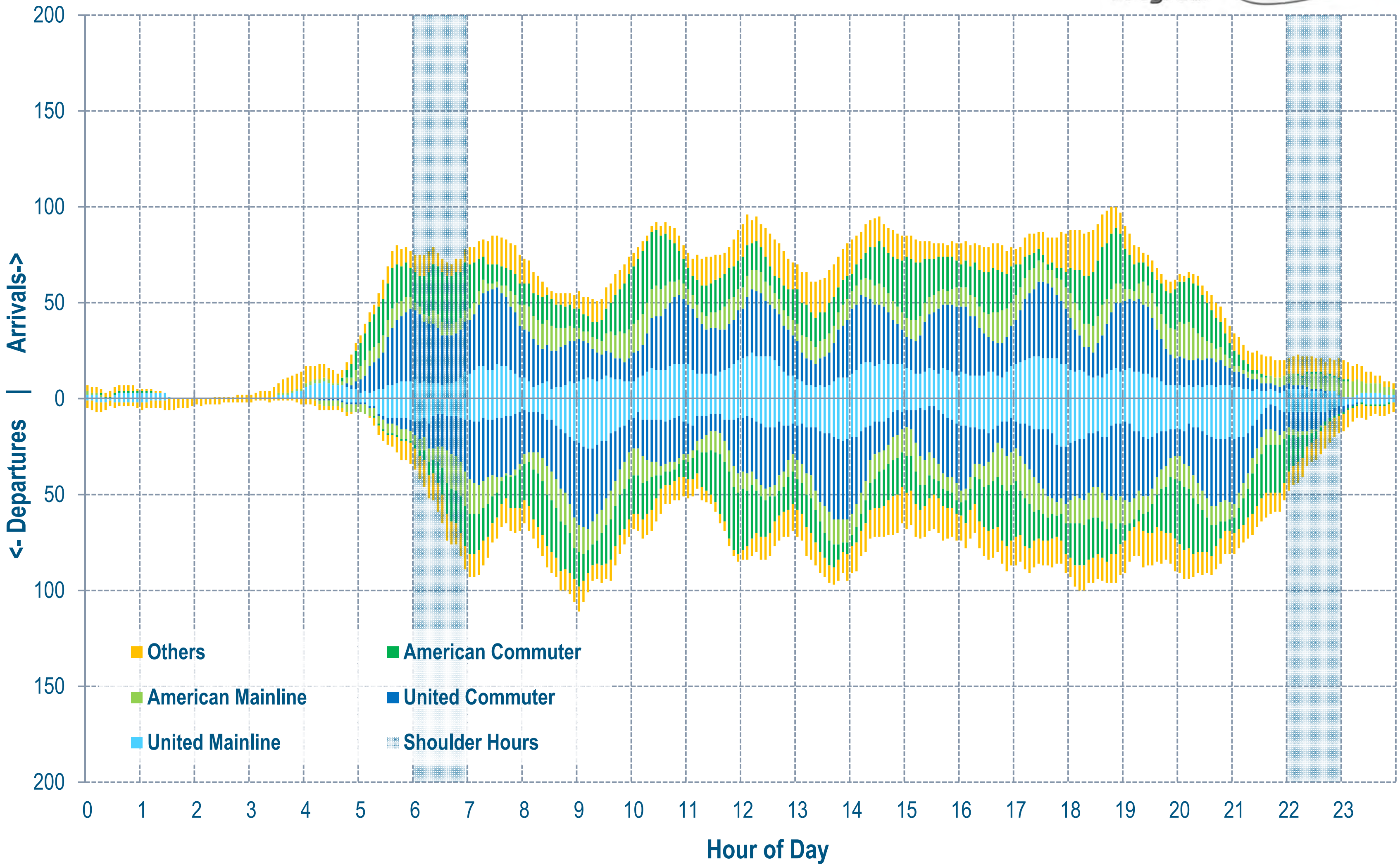


Primary Departures

Primary Arrivals

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

AIRLINE OPERATIONS BY HOUR (AUGUST 6, 2015)



DECISION CRITERIA

Departure Procedures | **Three Fly Quiet Programs** | Fly Quiet II Rotation

1. **Establish Three Programs** – Request FAA/CDA to establish three Fly Quiet Programs to align with nighttime demand patterns.
2. **Establish Evening Program** – Establish Fly Quiet I aimed at the evening hours when demand requires two departure runways. **(SOC FQ-17)**
3. **Redefine Overnight Program** – Redefine the existing Fly Quiet program as Fly Quiet II to address overnight hours when demand requires a single arrival or departure runway. This program will be further defined to include a runway rotation plan to spread out the noise. **(SOC FQ-18)**
4. **Establish Morning Program** – Establish Fly Quiet III aimed at the morning hours when demand requires two arrival runways. **(SOC FQ-17)**
5. **Require ONCC Review** – Final Program to be reviewed by ONCC prior to finalization and publication.
6. **Other?**

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

Fly Quiet II (Overnight)

Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out the noise.

EXAMPLE
FLY QUIET II OVERNIGHT ROTATION

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
January-03	22R	22L	10C	10L
January-10	27L	28R	4R	32L
January-17	28R	32L	9R	10C
January-24	14R	28R	14R	9R
January-31	22R	32L	9R	10L
February-07	27L	22L	10L	32L
February-14	28C	28R	14R	10L
February-21	14R	22L	10L	9R
February-28	22R	22L	10C	10L
March-06	27L	28R	4R	32L
March-13	28R	32L	9R	10C
March-20	14R	28R	14R	9R
March-27	22R	32L	9R	10L
April-03	27L	22L	10L	32L
April-10	28C	28R	14R	10L
April-17	14R	22L	10L	9R
April-24	22R	22L	10C	10L
May-01	27L	28R	4R	32L
May-08	28R	32L	9R	10C
May-15	14R	28R	14R	9R
May-22	22R	32L	9R	10L
May-29	27L	22L	10L	32L
June-05	28C	28R	14R	10L
June-12	14R	22L	10L	9R
June-19	22R	22L	10C	10L
June-26	27L	28R	4R	32L

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
July-03	28R	32L	9R	10C
July-10	14R	28R	14R	9R
July-17	22R	32L	9R	10L
July-24	27L	22L	10L	32L
July-31	28C	28R	14R	10L
August-07	14R	22L	10L	9R
August-14	22R	22L	10C	10L
August-21	27L	28R	4R	32L
August-28	28R	32L	9R	10C
September-04	14R	28R	14R	9R
September-11	22R	32L	9R	10L
September-18	27L	22L	10L	32L
September-25	28C	28R	14R	10L
October-02	14R	22L	10L	9R
October-09	22R	22L	10C	10L
October-16	27L	28R	4R	32L
October-23	28R	32L	9R	10C
October-30	14R	28R	14R	9R
November-06	22R	32L	9R	10L
November-13	27L	22L	10L	32L
November-20	28C	28R	14R	10L
November-27	14R	22L	10L	9R
December-04	22R	22L	10C	10L
December-11	27L	28R	4R	32L
December-18	28R	32L	9R	10C
December-25	14R	28R	14R	9R

Note 1: This alternative is proposed for consideration by the ONCC and has not been reviewed or approved by the FAA.
Note 2: Available runways are determined by CDA Operations, ATC, and prevailing winds.

DECISION CRITERIA

Departure Procedures | Three Fly Quiet Programs | **Fly Quiet II Rotation**

1. **Establish Rotation Plan** – Request the FAA/CDA to establish a runway rotation program for Fly Quiet II (Overnight hours)
2. **Rotate Weekly** – Rotate operating configurations on a weekly basis **(SOC FQ-18)**
3. **Avoid Consecutive Community Impacts** – Avoid impacting communities with the same operation type two periods in a row
4. **Include 14R and 32L** – Include 14R arrivals and 32L departures until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest would be utilized with other runways.
5. **Require ONCC Review** – Final rotation plans are to be reviewed by ONCC prior to finalization and publication.
6. **Other?**

FLY QUIET INITIATIVES – DECISION CRITERIA TO BE DISCUSSED

Refine Departure Procedures

- Review Existing Departure Headings
- Define New Departure Headings
- Require Full Runway Length

Define Three Fly Quiet Programs

- Establish Three Programs
- Establish Evening Program
- Redefine Overnight Program
- Establish Morning Program

Establish Fly Quiet II Rotation Plan

- Establish Rotation Plan
- Rotate Weekly
- Avoid Consecutive Community Impacts
- Include 14R and 32L

Require ONCC Review

Other Criteria to be Defined by the Fly Quiet Committee?

Questions

NEWSROOM

ONCC Fly Quiet Committee Votes On Departure Headings

January 25, 2016

The ONCC Ad Hoc Fly Quiet Committee met for the fourth time on Monday, January 25, 2016 to review, discuss and recommend modifications for O'Hare's nighttime noise abatement program to be presented to the FAA for review.

Three Fly Quiet Initiatives were presented: Refine Departure Procedures, Define Three Fly Quiet Programs (morning, evening and overnight) and Establish the overnight Rotation Plan. Discussion was primarily held on the first two initiatives. For the departure procedure discussion, Chicago Department of Aviation consultant Doug Goldberg from Landrum & Brown presented two refined departure heading charts and decision criteria. The first chart illustrated refined existing Fly Quiet departure tracks that were five miles in length. The second chart illustrated five additional departure tracks for runways 9R, 10L, 10C, 28R, and 28C. All 13 heading alternatives would be presented to the Federal Aviation Administration for review.

Other criteria included a recommendation for aircraft to utilize the full length of all runways during overnight hours and that all final procedure designs would be reviewed by ONCC prior to finalization and publication of the new Fly Quiet manual.

The committee unanimously voted to approve departure procedure decision criteria presented with the caveat that two additional departure headings recommended by the 41st ward would be included and voted upon in future meetings.

Decision criteria for the Three Fly Quiet Programs initiative also were discussed, but no votes were taken. The committee will meet again in February and prior to March 11 to discuss and vote on Fly Quiet Programs and rotation procedure options.

CDA Presentation - 1/25/16

News Archives

» 2016

» 2015

» 2014

» 2013

» 2012

APPENDIX 9

O'HARE NOISE COMPATIBILITY COMMISSION

O'HARE NOISE COMPATABILITY COMMISSION
AD HOC FLY QUIET COMMITTEE MEETING
TUESDAY, FEBRUARY 16, 2016 9:00 a.m.
Chicago Department of Aviation
Conference Room 1, 2nd Floor
10510 W. Zemke Road, Chicago, IL 60666

AGENDA

1. Call to Order – Mr. Joseph J. Annunzio, Chair
2. Roll Call
3. Approval of January 25, 2016 Meeting Minutes
4. Fly Quiet Rotation
5. Fly Quiet I & III
6. JDA/SOC Presentation
7. Discussion/Approval
8. Next ONCC Ad Hoc Fly Quiet Committee Meeting - TBD
9. Comments from the Audience

The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings.

- Questions or comments should be limited to items placed on the meeting agenda or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.
- Before making comments or asking questions, identify yourself to the Committee Chair and members by providing them with your name and address.

10. Adjournment

ONCC Meeting: Friday, March 11, 2016, 8 a.m. Café la Cave, 2777 S. Mannheim Rd., Des Plaines, IL

ONCC Technical Committee Meeting: Tuesday, March 22, 2016, 9 a.m. Mount Prospect Village Hall, 50 South Emerson St., Mount Prospect, IL

***Disclaimer:** Final action may be taken by the committee on any items listed on this agenda

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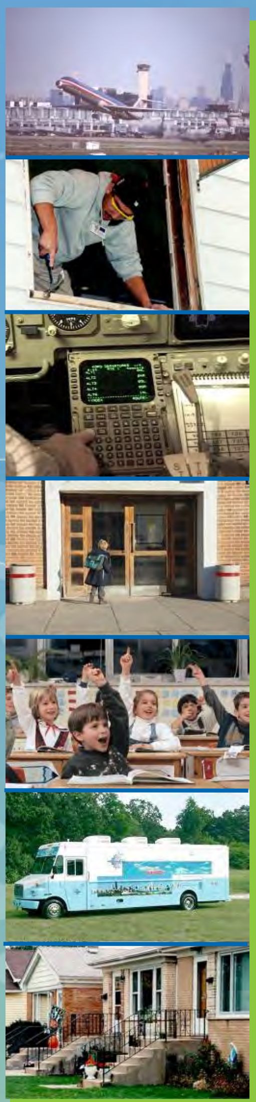


Welcome to the O'Hare Noise Compatibility Commission Fly Quiet Committee Meeting

Tuesday, February 16, 2016

FLY QUIET REDEVELOPMENT PROCESS

We are Here

March 11
2016
(Tentative)

ONCC
Fly Quiet Committee
Review & Recommend*

ONCC
Full Commission
Consider & Approve*

CDA
Submit Plan

FAA
Review Plan
Define Mechanics
Define Schedule

ONCC
Review Details

*ONCC recommendations shall be based on a supermajority (2/3) vote.

Discussion

FLY QUIET INITIATIVES – DECISION CRITERIA TO BE DISCUSSED

Refine Departure Procedures

- Review Existing Departure Headings
- Define New Departure Headings
- Require Full Runway Length

APPROVED BY COMMITTEE

Define Three Fly Quiet Programs

- Establish Three Programs
- Establish Evening Program
- Redefine Overnight Program
- Establish Morning Program

FURTHER DISCUSSION REQUIRED

Establish Fly Quiet II Rotation Plan

- Establish Rotation Plan
- Rotate Weekly
- Avoid Consecutive Community Impacts
- Include 14R and 32L

Today's Focus

Require ONCC Review

Other Criteria to be Defined by the Fly Quiet Committee?

Fly Quiet II (Overnight)

Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out community noise exposure. This program applies to overnight hours in which demand can be served by a single arrival or departure runway.

FLY QUIET ROTATION – TENTATIVE TIMELINE

ONCC RESPONSIBILITY	Date	Timeline	CDA & FAA RESPONSIBILITY
Decision on Implementation		2017	NEPA Analysis Depending on Plan Selected (FAA)
Review Feedback		December	
		November October	
Develop Criteria for Post-Test Analysis			Six Month Test (FAA) Collect Feedback (CDA)
ONCC Reviews Test Plan	May 6	June May	Analyze Test Plan
		April	FAA Review/Preparation for Test (CDA/FAA Coordination)
ONCC Approves Criteria (Tentative)	March 11	March	CDA Submits Plan to FAA
Fly Quiet Committee Criteria	February 16	February	
		2016	

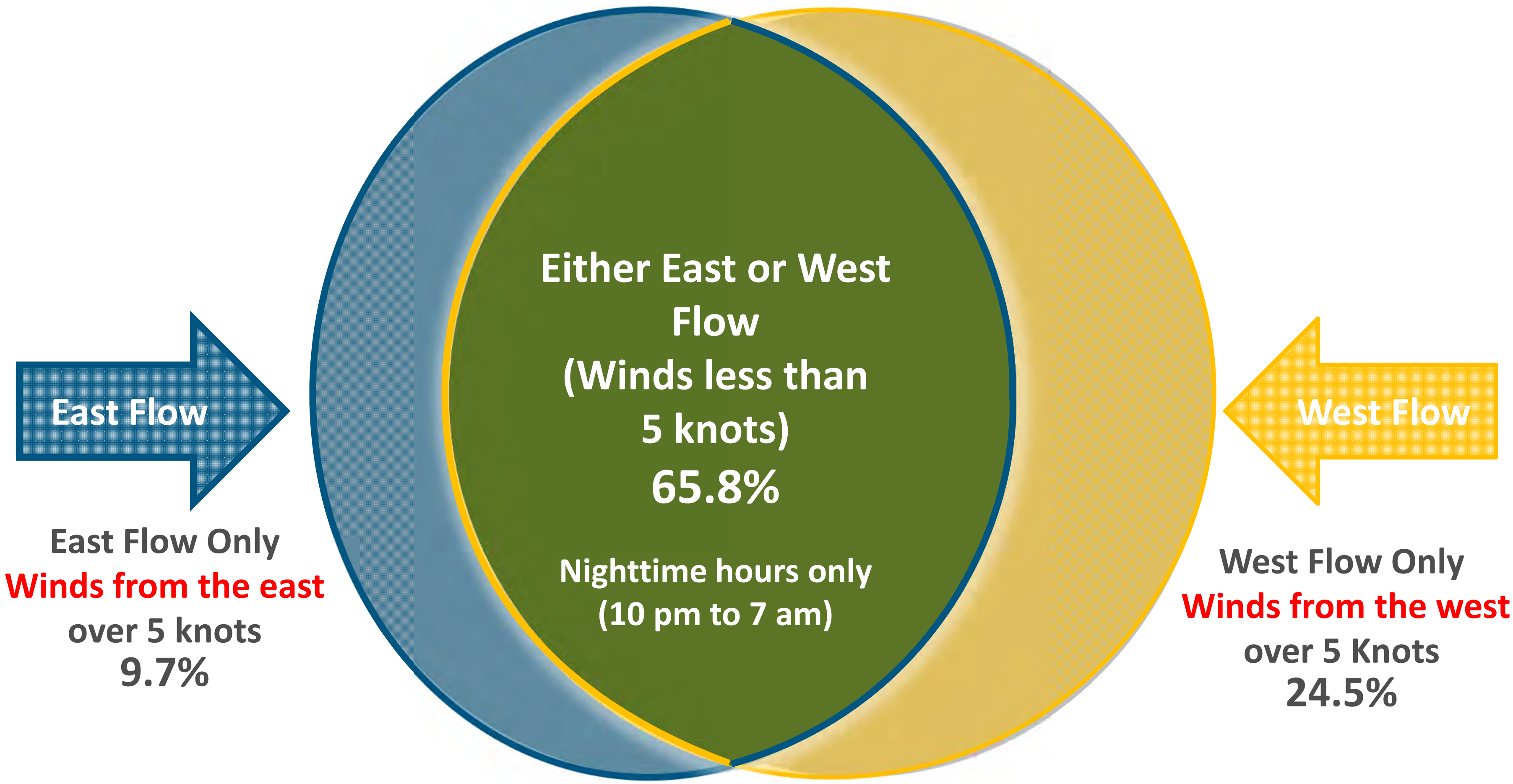
GOALS & GUIDELINES

Departure Procedures | Three Fly Quiet Programs | **Fly Quiet II Rotation**

1. **Provide Near-Term Relief** – Six-Month test with Citizen Feedback
2. **Reduce Impacts to the Highest Impacted Communities** – Provide Relief to Significantly Impacted Communities
3. **Provide Predictability** – Publish a rotation schedule that allows citizens to predict periods of relief to the extent possible

STRATEGIC	TACTICAL	PROCESS
1. Establish Rotation Plan 2. Alternate East and West Flow 3. Avoid Consecutive Community Impacts	4. Reduce Use of 10L/28R 5. Include 14R and 32L	6. Conduct a Test and Monitor Performance 7. Refine after ONCC Review

NIGHTTIME WINDS PROVIDE FLEXIBILITY FOR RUNWAY USE



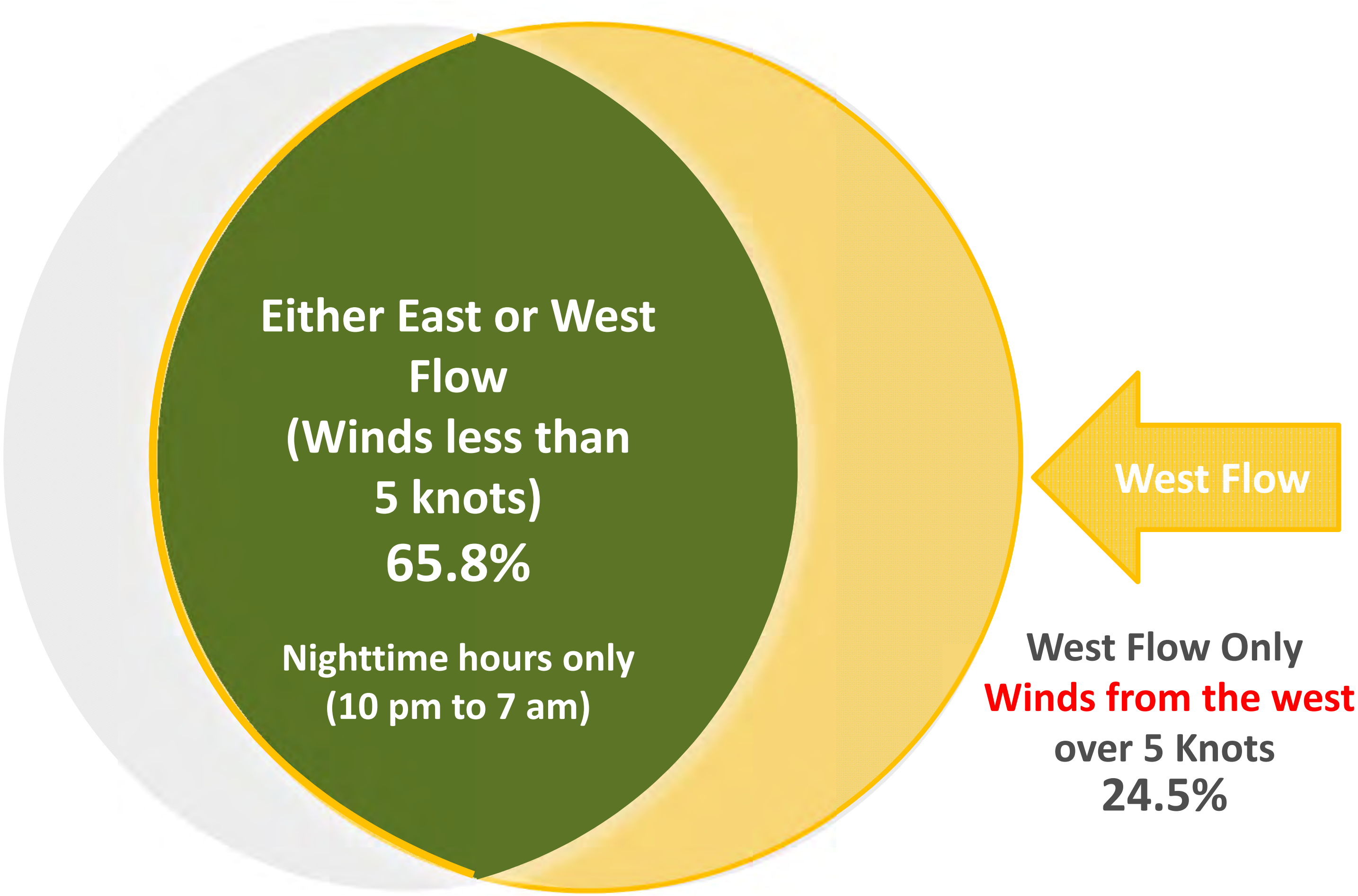
Potential Runway Use based on 10 Year average wind conditions
(Maximum 5 knot tailwind/25 Knot Crosswind Limit).
1 knot = 1.15078 mph

Source: Based on National Climatic Data Center
(August 2005 – July 2015)

EXAMPLE – WEST FLOW RUNWAY USE

90%

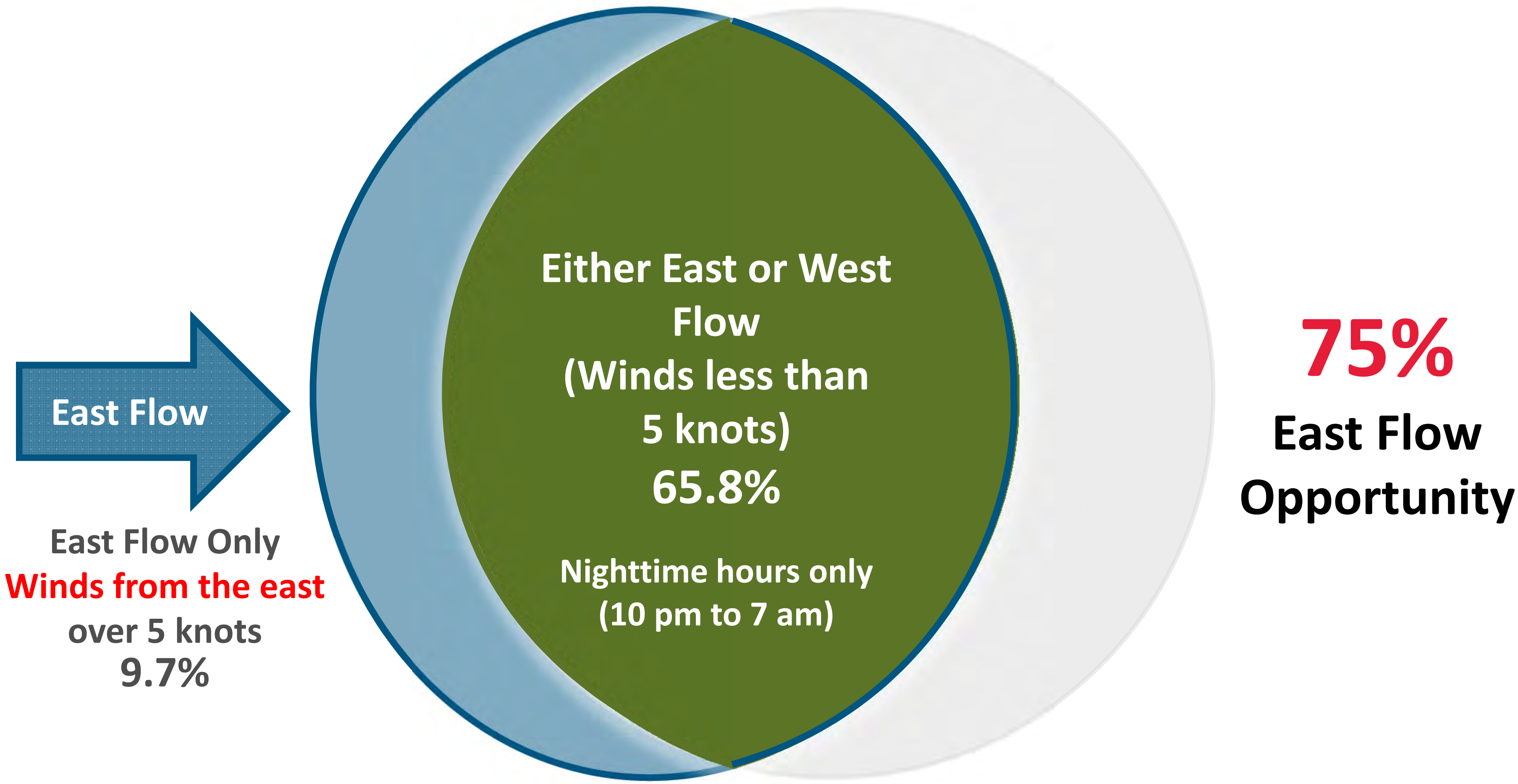
West Flow Opportunity



Potential Runway Use based on 10 Year average wind conditions (Maximum 5 knot tailwind/25 Knot Crosswind Limit).
1 knot = 1.15078 mph

Source: Based on National Climatic Data Center (August 2005 – July 2015)

EXAMPLE – EAST FLOW RUNWAY USE



Potential Runway Use based on 10 Year average wind conditions (Maximum 5 knot tailwind/25 Knot Crosswind Limit).
1 knot = 1.15078 mph

Source: Based on National Climatic Data Center (August 2005 – July 2015)

FLY QUIET II OVERNIGHT ROTATION CONCEPT

Fly Quiet Program

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
May-01	22R	22L	10C	10L
May-08	27L	28R	4R	32L
May-15	28R	32L	9R	10C
May-22	14R	28R	14R	9R
May-29	22R	32L	9R	10L
June-05	27L	22L	[illegible]	32L
June-12	28C	28R	[illegible]	[illegible]
June-19	14R	[illegible]	[illegible]	[illegible]
June-26	22R	[illegible]	[illegible]	[illegible]
July-03	[illegible]	[illegible]	[illegible]	[illegible]
July-10	[illegible]	[illegible]	[illegible]	[illegible]
July-17	[illegible]	[illegible]	[illegible]	9R
[illegible]	[illegible]	[illegible]	[illegible]	10L
[illegible]	[illegible]	[illegible]	10L	32L
[illegible]	[illegible]	[illegible]	14R	10L
[illegible]	[illegible]	22L	10L	9R
[illegible]	[illegible]	22L	10C	10L
[illegible]	27L	28R	4R	32L
[illegible]	28R	32L	9R	10C
[illegible]	14R	28R	14R	9R
September-18	22R	32L	9R	10L
September-25	27L	22L	10L	32L
October-02	28C	28R	14R	10L
October-09	14R	22L	10L	9R
October-16	22R	22L	10C	10L
October-23	27L	28R	4R	32L

To be refined for FAA Test

Note 1: This alternative is proposed for consideration by the ONCC and has not been reviewed or approved by the FAA.

Note 2: This is a voluntary program - available runways are determined by Air Traffic Control, CDA Operations, and wind/weather conditions.

COMMUNITY OUTREACH/FEEDBACK DURING THIS SUMMER'S RUNWAY ROTATION TEST

- Fly Quiet Website
    - Summary of Test Plan
    - Published Rotation Schedule
    - Feedback Survey
- ONCC will Review Feedback

CHICAGO Fly Quiet Runway Rotation Test
O'Hare International Airport

Schedule

Survey

Information

Fly Quiet Program

Fly Quiet Rotation Test

The Chicago Department of Aviation (CDA) will be conducting a Fly Quiet Rotation test beginning in the summer of 2016 running through the fall of 2016. Citizen feedback will be collected during the entire test period on this website in the form of a survey.

Fly Quiet Program

On June 17, 1997, the City of Chicago announced that airlines operating at O'Hare International Airport had agreed to use designated noise abatement flight procedures in accordance with the Fly Quiet Program. This program was implemented in an effort to reduce the impacts of aircraft noise on neighborhoods surrounding O'Hare.

The Fly Quiet Program is a voluntary program that encourages pilots and air traffic controllers to use designated nighttime preferential runways and flight tracks developed by the Chicago Department of Aviation (CDA) in cooperation with the O'Hare Noise Compatibility Commission (ONCC), the airlines and the air traffic controllers. These preferred routes are intended to direct aircraft over less-populated areas, such as forest preserves and highways, as well as commercial and industrial areas.

Fly Quiet II
(Overnight Rotation)

7 Proposed Decision Criteria for Review and Approval by the Fly Quiet Committee

CRITERIA FOR APPROVAL

Departure Procedures | Three Fly Quiet Programs | **Fly Quiet II Rotation**

1. **Establish Rotation Plan** – Request the FAA/CDA establish a weekly runway rotation program for Fly Quiet II (Overnight hours) to achieve a more balanced distribution of noise exposure. Each period may consist of one arrival and one departure runway or one mixed use runway (runway used for both arrivals and departures). **(SOC FQ-18)**
2. **Alternate East and West Flow (5 knot Tailwind)** – Minimize the potential for consecutive periods of east flow or west flow runway use to the extent possible, except when conditions require the opposite flow due to a tailwind exceeding 5 knots.
3. **Avoid Consecutive Community Impacts** – Minimize the potential for impacting communities with the same operation type (arrival or departure) two periods in a row.
4. **Reduce Use of 10L/28R** – Include Runway 10L/28R in the rotation but reduce its use if needed by assigning it for departing aircraft that require additional runway length to the extent possible. Prioritize the use of other runways to the extent possible for flights that do not require additional runway length.
5. **Include 14R and 32L** – Include 14R arrivals and 32L departures until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest could be utilized with other runways to the extent possible. **(FAiR Recommendation)**
6. **Conduct a Test and Monitor Performance** – Ask FAA to Conduct a 6-month test that applies these principles. Request CDA records nightly runway use and collects citizen feedback for ONCC review.
7. **Require ONCC Review** – Final rotation plans including any changes are to be reviewed by ONCC after the test prior to finalization and publication.

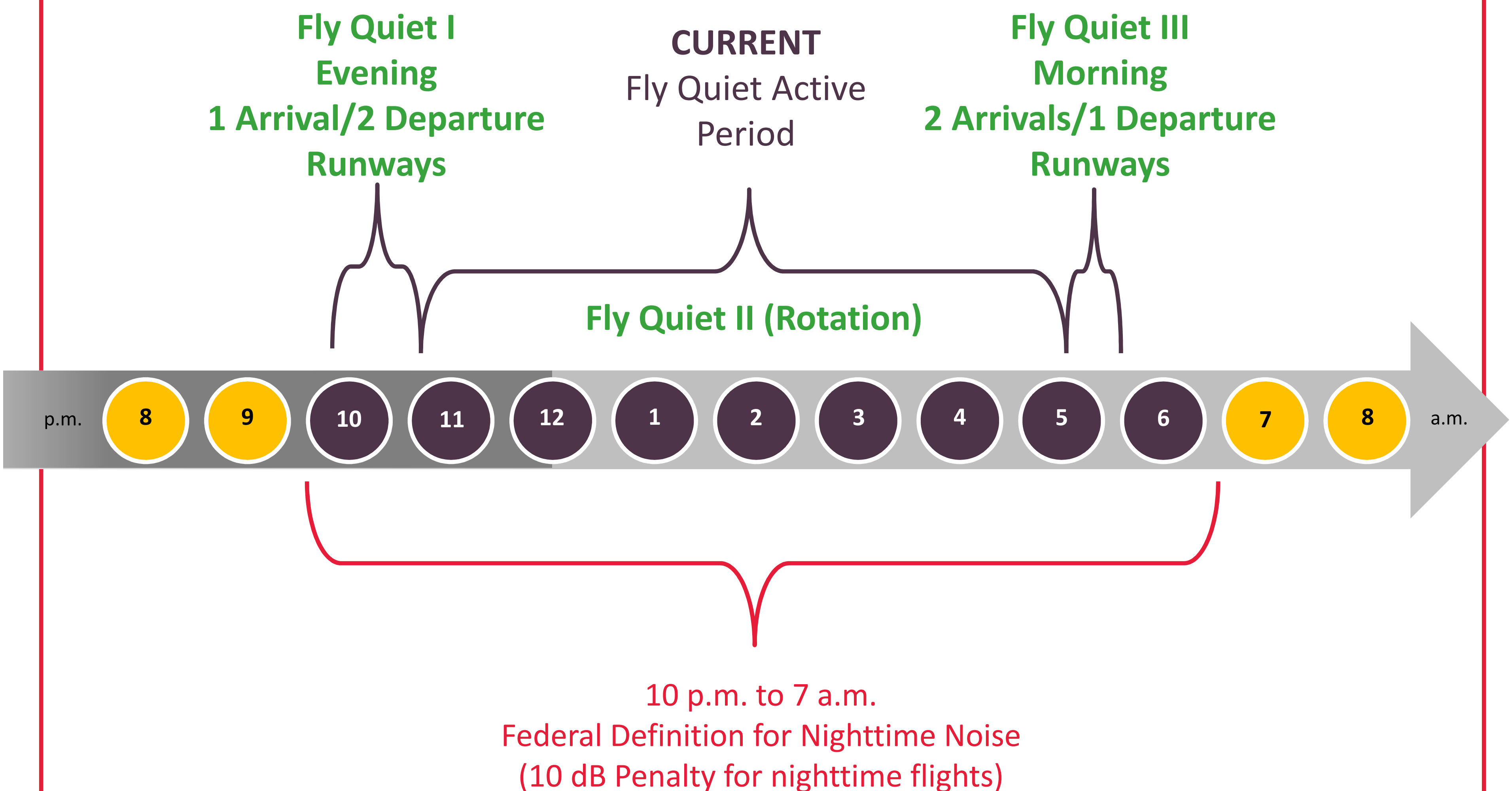
Discussion and Approval

Fly Quiet I (Evening) & Fly Quiet III (Morning)

Fly Quiet I is a new program aimed at the evening hours when demand requires two departure runways.

Fly Quiet III is a new program aimed at the morning hours when demand requires two arrival runways.

THREE FLY QUIET PERIODS



CRITERIA FOR APPROVAL

Departure Procedures | **Three Fly Quiet Programs** | Fly Quiet II Rotation

1. **Establish Three Programs** – Request FAA/CDA to establish three Fly Quiet Programs to align with nighttime demand patterns.
2. **Establish Evening Program** – Establish Fly Quiet I aimed at the evening hours when demand requires two departure runways. **(SOC FQ-17)**
3. **Redefine Overnight Program** – Redefine the existing Fly Quiet program as Fly Quiet II to address overnight hours when demand requires a single arrival or departure runway. This program will be further defined to include a runway rotation plan to spread out the noise. **(SOC FQ-18)**
4. **Establish Morning Program** – Establish Fly Quiet III aimed at the morning hours when demand requires two arrival runways. **(SOC FQ-17)**
5. **Require ONCC Review** – Final Program to be reviewed by ONCC prior to finalization and publication.

Discussion and Approval

Questions

NEWSROOM

ONCC Fly Quiet Committee Approves Criteria To Reduce O'Hare Nighttime Noise

February 16, 2016

Chicago and suburban leaders reach consensus on proposal for overnight noise relief

The O'Hare Noise Compatibility Commission (ONCC) Ad Hoc Fly Quiet Committee today approved criteria to establish a nighttime runway rotation proposal for O'Hare International Airport.

The rotation proposal, termed "Fly Quiet II," developed by the Chicago Department of Aviation (CDA), in consultation with CDA and Suburban O'Hare Commission (SOC) aviation experts, has the potential to significantly reduce nighttime noise impacts to communities most affected by aircraft noise.

"The goal of this committee was to bring relief quickly to communities most impacted by nighttime noise," said Committee Chair Joseph Annunzio. "Approval of the Fly Quiet runway rotation concepts presented to the committee today puts the testing of a runway rotation plan on a fast track."

The Fly Quiet II proposal contained a set of criteria that includes: plans to alternate East and West Flow runway use to further distribute noise exposure more evenly; to include use of Runway14R/ 32L for nighttime operations; requests the Federal Aviation Administration (FAA) to conduct a six-month test and monitor performance; allows citizen feedback during the test phase; and requires full ONCC review after testing prior to finalization.

The committee also voted today to approve modifications to the Fly Quiet program, dividing it into three periods to address operations during the late evening, overnight and early morning hours. At a previous meeting, the committee approved a measure that would refine nighttime departure flight headings to reduce the number of homes impacted by aircraft noise.

The Fly Quiet Committee will present all of the proposals to the full ONCC membership for consideration at the next regularly scheduled ONCC meeting on March 11, 2016. If the proposal is approved by the ONCC, the CDA will package and submit it to the FAA for review and approval. Implementation of the rotation plan as a test program could begin as early as May 2016.

"The city's goal is to provide immediate relief for communities most impacted by nighttime noise, and that's what this plan will accomplish," said CDA Commissioner Ginger S. Evans.

"I want thank the Fly Quiet Committee members for their hard work studying this complex issue, and I look forward to discussing this proposal at the ONCC March meeting. Ensuring that O'Hare is both the economic engine of the city, as well as a good neighbor, is my top priority. We have more work to do, but this is an important first step," she said.

ONCC Chair and Mount Prospect Mayor Arlene Juracek said she was encouraged by today's meeting. "We heard different points of view, everyone listened to each other and a productive discussion took place," Juracek said. "It was a group of people who wanted to reach a decision. The committee took an important step forward toward putting the wheels in motion on an Interim Fly Quiet Plan," she said. "All of the parties involved – CDA, SOC and the FAA are working together and talking to each other in a constructive way that will bring relief."

News Archives

- » 2016
- » 2015
- » 2014
- » 2013
- » 2012

The measure approved today seeks to establish a weekly runway rotation program at O'Hare during overnight hours that is designed to achieve a more balanced distribution of noise exposure for Chicago and suburban communities. Each period may consist of one arrival and one departure runway or one mixed use runway (runway used for both arrivals and departures). The rotation schedule would also be published for the public to view.

Under the current Fly Quiet Program, certain runways are predominately utilized for aircraft arrivals and departures. Communities near the flight paths of these designated runways are the most heavily impacted by aircraft noise at night. With a rotation program in place, the designated nighttime arrival and departure runways at O'Hare would be rotated on a weekly basis.

"The FAA looks to ONCC as the representation of all noise affected communities," said Commissioner Evans. "It is key that the ONCC has set up a process that garners input from those communities. The FAA has made it clear that they will focus on what ONCC recommends. The details of the plan must be developed by the FAA themselves and the experts. The FAA agrees with concept and they want it to work," Evans said.

She continued, "The city is committed to this process. We all share the same goal of giving people relief, both in the short and long term," Evans stated. "We will use every tool in the tool box to get there."

The ONCC Fly Quiet Committee was formed in fall 2015 to explore ways to modify O'Hare Fly Quiet procedures. The committee is comprised of nine voting members from Chicago and suburbs near O'Hare as well as representatives from SOC and Fair Allocation in Runways (FAiR).

CDA Presentation - 02/16/16

JDA Presentation - 02/16/16

APPENDIX 10

O'HARE NOISE COMPATIBILITY COMMISSION

O'HARE NOISE COMPATABILITY COMMISSION
AD HOC FLY QUIET COMMITTEE MEETING
Friday, March 11, 2016 7:45 a.m.
Café la Cave
2777 S. Mannheim Road, Des Plaines, IL

AGENDA

1. Call to Order – Mr. Joseph J. Annunzio, Chair
2. Roll Call
3. Approval of February 16, 2016 Meeting Minutes
4. Approval of Criteria for Departure Procedures
5. Next ONCC Ad Hoc Fly Quiet Committee Meeting - TBD
6. Comments from the Audience

The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings.

- Questions or comments should be limited to items placed on the meeting agenda or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.
- Before making comments or asking questions, identify yourself to the Committee Chair and members by providing them with your name and address.

7. Adjournment

ONCC Meeting: Friday, March 11, 2016, 8 a.m. Café la Cave, 2777 S. Mannheim Rd., Des Plaines, IL

ONCC Technical Committee Meeting: Tuesday, March 22, 2016, 9 a.m. Mount Prospect Village Hall, 50 South Emerson St., Mount Prospect, IL

***Disclaimer:** Final action may be taken by the committee on any items listed on this agenda

APPENDIX 11

O'HARE NOISE COMPATIBILITY COMMISSION

Arlene A. Juracek
Chair

Ginger S. Evans
Commissioner
Chicago Department of Aviation

Joseph J. Annunzio
Vice-Chair

Frank A. Damato
Chair, Residential Committee

Catherine Dunlap
Chair, Technical Committee

Judith Dunne Bernardi
Treasurer

Dr. Raymond J. Kuper
Chair, School Committee

Jeanette Camacho
Executive Director

Members:
Arlington Heights
Bartlett
Bellwood
Bensenville
Bloomingdale
Chicago
Chicago Wards
36, 38, 39, 40, 41, 45
Cook County
Des Plaines
Downers Grove
DuPage County
Elmwood Park
Franklin Park
Hanover Park
Harwood Heights
Hoffman Estates
Itasca
Lincolnwood
Maywood
Melrose Park
Morton Grove
Mount Prospect
Niles
Norridge
Northlake
Oak Park
Palatine
Park Ridge
River Forest
River Grove
Rolling Meadows
Rosemont
Schaumburg
Schiller Park
Stone Park
Wood Dale

School Districts:
59, 63, 64, 80, 81, 84, 84.5, 85.5, 86, 87, 88, 89, 214, 234, 299, 401

ONCC MEETING AGENDA
FRIDAY, JANUARY 8, 2016
Café la Cave, 2777 S. Mannheim Road, Des Plaines, IL. 8:00 a.m.

1. Call to Order – Mayor Arlene A. Juracek – ONCC Chair

2. Pledge of Allegiance

3. Membership Roll Call

4. Approval of November 6, 2015 ONCC Meeting Minutes

5. Report of the City of Chicago Department of Aviation
   a) CDA Noise Recommendations Task List Update
   b) October/November 2015 ANMS Report

6. Report of the Chair – Mayor Arlene A. Juracek
   a) FAA Response to Nighttime Utilization on Runway 10R/28L
   b) ONCC Correspondence to Commissioner Ginger S. Evans Regarding Noise Monitors
   c) 2016 Aviation Noise Symposium – February 28, 2016
   d) 2016 IGA Renewal

7. ONCC Standing Committee Reports/Ad Hoc Committee Reports
   a) Technical Committee - Ms. Catherine Dunlap, Chair
   b) Residential Committee – Mr. Frank A. Damato, Chair
   c) 2016 Nominating Committee – Mayor Jeffrey Sherwin, Chair
   d) Fly Quiet Committee – Mr. Joseph Annunzio, Chair

8. Report of ONCC Executive Director – Ms. Jeanette Camacho
   a) November/December 2015 Financial Report
   b) Outreach Workshops
   c) Next ONCC Meeting – March 11, 2016

9. Comments from Members

10. Comments from the Audience:
    The O'Hare Noise Compatibility Commission provides a public forum to address community noise issues related to aircraft operations at O'Hare International Airport. The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:

    Questions or comments should only be limited to items placed on the meeting agenda, or those that are included as part of the Commission's Work Plan, which focuses on aircraft noise mitigation at O'Hare International Airport.

    If you wish to address the ONCC, you must be present and complete the Comment/Question card outlining the question or area you wish to address.

P.O. Box 1126 • Des Plaines, IL 60017-1126
773-686-3198 • www.oharenoise.org

Before making comments or asking questions, identify yourself to the Chairman and Commission members by stating your name and address.

The Commission does recognize that public input is important and appreciates your cooperation regarding following the above guidelines.

11. Adjournment

Upcoming Meetings:
Next ONCC Fly Quiet Committee Meeting –
Monday, January 25, 2016, 10510 W. Zemke Road, Chicago, IL
9:00 a.m.

Next Technical Committee Meeting –
Tuesday, January 19, 2016, Mount Prospect Village Hall
50 S. Emerson, Mount Prospect, IL. 9:00 a.m.

Next O'Hare Noise Compatibility Commission Meeting –
Friday, March 11, 2016, Café la Cave, 2777 S. Mannheim Road
Des Plaines, IL. 8:00 a.m.

Next Residential Sound Insulation Committee Meeting –
Wednesday, February 17, 2016, Norridge Village Hall
4000 N. Olcott Avenue, Norridge, IL. 9:30 a.m.

Next School Sound Insulation Committee Meeting – TBD

ONCC Web site: www.oharenoise.org
Chicago Department of Aviation Web site: www.flychicago.com
Federal Aviation Administration: www.faa.gov

O’Hare Noise Compatibility Commission Meeting

January 8, 2016

Ginger S. Evans, Commissioner
City of Chicago, Department of Aviation

CHICAGO

KEY CONCEPTS

1. The North and South Control Towers are closed at night (10 p.m. to 6 a.m.) and neither is included in the Fly Quiet Program.

2. No recommendations shall require additional controllers, controller hours, or increased controller workload.

3. Runway 14L/32R was permanently closed on August 20, 2015 and the CDA has commenced decommissioning activities.

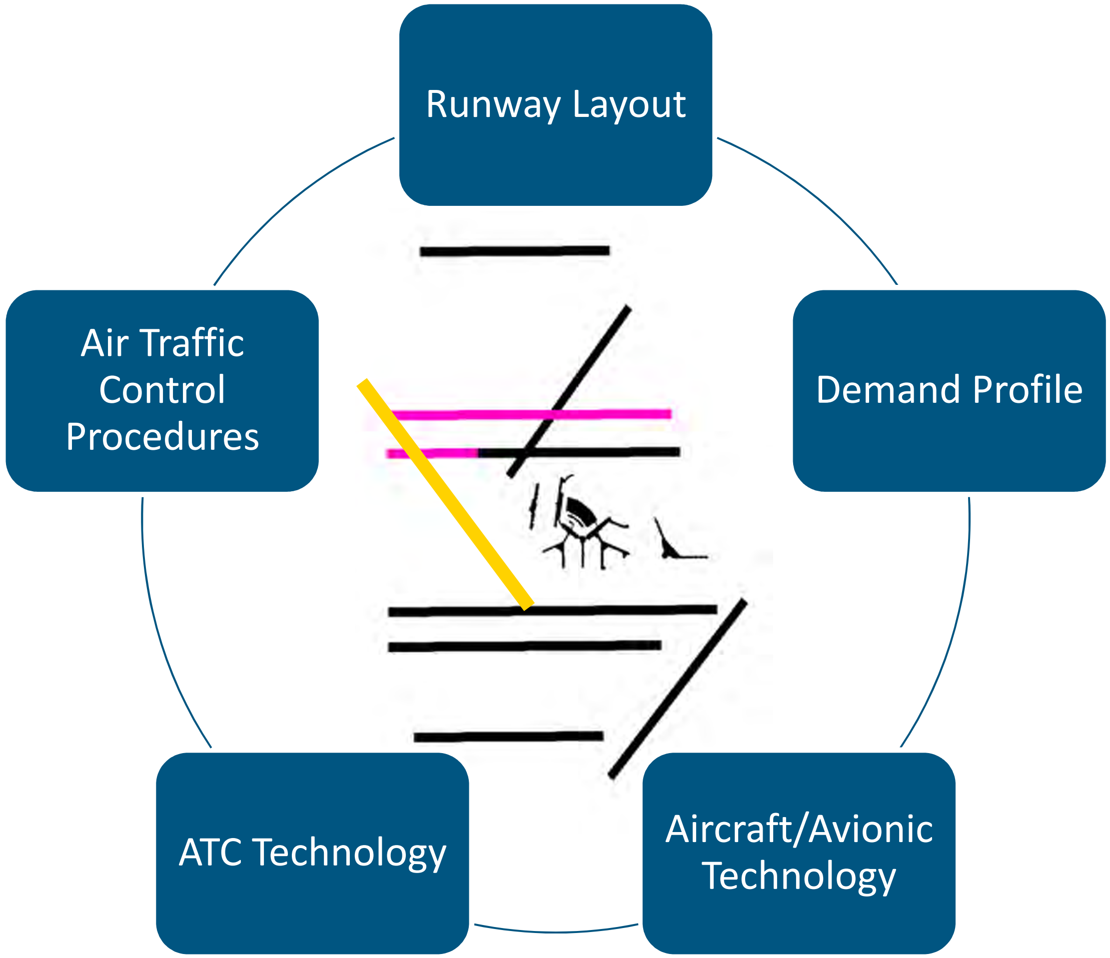
4. Runway 9C/27C is scheduled to open in 2020, which requires the closure of Runway 14R/32L.

    a. Runway 27C will utilize the same departure corridor as Runway 32L.

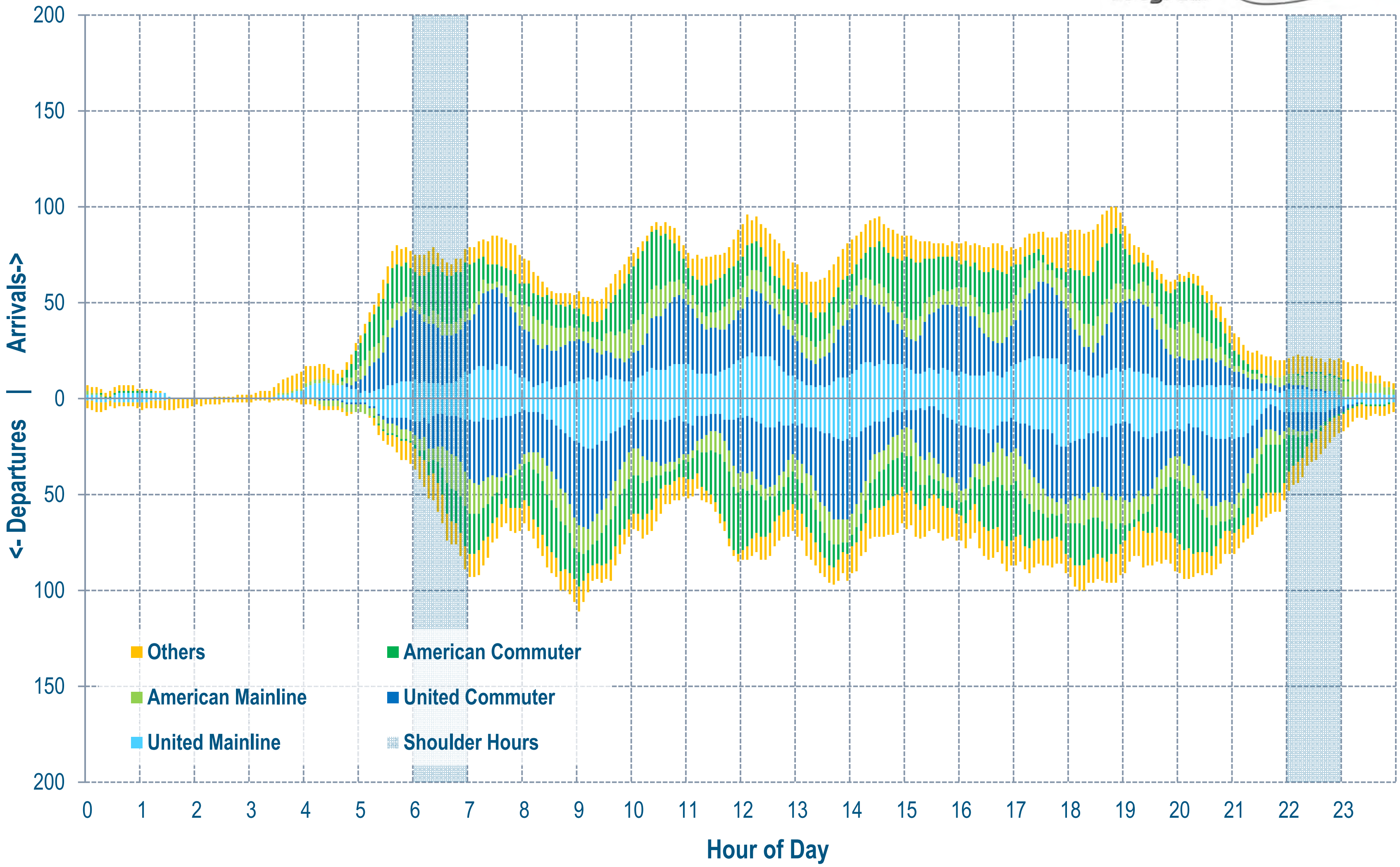
    b. Runway 14R/32L closure is also required to enable the construction of Western Access to O'Hare.

Review Operational Data/Changes since 1997

CHANGES SINCE 1997 FLY QUIET INCEPTION



AIRLINE OPERATIONS BY HOUR (AUGUST 6, 2015)



KEY CONCEPTS

Evening	→	Departure Demand	→	Fly Quiet I
Overnight	→	Low Demand	→	Fly Quiet II
Morning	→	Arrival Demand	→	Fly Quiet III

FLY QUIET COMMITTEE INITIATIVES

PBN Departure Procedures

- **Existing Procedures** (RNAV)
- **New Procedures** (RNAV)

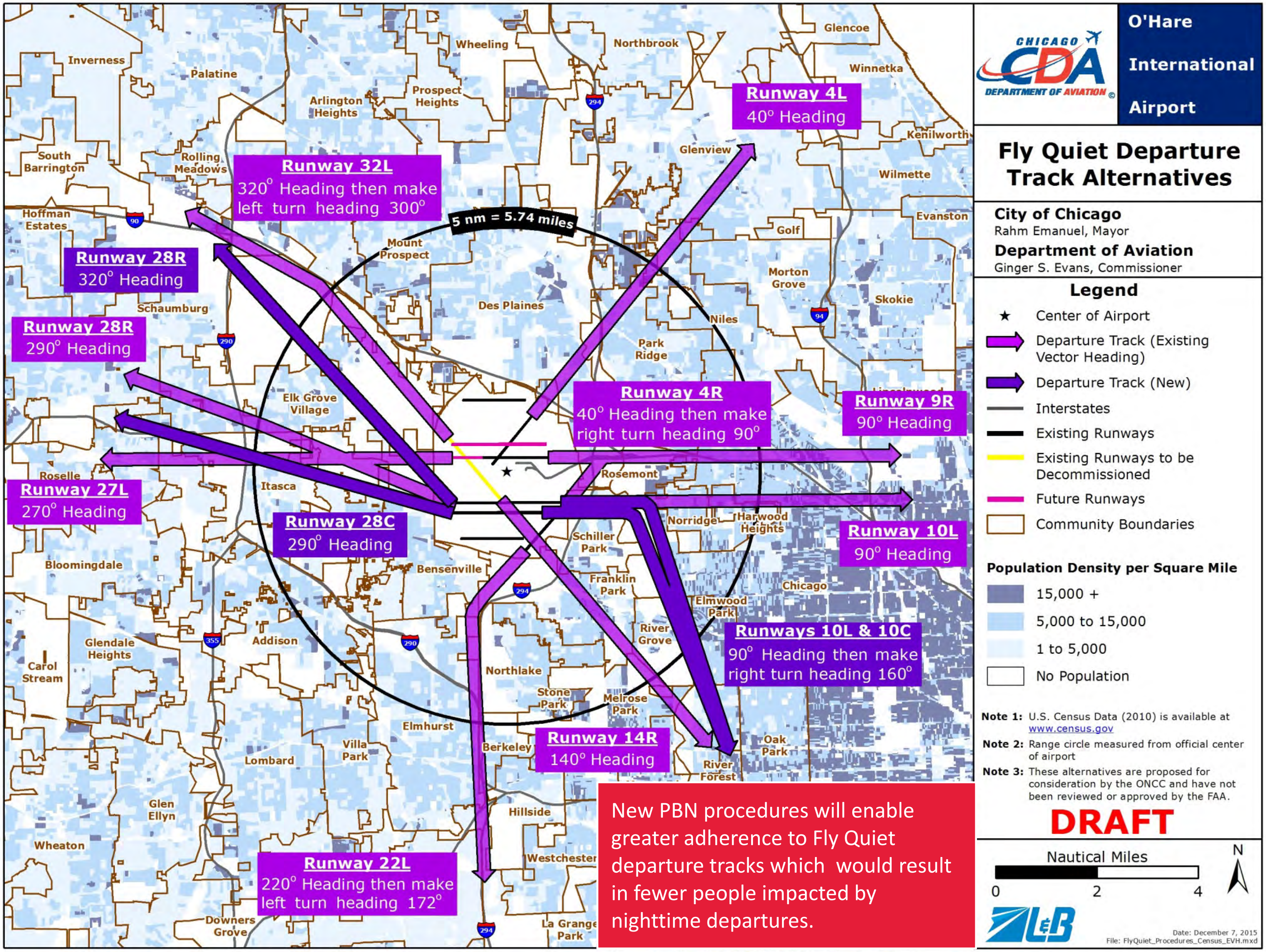
Three Fly Quiet Programs

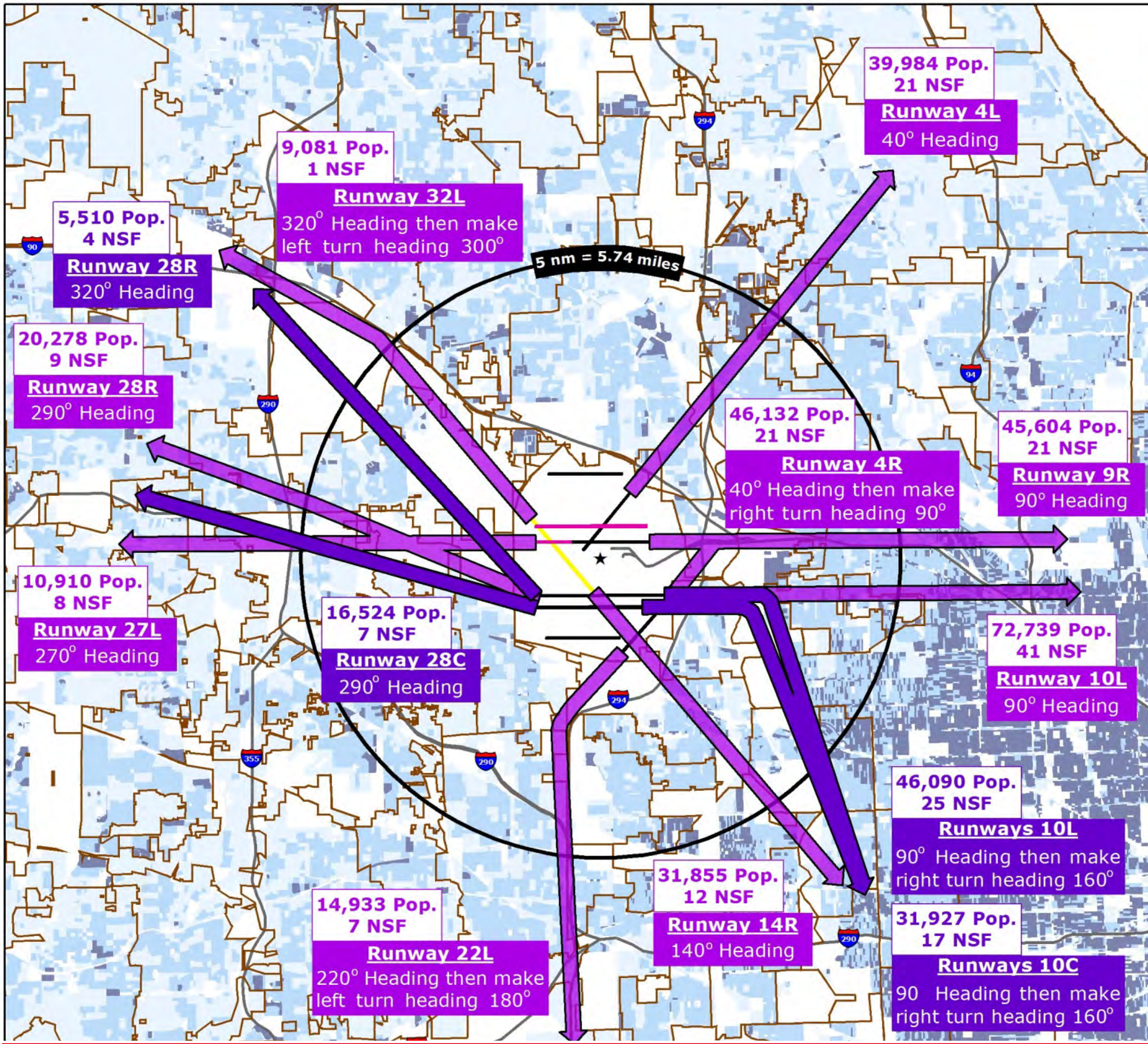
- **Fly Quiet I - Evening** (Four Configurations)
- **Fly Quiet III - Morning** (Two Configurations)

Fly Quiet II Rotation

- **Rotation** (Yes or No)
- **Frequency** (Weekly or Monthly)
- **Guidelines** (Criteria)

Performance Based Navigation (PBN) Departures


O'Hare International Airport
CHICAGO CDA DEPARTMENT OF AVIATION
Fly Quiet Departure Track Alternatives
City of Chicago
Rahm Emanuel, Mayor
Department of Aviation
Ginger S. Evans, Commissioner
Legend
Center of Airport
Departure Track (Existing Vector Heading)
Departure Track (New)
Interstates
Existing Runways
Existing Runways to be Decommissioned
Future Runways
Community Boundaries
Population Density per Square Mile
15,000 +
5,000 to 15,000
1 to 5,000
No Population
Note 1: U.S. Census Data (2010) is available at www.census.gov
Note 2: Range circle measured from official center of airport
Note 3: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
DRAFT
Nautical Miles
0 2 4
N
L&B
Date: December 7, 2015
File: FlyQuiet_Procedures_Census_EVH.mxd
5 nm = 5.74 miles
Runway 4L
40° Heading
Runway 32L
320° Heading then make left turn heading 300°
Runway 28R
320° Heading
Runway 28R
290° Heading
Runway 4R
40° Heading then make right turn heading 90°
Runway 9R
90° Heading
Runway 27L
270° Heading
Runway 28C
290° Heading
Runway 10L
90° Heading
Runways 10L & 10C
90° Heading then make right turn heading 160°
Runway 14R
140° Heading
Runway 22L
220° Heading then make left turn heading 172°
New PBN procedures will enable greater adherence to Fly Quiet departure tracks which would result in fewer people impacted by nighttime departures.
Inverness
Palatine
Wheeling
Northbrook
Glencoe
Winnetka
Kenilworth
Wilmette
Evanston
Arlington Heights
Prospect Heights
South Barrington
Rolling Meadows
Glenview
Golf
Hoffman Estates
Mount Prospect
Morton Grove
Skokie
Schaumburg
Des Plaines
Niles
Park Ridge
Elk Grove Village
Rosemont
Roselle
Itasca
Norridge
Harwood Heights
Schiller Park
Bloomingdale
Bensenville
Franklin Park
Chicago
Elmwood Park
Glendale Heights
Addison
River Grove
Carol Stream
Northlake
Stone Park
Melrose Park
Elmhurst
Berkeley
Oak Park
Villa Park
Lombard
River Forest
Glen Ellyn
Hillside
Wheaton
Westchester
Downers Grove
La Grange Park



CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

Fly Quiet Departure Track Alternatives

City of Chicago
Rahm Emanuel, Mayor
Department of Aviation
Ginger S. Evans, Commissioner

Legend

- ★ Center of Airport
- Departure Track (Existing Vector Heading)
- Departure Track (New)
- Interstates
- Existing Runways
- Existing Runways to be Decommissioned
- Future Runways
- Community Boundaries

Population Density per Square Mile

- 15,000 +
- 5,000 to 15,000
- 1 to 5,000
- No Population

Note 1: U.S. Census Data (2010) is available at www.census.gov
Note 2: Range circle measured from official center of airport
Note 3: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

DRAFT

Nautical Miles
0 2 4
N

L&B

Date: December 11, 2015
File: FlyQuiet_Procedures_Pop_NSF.mxd

Population and noise sensitive facilities were calculated based on 8.0 statute miles from runway end and 0.5 statute miles from each procedure centerline. Noise sensitive facilities included health care facilities, firehouses, and churches.

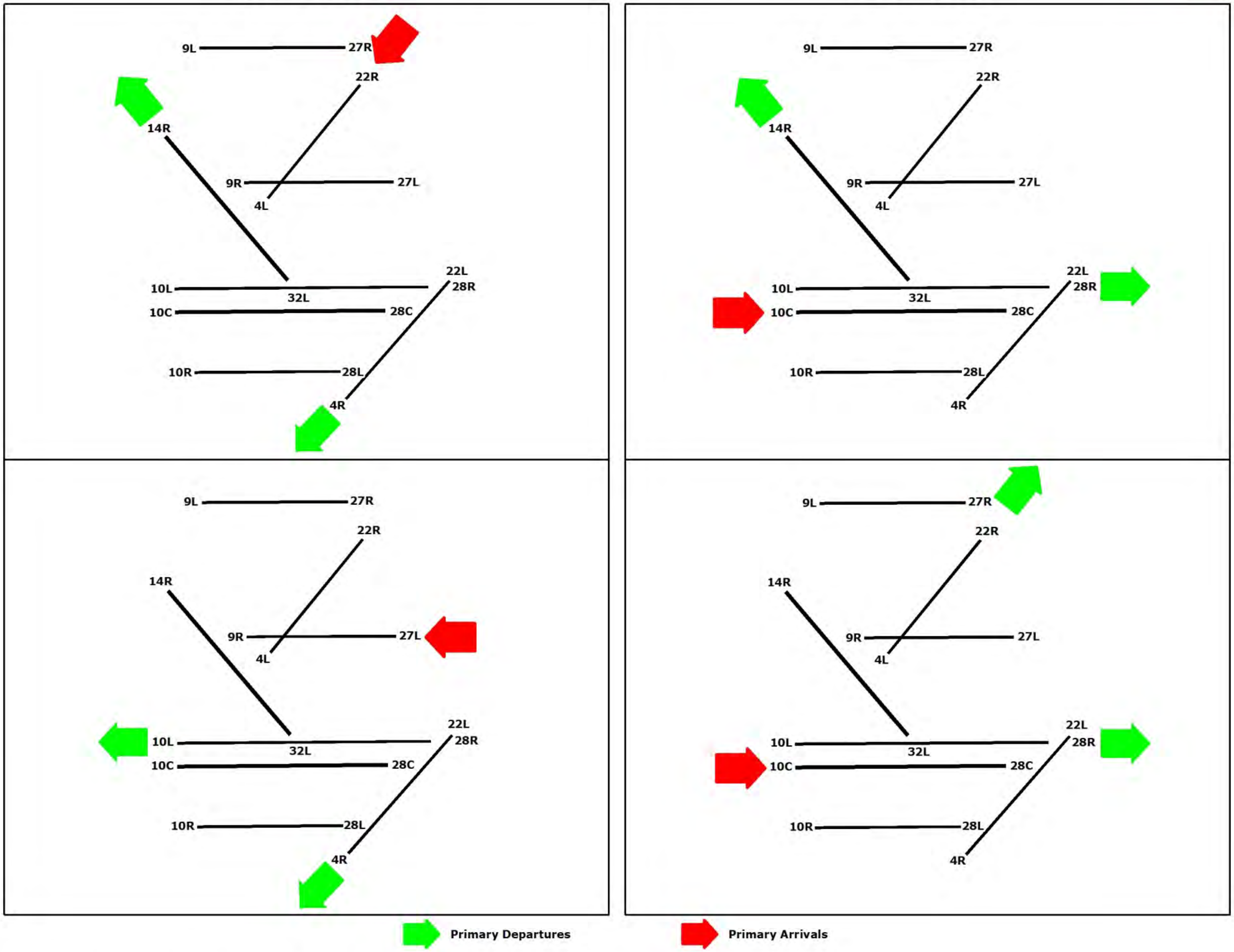
Fly Quiet I (Evening)

Fly Quiet I is a new program aimed at the evening hours when demand requires two departure runways.

FLY QUIET I (EVENING) ALTERNATIVES

DRAFT

West Flow | East Flow



Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: FAA will determine runway assignments based in part on the destination of each flight and the location of the initial departure fix.

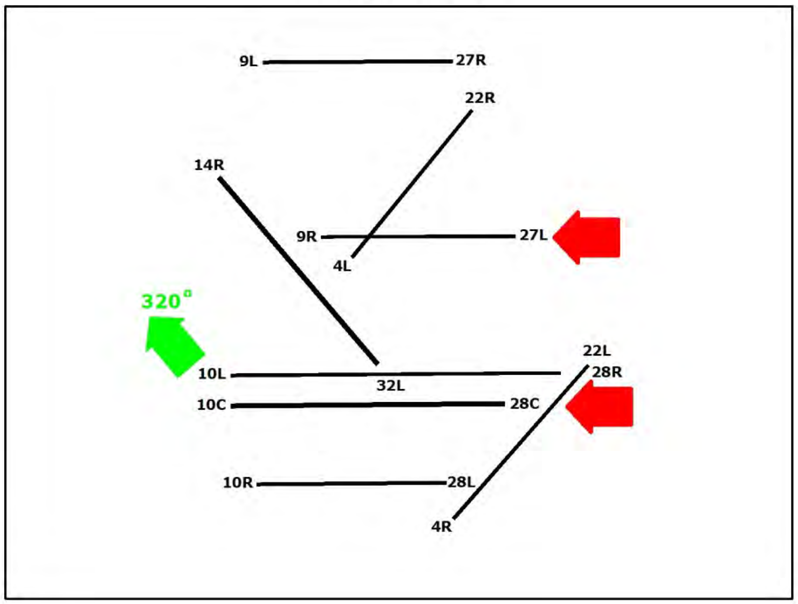
Fly Quiet III (Morning)

Fly Quiet III is a new program aimed at the morning hours when demand requires two arrival runways.

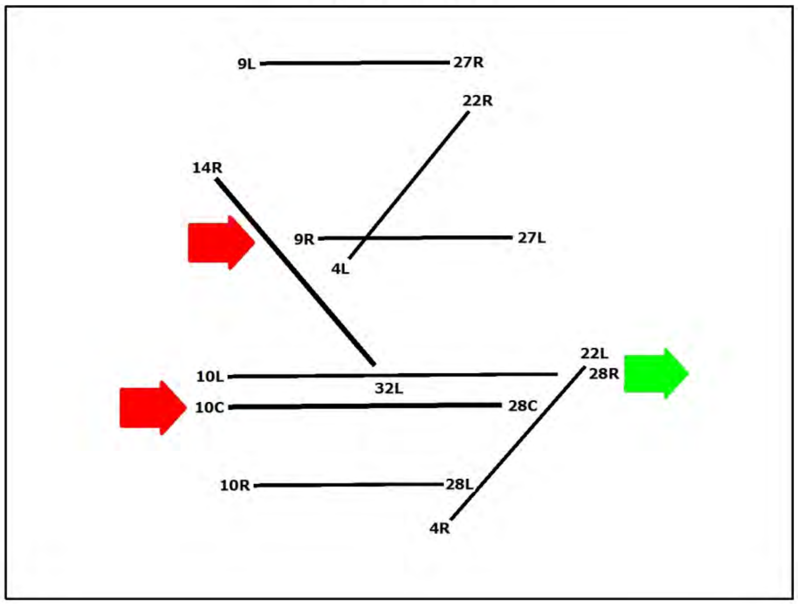
FLY QUIET III (MORNING) ALTERNATIVES

DRAFT

West Flow



East Flow



Primary Departures

Primary Arrivals

Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.

Fly Quiet II (Overnight)

Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out the noise.

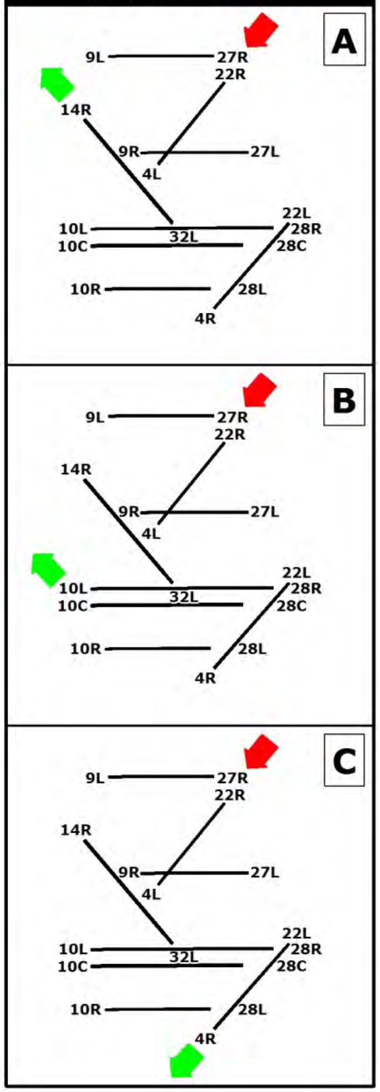
DRAFT

FLY QUIET II (OVERNIGHT) ROTATION

West Flow

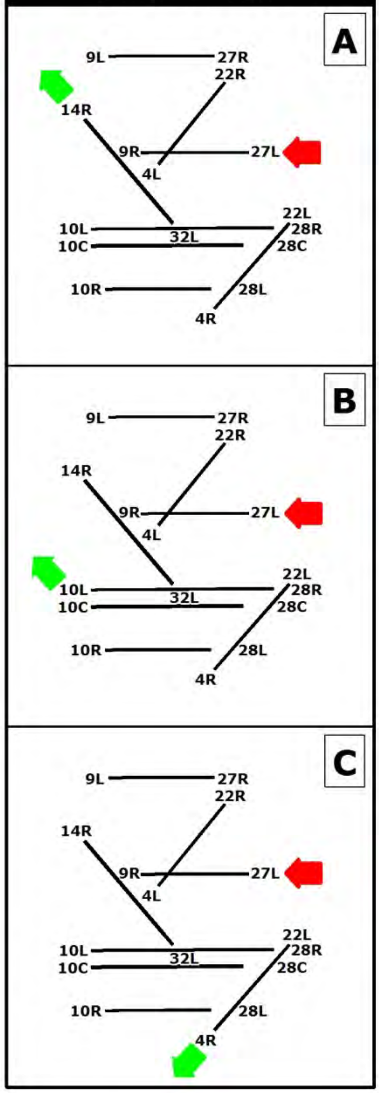
Period 1

22R Arrivals



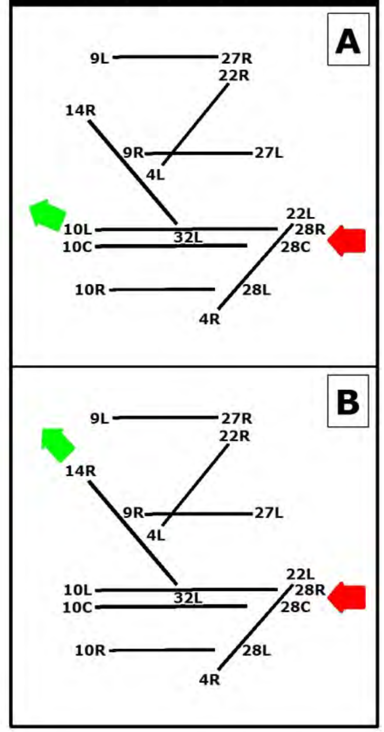
Period 2

27L Arrivals



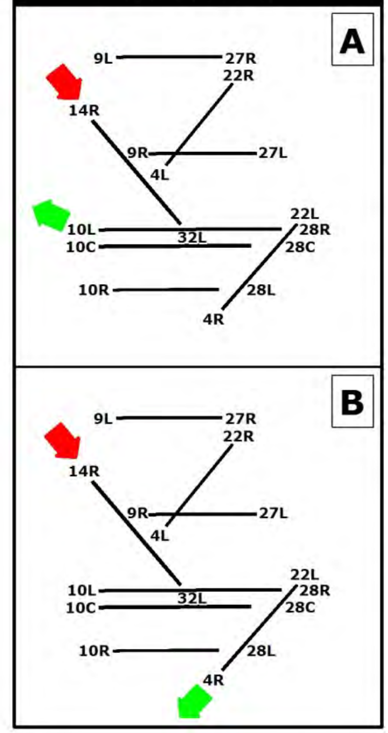
Period 3

28C & 28R Arrivals



Period 4

14R Arrivals



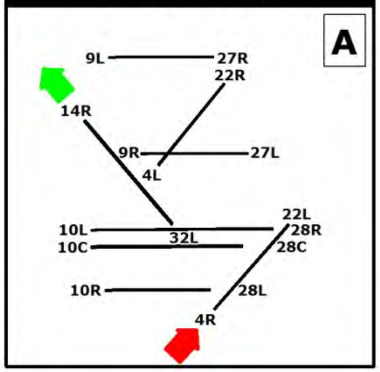
Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Alternatives that include 14R arrivals or 32L departures are interim until the decommissioning of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

FLY QUIET II (OVERNIGHT) ROTATION

East Flow

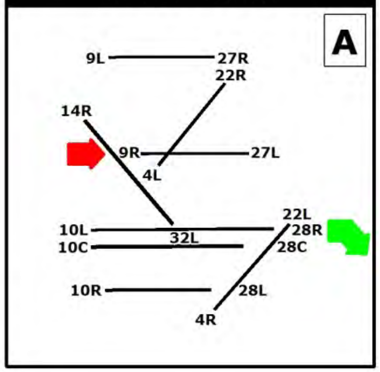
Period 1

4R Arrivals



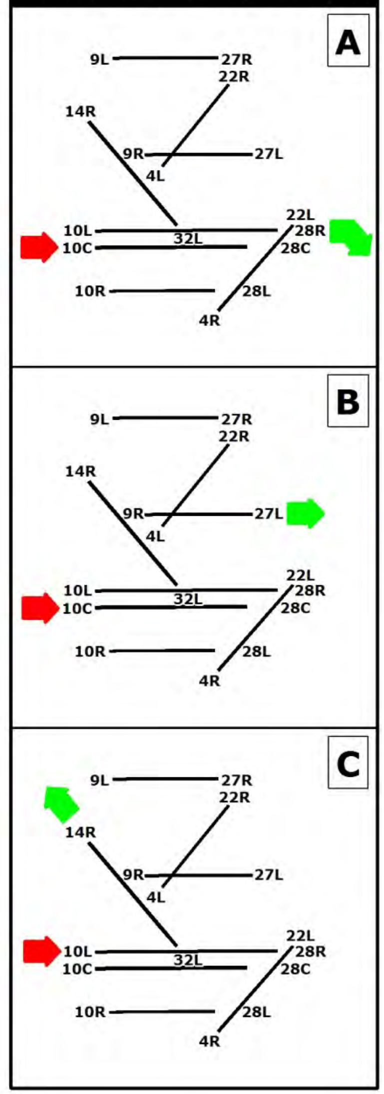
Period 2

9R Arrivals



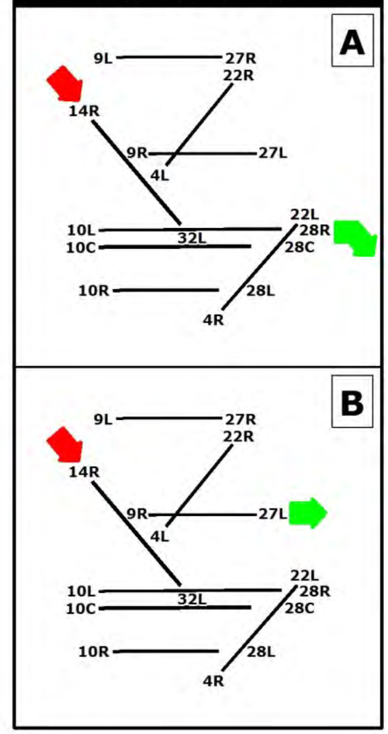
Period 3

10C & 10L Arrivals



Period 4

14R Arrivals



Note 1: These alternatives are proposed for consideration by the ONCC and have not been reviewed or approved by the FAA.
Note 2: Alternatives that include 14R arrivals or 32L departures are interim until the decommissioning of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

FLY QUIET II ROTATION METHOLOGY

1. Rotate configurations every period.

2. Don’t impact communities with the same operation type two periods in a row to the extent possible.

3. Coordinate runway closings with maintenance and inspection schedules to reduce unexpected changes.

4. Alternatives that include 14R arrivals or 32L departures are interim until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest can be utilized with other runways.

5. Alternative runways may need to be used to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs.

6. Periods are subject to change based on ONCC Review.

EXAMPLE
FLY QUIET II OVERNIGHT ROTATION

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
January-03	22R	22L	10C	10L
January-10	27L	28R	4R	32L
January-17	28R	32L	9R	10C
January-24	14R	28R	14R	9R
January-31	22R	32L	9R	10L
February-07	27L	22L	10L	32L
February-14	28C	28R	14R	10L
February-21	14R	22L	10L	9R
February-28	22R	22L	10C	10L
March-06	27L	28R	4R	32L
March-13	28R	32L	9R	10C
March-20	14R	28R	14R	9R
March-27	22R	32L	9R	10L
April-03	27L	22L	10L	32L
April-10	28C	28R	14R	10L
April-17	14R	22L	10L	9R
April-24	22R	22L	10C	10L
May-01	27L	28R	4R	32L
May-08	28R	32L	9R	10C
May-15	14R	28R	14R	9R
May-22	22R	32L	9R	10L
May-29	27L	22L	10L	32L
June-05	28C	28R	14R	10L
June-12	14R	22L	10L	9R
June-19	22R	22L	10C	10L
June-26	27L	28R	4R	32L

Date (Week Commencing)	West Flow		East Flow	
	Arrivals	Departures	Arrivals	Departures
July-03	28R	32L	9R	10C
July-10	14R	28R	14R	9R
July-17	22R	32L	9R	10L
July-24	27L	22L	10L	32L
July-31	28C	28R	14R	10L
August-07	14R	22L	10L	9R
August-14	22R	22L	10C	10L
August-21	27L	28R	4R	32L
August-28	28R	32L	9R	10C
September-04	14R	28R	14R	9R
September-11	22R	32L	9R	10L
September-18	27L	22L	10L	32L
September-25	28C	28R	14R	10L
October-02	14R	22L	10L	9R
October-09	22R	22L	10C	10L
October-16	27L	28R	4R	32L
October-23	28R	32L	9R	10C
October-30	14R	28R	14R	9R
November-06	22R	32L	9R	10L
November-13	27L	22L	10L	32L
November-20	28C	28R	14R	10L
November-27	14R	22L	10L	9R
December-04	22R	22L	10C	10L
December-11	27L	28R	4R	32L
December-18	28R	32L	9R	10C
December-25	14R	28R	14R	9R

Note 1: This alternative is proposed for consideration by the ONCC and has not been reviewed or approved by the FAA.
Note 2: Available runways are determined by CDA Operations, ATC, and prevailing winds.

NEXT STEPS

We are Here

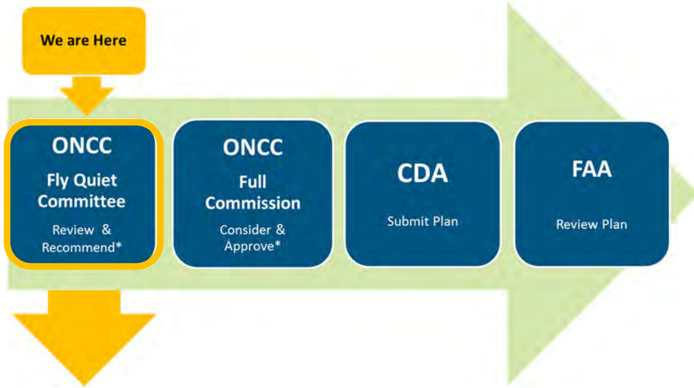
ONCC
Fly Quiet Committee
Review & Recommend*

ONCC
Full Commission
Consider & Approve*

CDA
Submit Plan

FAA
Review Plan

FLY QUIET COMMITTEE 3-STEP PROCESS



Data Gathering

October 2015
November 2015
December 2015

Discussion

December 2015
January 2016

Decisions

January 2016
February 2016

O'HARE & MIDWAY INTERNATIONAL AIRPORTS

Questions

APPENDIX 12

O'HARE NOISE COMPATIBILITY COMMISSION

Arlene A. Juracek
Chair

Ginger S. Evans
Commissioner
Chicago Department of Aviation

Joseph J. Annunzio
Vice-Chair

Frank A. Damato
Chair, Residential Committee

Catherine Dunlap
Chair, Technical Committee

Judith Dunne Bernardi
Treasurer

Dr. Raymond J. Kuper
Chair, School Committee

Jeanette Camacho
Executive Director

Members:
Arlington Heights
Bartlett
Bellwood
Bensenville
Bloomingdale
Chicago
Chicago Wards
36, 38, 39, 40, 41, 45
Cook County
Des Plaines
Downers Grove
DuPage County
Elmwood Park
Franklin Park
Hanover Park
Harwood Heights
Hoffman Estates
Itasca
Lincolnwood
Maywood
Melrose Park
Morton Grove
Mount Prospect
Niles
Norridge
Northlake
Oak Park
Palatine
Park Ridge
River Forest
River Grove
Rolling Meadows
Rosemont
Schaumburg
Schiller Park
Stone Park
Wood Dale

School Districts:
59, 63, 64, 80, 81, 84, 84.5, 85.5, 86, 87, 88, 89, 214, 234, 299, 401

ONCC MEETING AGENDA
FRIDAY, MARCH 11, 2016
Café la Cave, 2777 S. Mannheim Road, Des Plaines, IL. 8:00 a.m.

1. **Call to Order – Mayor Arlene A. Juracek – ONCC Chair**

2. **Pledge of Allegiance**

3. **Membership Roll Call**

FINAL ACTION MAY BE TAKEN BY THE COMMISSION ON ANY ITEM LISTED ON THIS AGENDA

4. **2016 ONCC Annual Meeting**
   a) 2015 ONCC Annual Report
   b) Ad Hoc Nominating Committee Report – Mayor Jeffrey T. Sherwin, Chair
      ONCC Resolution 2016-1: 2016 Slate of ONCC Officers
         Mayor Arlene A. Juracek for Chair
         Mr. Joseph J. Annunzio for Vice-Chair
         Dr. Raymond J. Kuper for Treasurer
   c) Recognition of Past Officer

5. **ONCC General Meeting**

   A. Approval of January 8, 2016 ONCC Meeting Minutes

   B. Report of the City of Chicago Department of Aviation
      a) CDA Noise Recommendations Task List Update
      b) December 2015/January 2016 ANMS Reports

   C. Report of the Chair – Mayor Arlene A. Juracek
      a) 2016 Aviation Noise Symposium Recap – February 28, 2016
      b) ONCC Statement to City of Chicago Aviation Committee

   D. Fly Quiet Committee - Mr. Joseph Annunzio, Chair
      a) Approval of Criteria for Modified Departure Headings
      b) Approval of Criteria for Fly Quiet II (Rotation)
      c) Approval of Criteria for Fly Quiet I and III

   E. ONCC Standing Committees
      a) Technical Committee - Ms. Catherine Dunlap, Chair
      b) Residential Committee – Mr. Frank A. Damato, Chair

P.O. Box 1126 • Des Plaines, IL 60017-1126
773-686-3198 • www.oharenoise.org

F. Report of ONCC Executive Director – Ms. Jeanette Camacho
a) Approval of January/February 2016 Financial Reports
b) Next ONCC Meeting – May 6, 2016

G. Comments from Members

H. Comments from the Audience:
The O'Hare Noise Compatibility Commission provides a public forum to address community noise issues related to aircraft operations at O'Hare International Airport. The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:

Questions or comments should only be limited to items placed on the meeting agenda, or those that are included as part of the Commission's Work Plan, which focuses on aircraft noise mitigation at O'Hare International Airport.

If you wish to address the ONCC, you must be present and complete the Comment/Question card outlining the question or area you wish to address.

Before making comments or asking questions, identify yourself to the Chairman and Commission members by stating your name and address.

The Commission does recognize that public input is important and appreciates your cooperation regarding following the above guidelines.

I. Adjournment

Upcoming Meetings:

Next Technical Committee Meeting –
Tuesday, March 22, 2016, Mount Prospect Village Hall
50 S. Emerson, Mount Prospect, IL. 9:00 a.m.

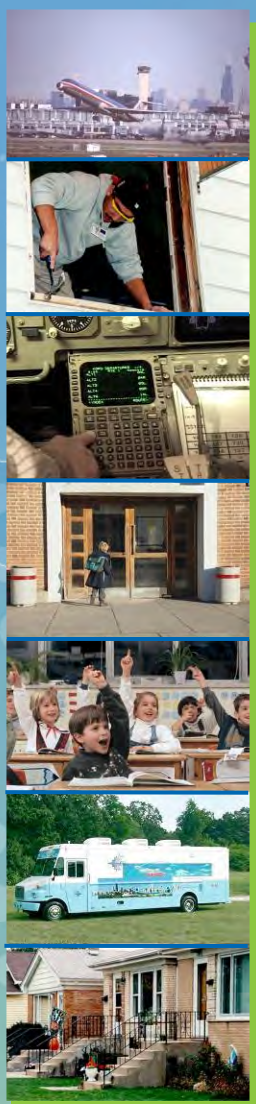
Next O'Hare Noise Compatibility Commission Meeting –
Friday, May 6, 2016, Café la Cave, 2777 S. Mannheim Road
Des Plaines, IL. 8:00 a.m.

Next Residential Sound Insulation Committee Meeting –
Wednesday, April 20, 2016, Norridge Village Hall
4000 N. Olcott Avenue, Norridge, IL. 9:30 a.m.

Next School Sound Insulation Committee Meeting – *TBD*

ONCC Web site: www.oharenoise.org
Chicago Department of Aviation Web site: www.flychicago.com
Federal Aviation Administration: www.faa.gov

O'HARE NOISE COMPATIBILITY COMMISSION



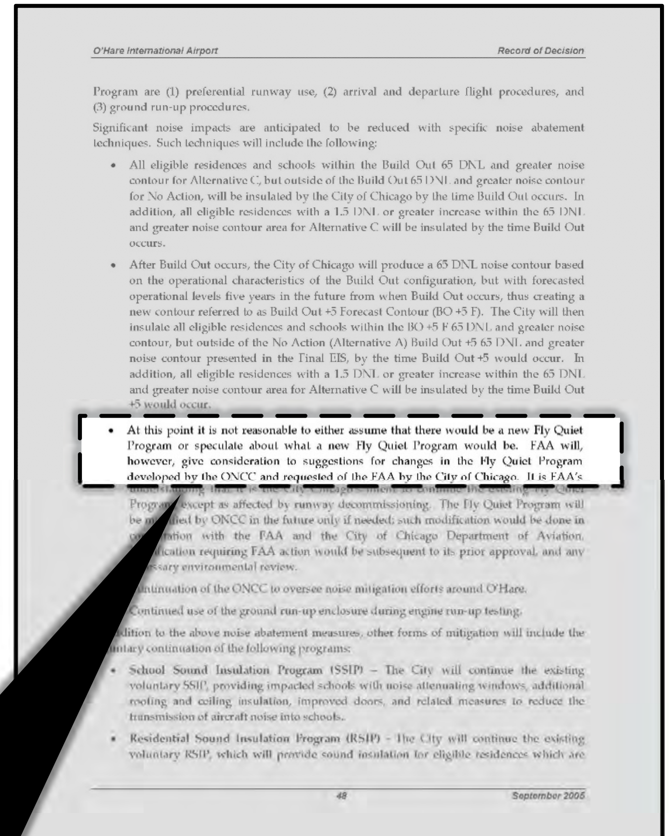
Fly Quiet Committee Approved Recommendations

Friday, March 11, 2016

REQUIREMENTS OF THE O’HARE MODERNIZATION ROD FOR FLY QUIET

Record of Decision (ROD) was issued on September 30, 2005

- Provided environmental approval of OMP on the condition of many requirements including noise requirements



O'Hare International Airport *Record of Decision*

Program are (1) preferential runway use, (2) arrival and departure flight procedures, and (3) ground run-up procedures.

Significant noise impacts are anticipated to be reduced with specific noise abatement techniques. Such techniques will include the following:

- All eligible residences and schools within the Build Out 65 DNL and greater noise contour for Alternative C, but outside of the Build Out 65 DNL and greater noise contour for No Action, will be insulated by the City of Chicago by the time Build Out occurs. In addition, all eligible residences with a 1.5 DNL or greater increase within the 65 DNL and greater noise contour area for Alternative C will be insulated by the time Build Out occurs.
- After Build Out occurs, the City of Chicago will produce a 65 DNL noise contour based on the operational characteristics of the Build Out configuration, but with forecasted operational levels five years in the future from when Build Out occurs, thus creating a new contour referred to as Build Out +5 Forecast Contour (BO +5 F). The City will then insulate all eligible residences and schools within the BO +5 F 65 DNL and greater noise contour, but outside of the No Action (Alternative A) Build Out +5 65 DNL and greater noise contour presented in the Final EIS, by the time Build Out +5 would occur. In addition, all eligible residences with a 1.5 DNL or greater increase within the 65 DNL and greater noise contour area for Alternative C will be insulated by the time Build Out +5 would occur.
- At this point it is not reasonable to either assume that there would be a new Fly Quiet Program or speculate about what a new Fly Quiet Program would be. FAA will, however, give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago. It is FAA's [illegible] Program except as affected by runway decommissioning. The Fly Quiet Program will be modified by ONCC in the future only if needed; such modification would be done in [illegible] with the FAA and the City of Chicago Department of Aviation. [illegible] requiring FAA action would be subsequent to its prior approval, and any [illegible] environmental review.
- [illegible] of the ONCC to oversee noise mitigation efforts around O'Hare.
- Continued use of the ground run-up enclosure during engine run-up testing.

[illegible] to the above noise abatement measures, other forms of mitigation will include the [illegible] continuation of the following programs:

- School Sound Insulation Program (SSIP) – The City will continue the existing voluntary SSIP, providing impacted schools with noise attenuating windows, additional roofing and ceiling insulation, improved doors, and related measures to reduce the transmission of aircraft noise into schools.
- Residential Sound Insulation Program (RSIP) – The City will continue the existing voluntary RSIP, which will provide sound insulation for eligible residences which are

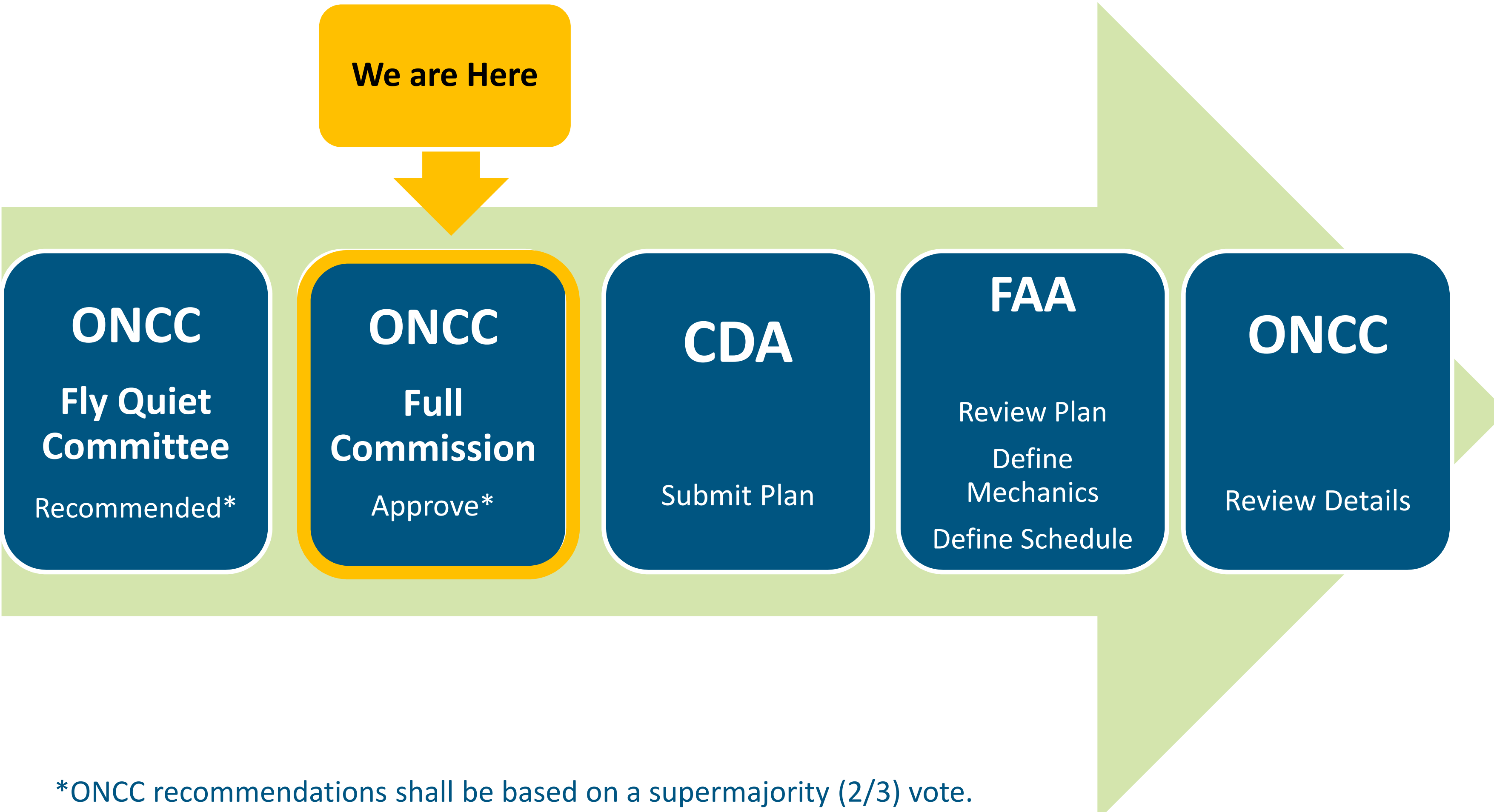
48 *September 2005*

“At this point it is not reasonable to either assume that there would be a new Fly Quiet Program or speculate about what a new Fly Quiet Program would be. FAA will, however, give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago.”

FAA Record of Decision for O’Hare Modernization, September 30, 2015, page 48)

O’HARE & MIDWAY INTERNATIONAL AIRPORTS

FLY QUIET REDEVELOPMENT PROCESS



*ONCC recommendations shall be based on a supermajority (2/3) vote.

FLY QUIET INITIATIVES – DECISION CRITERIA TO BE DISCUSSED

Refine Departure Procedures
- Review Existing Departure Headings
- Define New Departure Headings
- Require Full Runway Length

APPROVED BY COMMITTEE

Define Three Fly Quiet Programs
- Establish Three Programs
- Establish Evening Program
- Redefine Overnight Program
- Establish Morning Program

APPROVED BY COMMITTEE

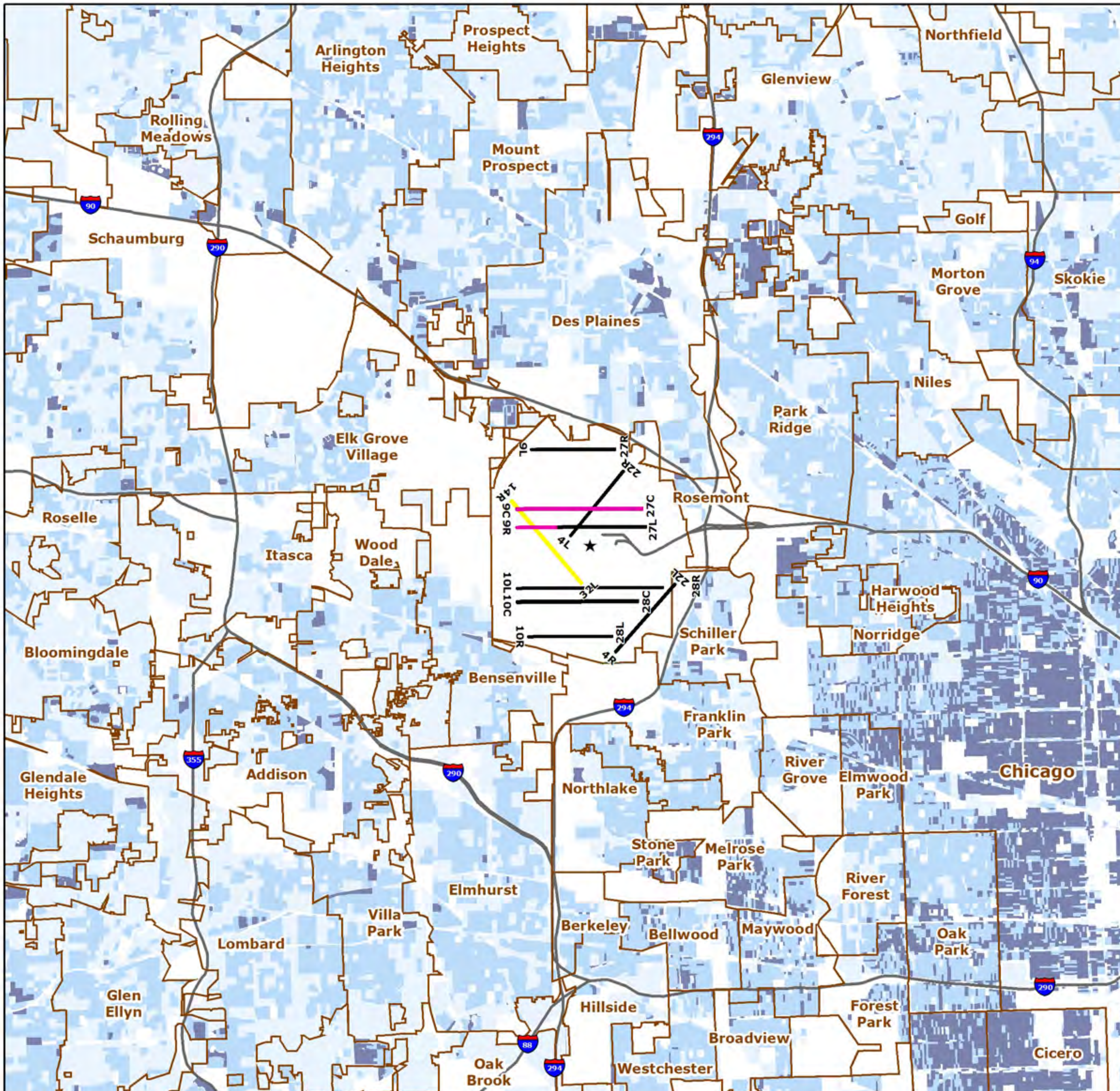
Establish Fly Quiet II Rotation Plan
- Establish Weekly Rotation Plan
- Alternate East/West Flow
- Avoid Consecutive Impacts
- Reduce Use of 10L/28R
- Include 14R and 32L
- Conduct Test

APPROVED BY COMMITTEE

Require ONCC Review

Departure Procedures

Existing and new Departure Procedures will be examined and refined in order to maximize compatible land use and reduce population impacts.



CHICAGO CDA DEPARTMENT OF AVIATION

O'Hare International Airport

Population Density

City of Chicago
Rahm Emanuel, Mayor
Department of Aviation
Ginger S. Evans, Commissioner

Legend

★ Center of Airport
Interstates
Existing Runways
Existing Runway to be Decommissioned
Future Runways
Community Boundaries

Population Density per Square Mile

15,000 +
5,000 to 15,000
1 to 5,000
No Population

Note 1: U.S. Census Data (2010) is available at www.census.gov

Miles
0 2 4
N

Date: February 25, 2016
File: FlyQuiet_Base.mxd

APPROVED CRITERIA

Departure Procedures | Three Fly Quiet Programs | Fly Quiet II Rotation

1. **Review Existing Departure Headings** – Review existing Fly Quiet departure procedures so flight tracks are aligned over compatible land use **(SOC FQ-8), (SOC FQ-10)**
2. **Define New Departure Headings** – Develop new departure procedures for new headings as follows: **(SOC FQ-10)**
    a) 9R – straight, then turn to northeast
    b) 10L – straight, then turn to southeast
    c) 10C – straight, then turn to southeast
    d) 28R – turn to northwest
    e) 28C – turn to northwest
    f) Other alternatives as deemed appropriate by the FAA
3. **Require Full Runway Length** – All Departure should utilize the full-length of the runway. **(SOC FQ-19)**
4. **Require ONCC Review** – Final procedure designs are to be reviewed by ONCC prior to finalization and publication.

Fly Quiet I (Evening) & Fly Quiet III (Morning)

Fly Quiet I is a new program aimed at the evening hours when demand requires two departure runways.

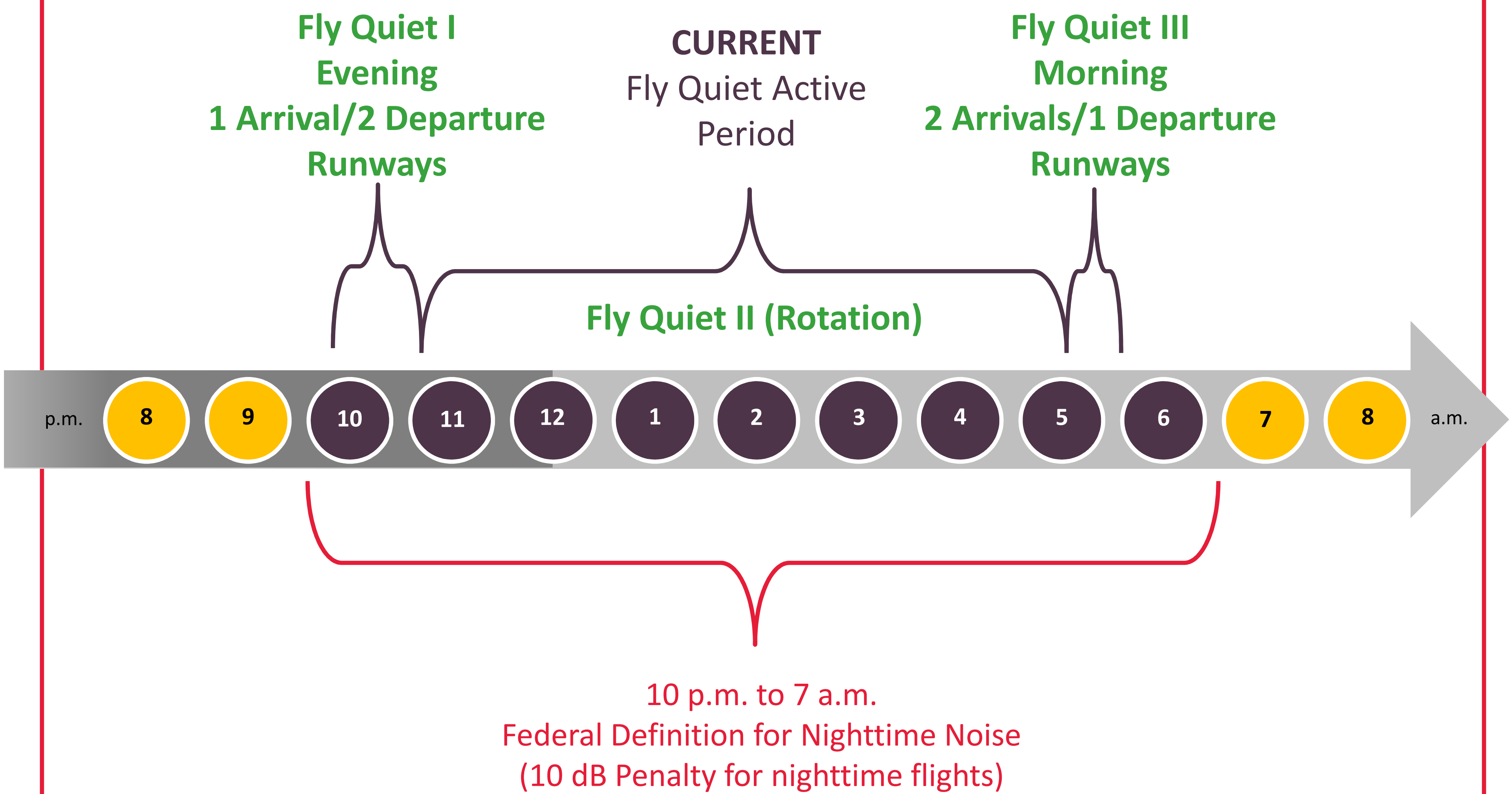
Fly Quiet III is a new program aimed at the morning hours when demand requires two arrival runways.

FQ-I and FQ-III Defined

Departure Procedures | **Three Fly Quiet Programs** | Fly Quiet II Rotation

1. The current Fly Quiet Program defines a single set of preferred noise-compatible runways to be used during nighttime hours from 10 p.m. to 7 a.m., assuming demand can be served with a single arrival runway and departure runway.
2. The program allows the FAA to use additional runways if demand requires more than one arrival or departure runway. However, the current program does not designate which runways can be used during such conditions.
3. Because demand requires more than 1 departure runway in the late evening hours and more than 1 arrival runway in the early morning hours, the FAA currently uses other runways in these hours but without guidance from the ONCC about the most noise compatible runways.
4. The purpose of this initiative is to provide guidance to the FAA about which runways are preferred during late evening when 2 departure runways are needed(FQ-I) and during early morning hours when 2 arrival runways are needed (FQ-III).

THREE FLY QUIET PERIODS



APPROVED CRITERIA

Departure Procedures | **Three Fly Quiet Programs** | Fly Quiet II Rotation

1. **Establish Three Programs** – Request FAA/CDA to establish three Fly Quiet Programs to align with nighttime demand patterns.
2. **Establish Evening Program** – Establish Fly Quiet I aimed at the evening hours when demand requires two departure runways. **(SOC FQ-17)**
3. **Redefine Overnight Program** – Redefine the existing Fly Quiet program as Fly Quiet II to address overnight hours when demand requires a single arrival or departure runway. This program will be further defined to include a runway rotation plan to spread out the noise. **(SOC FQ-18)**
4. **Establish Morning Program** – Establish Fly Quiet III aimed at the morning hours when demand requires two arrival runways. **(SOC FQ-17)**
5. **Require ONCC Review** – Final Program to be reviewed by ONCC prior to finalization and publication.

Fly Quiet II (Overnight)

Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out community noise exposure. This program applies to overnight hours in which demand can be served by a single arrival or departure runway.

FLY QUIET ROTATION – TENTATIVE TIMELINE

ONCC RESPONSIBILITY

Decision on Implementation

Review Feedback

Develop Criteria for Post-Test Analysis

ONCC Reviews Test Plan — May 6

ONCC Approves Criteria (Tentative) — March 11

Fly Quiet Committee Criteria — February 16

CDA & FAA RESPONSIBILITY

NEPA Analysis Depending on Plan Selected (FAA)

Six Month Test (FAA)
Collect Feedback (CDA)

Analyze Test Plan

FAA Review/Preparation for Test
(CDA/FAA Coordination)

CDA Submits Plan to FAA

Timeline:

2017

December

November

October

June

May

April

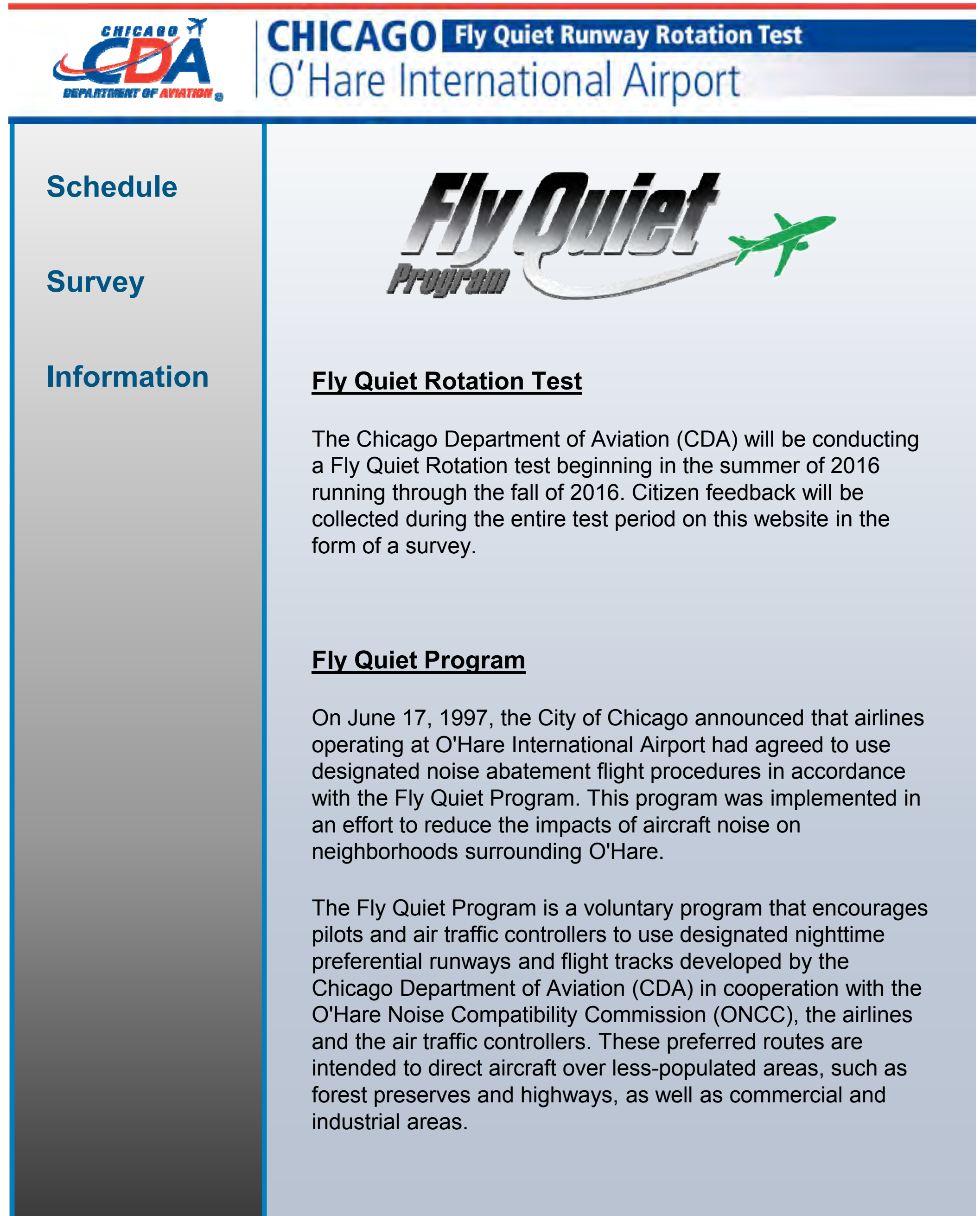
March

February

2016

COMMUNITY OUTREACH/FEEDBACK DURING THIS SUMMER'S RUNWAY ROTATION TEST

- Fly Quiet Website
  - Summary of Test Plan
  - Published Rotation Schedule
  - Feedback Survey
- ONCC will Review Feedback



CHICAGO Fly Quiet Runway Rotation Test
O'Hare International Airport

Schedule

Survey

Information

Fly Quiet Rotation Test

The Chicago Department of Aviation (CDA) will be conducting a Fly Quiet Rotation test beginning in the summer of 2016 running through the fall of 2016. Citizen feedback will be collected during the entire test period on this website in the form of a survey.

Fly Quiet Program

On June 17, 1997, the City of Chicago announced that airlines operating at O'Hare International Airport had agreed to use designated noise abatement flight procedures in accordance with the Fly Quiet Program. This program was implemented in an effort to reduce the impacts of aircraft noise on neighborhoods surrounding O'Hare.

The Fly Quiet Program is a voluntary program that encourages pilots and air traffic controllers to use designated nighttime preferential runways and flight tracks developed by the Chicago Department of Aviation (CDA) in cooperation with the O'Hare Noise Compatibility Commission (ONCC), the airlines and the air traffic controllers. These preferred routes are intended to direct aircraft over less-populated areas, such as forest preserves and highways, as well as commercial and industrial areas.

APPROVED CRITERIA

Departure Procedures | Three Fly Quiet Programs | **Fly Quiet II Rotation**

1. **Establish Rotation Plan** – Request the FAA/CDA establish a weekly runway rotation program for Fly Quiet II (Overnight hours) to achieve a more balanced distribution of noise exposure. Each period may consist of one arrival and one departure runway or one mixed use runway (runway used for both arrivals and departures). **(SOC FQ-18)**
2. **Alternate East and West Flow (5 knot Tailwind)** – Minimize the potential for consecutive periods of east flow or west flow runway use to the extent possible, except when conditions require the opposite flow due to a tailwind exceeding 5 knots.
3. **Avoid Consecutive Community Impacts** – Minimize the potential for impacting communities with the same operation type (arrival or departure) two periods in a row.
4. **Reduce Use of 10L/28R** – Include Runway 10L/28R in the rotation but reduce its use if needed by assigning it for departing aircraft that require additional runway length to the extent possible. Prioritize the use of other runways to the extent possible for flights that do not require additional runway length.
5. **Include 14R and 32L** – Include 14R arrivals and 32L departures until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest could be utilized with other runways to the extent possible. **(FAiR Recommendation)**
6. **Conduct a Test and Monitor Performance** – Ask FAA to Conduct a 6-month test that applies these principles. Request CDA records nightly runway use and collects citizen feedback for ONCC review.
7. **Require ONCC Review** – Final rotation plans including any changes are to be reviewed by ONCC after the test prior to finalization and publication.

APPENDIX 13

O'HARE NOISE COMPATIBILITY COMMISSION

Arlene A. Juracek
Chair

Joseph J. Annunzio
Vice-Chair

Dr. Raymond J. Kuper
Treasurer
Chair, School Committee

Ginger S. Evans
Commissioner
Chicago Department of Aviation

Frank A. Damato
Chair, Residential Committee

Catherine Dunlap
Chair, Technical Committee

Jeanette Camacho
Executive Director

Members:
Arlington Heights
Bensenville
Bloomingdale
Chicago
Chicago Wards
36, 38, 39, 40, 41, 45
Cook County
Des Plaines
Downers Grove
DuPage County
Elmwood Park
Franklin Park
Hanover Park
Harwood Heights
Hoffman Estates
Itasca
Lincolnwood
Maywood
Melrose Park
Mount Prospect
Niles
Norridge
Northlake
Palatine
Park Ridge
River Forest
River Grove
Rolling Meadows
Rosemont
Schaumburg
Schiller Park
Stone Park
Wood Dale

School Districts:
59, 63, 64, 80, 81, 84,
84.5, 85.5, 86, 87, 89,
214, 234, 299, 401

ONCC MEETING AGENDA
FRIDAY, MAY 6, 2016
Café la Cave, 2777 S. Mannheim Road
Des Plaines, IL 8:00 AM

FINAL ACTION MAY BE TAKEN BY THE COMMISSION ON ANY ITEM LISTED ON THIS AGENDA

1. **Call to Order – Mayor Arlene A. Juracek- ONCC Chair**

2. **Pledge of Allegiance**

3. **Membership Roll Call**

4. **Approval of March 11, 2016, ONCC Meeting Minutes**
   Action Requested: Approval

5. **Approval of Membership Renewal for Village of Bartlett: ONCC Resolution 2016-2**
   Action Requested: Approval

6. **Approval of Proposed Fly Quiet Rotation Plan**
   Action Requested: Approval

7. **Report of the City of Chicago Department of Aviation**
   a) CDA Noise Recommendations Task List Update
   b) February/March 2016 ANMS Reports
      Action Requested: Informational

8. **ONCC Standing Committee Reports**
   a) Technical Committee – Ms. Catherine Dunlap, Chair
      Action Requested: Informational

9. **Report of ONCC Executive Director – Ms. Jeanette Camacho**
   a) Approval of January-April 2016 Financial Reports
      Action Requested: Approval
   b) Next ONCC Meeting – June 3, 2016
      Action Requested: Informational

10. **Comments from Members**

11. **Comments from the Audience**:
    The O'Hare Noise Compatibility Commission provides a public forum to address community noise issues related to aircraft operations at O'Hare International Airport. The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:

- Questions or comments should only be limited to items placed on the meeting agenda, or those that are included as part of the Commission's Work Plan, which focuses on aircraft noise mitigation at O'Hare International Airport.
- If you wish to address the ONCC, you must be present and complete the Comment/Question card outlining the question or area you wish to address.
- Before making comments or asking questions, identify yourself to the Chairman and Commission members by stating your name and address.
- The Commission does recognize that public input is important and appreciates your cooperation regarding following the above guidelines.

12. Adjournment

Upcoming Meetings:

Next Technical Committee Meeting –
Tuesday, May 17, 2016, Mount Prospect Village Hall
50 S. Emerson, Mount Prospect, IL. 9:00 a.m.

Next O'Hare Noise Compatibility Commission Meeting –
Friday, June 3, 2016, Café la Cave, 2777 S. Mannheim Road
Des Plaines, IL. 8:00 a.m.

Next Residential Sound Insulation Committee Meeting –
Wednesday, June 15, 2016, Norridge Village Hall
4000 N. Olcott Avenue, Norridge, IL. 9:30 a.m.

Next School Sound Insulation Committee Meeting – *TBD*

ONCC Web site: www.oharenoise.org
Chicago Department of Aviation Web site: www.flychicago.com
Federal Aviation Administration: www.faa.gov

O'Hare Noise Compatibility Commission Meeting

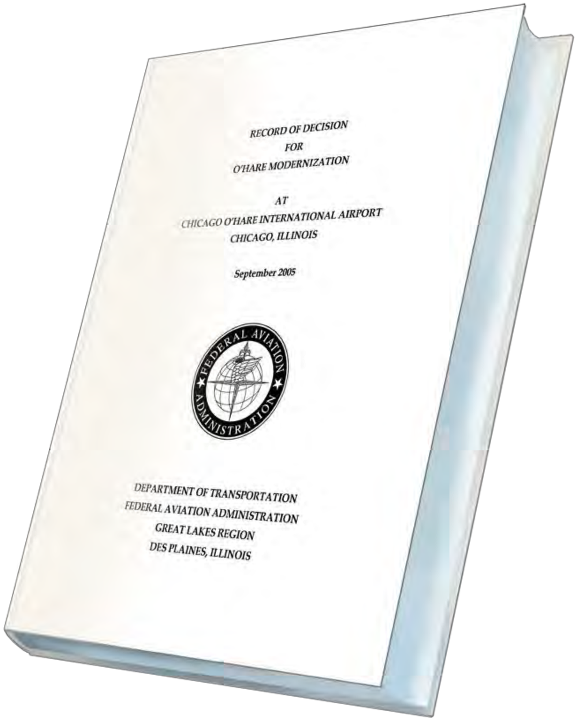
May 6, 2016

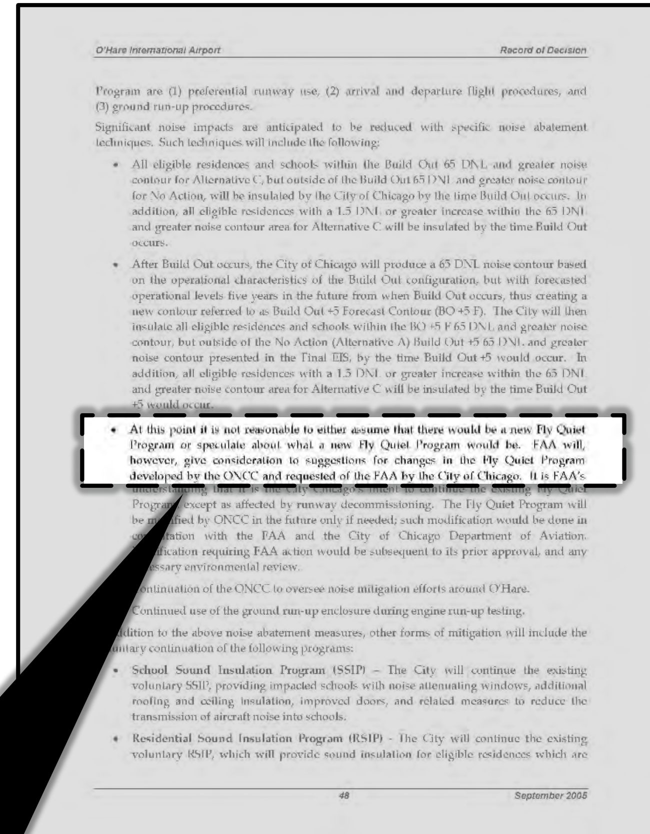
Test of Proposed

Interim Fly Quiet Runway Rotation Plan

O’HARE MODERNIZATION ROD - FLY QUIET

Record of Decision (ROD) was issued on September 30, 2005





O'Hare International Airport — Record of Decision

Program are (1) preferential runway use, (2) arrival and departure flight procedures, and (3) ground run-up procedures.

Significant noise impacts are anticipated to be reduced with specific noise abatement techniques. Such techniques will include the following:

- All eligible residences and schools within the Build Out 65 DNL and greater noise contour for Alternative C, but outside of the Build Out 65 DNL and greater noise contour for No Action, will be insulated by the City of Chicago by the time Build Out occurs. In addition, all eligible residences with a 1.5 DNL or greater increase within the 65 DNL and greater noise contour area for Alternative C will be insulated by the time Build Out occurs.
- After Build Out occurs, the City of Chicago will produce a 65 DNL noise contour based on the operational characteristics of the Build Out configuration, but with forecasted operational levels five years in the future from when Build Out occurs, thus creating a new contour referred to as Build Out +5 Forecast Contour (BO +5 F). The City will then insulate all eligible residences and schools within the BO +5 F 65 DNL and greater noise contour, but outside of the No Action (Alternative A) Build Out +5 65 DNL and greater noise contour presented in the Final EIS, by the time Build Out +5 would occur. In addition, all eligible residences with a 1.5 DNL or greater increase within the 65 DNL and greater noise contour area for Alternative C will be insulated by the time Build Out +5 would occur.
- At this point it is not reasonable to either assume that there would be a new Fly Quiet Program or speculate about what a new Fly Quiet Program would be. FAA will, however, give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago. It is FAA's understanding that it is the City Chicago's intent to continue the existing Fly Quiet Program except as affected by runway decommissioning. The Fly Quiet Program will be modified by ONCC in the future only if needed; such modification would be done in consultation with the FAA and the City of Chicago Department of Aviation. Modification requiring FAA action would be subsequent to its prior approval, and any necessary environmental review.
- Continuation of the ONCC to oversee noise mitigation efforts around O'Hare.
- Continued use of the ground run-up enclosure during engine run-up testing.

In addition to the above noise abatement measures, other forms of mitigation will include the voluntary continuation of the following programs:

- **School Sound Insulation Program (SSIP)** – The City will continue the existing voluntary SSIP, providing impacted schools with noise attenuating windows, additional roofing and ceiling insulation, improved doors, and related measures to reduce the transmission of aircraft noise into schools.
- **Residential Sound Insulation Program (RSIP)** - The City will continue the existing voluntary RSIP, which will provide sound insulation for eligible residences which are

48 — September 2005

“At this point it is not reasonable to either assume that there would be a new Fly Quiet Program or speculate about what a new Fly Quiet Program would be. FAA will, however, give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago.”

FAA Record of Decision for O’Hare Modernization, September 30, 2005, page 48)

O’HARE & MIDWAY INTERNATIONAL AIRPORTS

MISSION STATEMENT FOR FLY QUIET ENHANCEMENT

The ONCC acknowledges that aircraft noise at night impacts the residents in communities around O'Hare and that conditions have changed since Fly Quiet Program inception in 1997. The ONCC desires to evaluate ways to modify the Fly Quiet Program and make recommendations to the Chicago Department of Aviation (CDA) based on ONCC consensus.

Accomplished through a Six-Month Test of the Proposed Runway Rotation Plan

Fly Quiet II (Overnight)

Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out community noise exposure. This program applies to overnight hours in which demand can be served by a single arrival or departure runway.

FLY QUIET RUNWAY ROTATION TEST – TENTATIVE TIMELINE

ONCC RESPONSIBILITY		Timeline	CDA & FAA RESPONSIBILITY
Decision on Implementation		2017	NEPA Analysis on Revised Plan (FAA)
ONCC Reviews Feedback Suggest Changes if Needed		2017	CDA Revise Plan if needed based on ONCC feedback
Develop Criteria for Post-Test Analysis		December November ↕ July	Six Month Test (FAA) Collect Feedback (CDA)
		June	CDA Submits Plan to FAA Analyze Test Plan
ONCC Approves Test Plan (Tentative)	May 6	May	
		April	CDA Develops Plan with Stakeholder Input
ONCC Reviews Criteria	March 11	March	
Fly Quiet Committee Established Criteria	February 16	February	
		2016	

SUMMARY – TEST OF FLY QUIET RUNWAY ROTATION PLAN

1. Applies during overnight hours when demand allows for one arrival/one departure runway
2. Balanced Approach for 12 Weekly Periods
   - 6 Parallel Configurations and 6 Diagonal Configurations
   - 6 West Flow and 6 East Flow
3. Reflects Stakeholder input
   - ONCC – Meets ONCC Criteria
   - SOC – Supports this Plan
   - FAiR – Use of Diagonals
4. Includes mixed-use runways
5. Includes procedures to limit use of longest runways
6. Primary and secondary runway use configurations defined to accommodate wind conditions
7. Communication Protocols defined for CDA and Airlines

TEST OF FLY QUIET RUNWAY ROTATION PLAN – KEY FEATURES

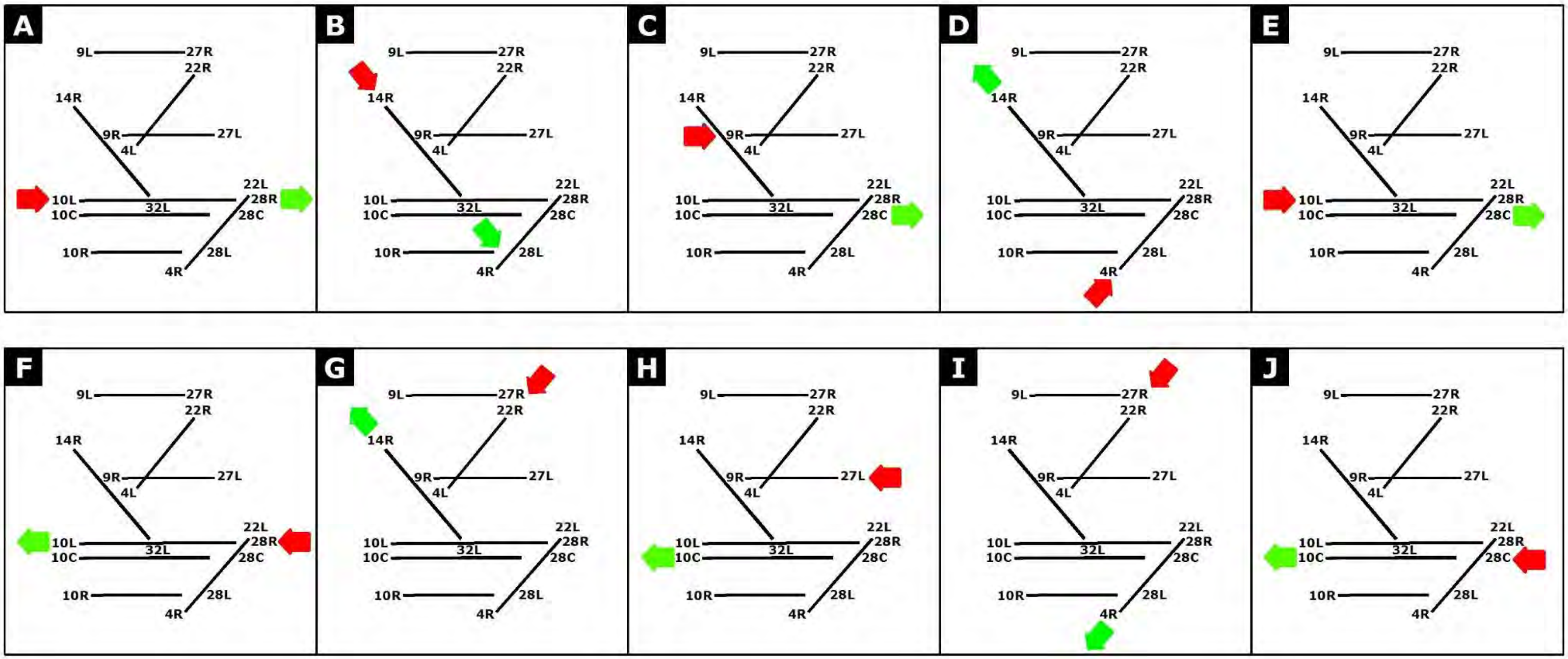
1. Six-month test to obtain actual data and community feedback
2. Based on existing departure headings – does not include new departure headings
3. Applies during overnight hours when demand is low
4. Balances runway use by approximately 45 arrivals and 35 departures on an average night during overnight hours
5. Maintains existing sound insulation commitments and criteria
6. Potential for implementation depends on ONCC review of test results

APPROVED CRITERIA

Departure Procedures | Three Fly Quiet Programs | **Fly Quiet II Rotation**

1. **Establish Rotation Plan (SOC FQ-18)** – Request the FAA/CDA establish a weekly runway rotation program for Fly Quiet II (Overnight hours) to achieve a more balanced distribution of noise exposure. Each period may consist of one arrival and one departure runway or one mixed use runway (runway used for both arrivals and departures).
2. **Alternate East and West Flow (5 knot Tailwind)** – Minimize the potential for consecutive periods of east flow or west flow runway use to the extent possible, except when conditions require the opposite flow due to a tailwind exceeding 5 knots.
3. **Avoid Consecutive Community Impacts** – Minimize the potential for impacting communities with the same operation type (arrival or departure) two periods in a row.
4. **Reduce Use of 10L/28R** – Include Runway 10L/28R in the rotation but reduce its use if needed by assigning it for departing aircraft that require additional runway length to the extent possible. Prioritize the use of other runways to the extent possible for flights that do not require additional runway length.
5. **Include 14R and 32L (FAiR Recommendation)** – Include 14R arrivals and 32L departures until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest could be utilized with other runways to the extent possible.
6. **Conduct a Test and Monitor Performance** – Ask FAA to Conduct a 6-month test that applies these principles. Request CDA records nightly runway use and collects citizen feedback for ONCC review.
7. **Require ONCC Review** – Final rotation plans including any changes are to be reviewed by ONCC after the test prior to finalization and publication.

PROPOSED FLY QUIET II RUNWAY CONFIGURATIONS



Notes

- Use of these runways is voluntary, pilots are encouraged to use designated nighttime preferential runways.
- Alternative runways may be used to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs. Available runways are determined by Chicago Department of Aviation (CDA) Operations, and prevailing winds.
- This proposed plan has not been approved by the Federal Aviation Administration (FAA).
- Runway 10L/28R, if closed for noise abatement, would be made available for flights that require additional runway length after operator coordination, at a minimum of 2 hours prior to arrival or departure, with Chicago Department of Aviation (CDA) Operations.

POTENTIAL USAGE BASED ON HISTORICAL WINDS

<table>
<tr><th>CONFIGURATION</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>A</td><td rowspan="3">53.4%</td><td rowspan="3">60.0%</td><td rowspan="3">76.7%</td><td rowspan="3">76.2%</td><td rowspan="3">81.6%</td><td rowspan="3">83.6%</td><td rowspan="3">83.1%</td><td rowspan="3">89.9%</td><td rowspan="3">84.9%</td><td rowspan="3">72.0%</td><td rowspan="3">63.1%</td><td rowspan="3">61.5%</td></tr>
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<tr><td>E</td></tr>
<tr><td>B</td><td>61.0%</td><td>59.2%</td><td>70.2%</td><td>74.3%</td><td>83.7%</td><td>88.1%</td><td>89.1%</td><td>89.5%</td><td>83.0%</td><td>72.3%</td><td>69.8%</td><td>66.9%</td></tr>
<tr><td>D</td><td>56.8%</td><td>65.3%</td><td>69.9%</td><td>65.5%</td><td>69.5%</td><td>76.7%</td><td>79.1%</td><td>82.7%</td><td>78.1%</td><td>67.0%</td><td>56.4%</td><td>56.0%</td></tr>
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</table>

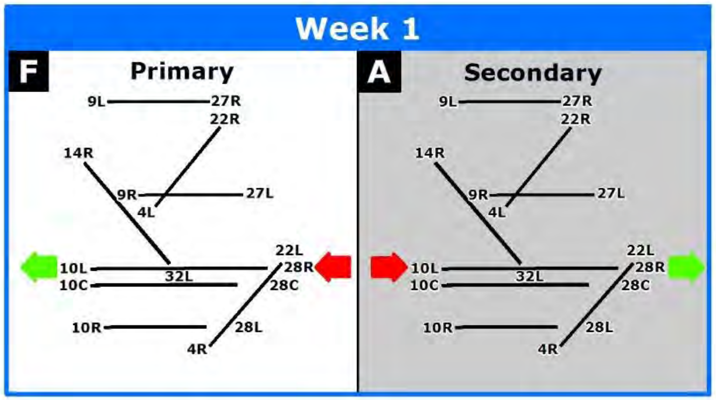
Percentages are based on a tailwind limit of 5 knots and a crosswind limit of 25 knots; includes wind gusts.

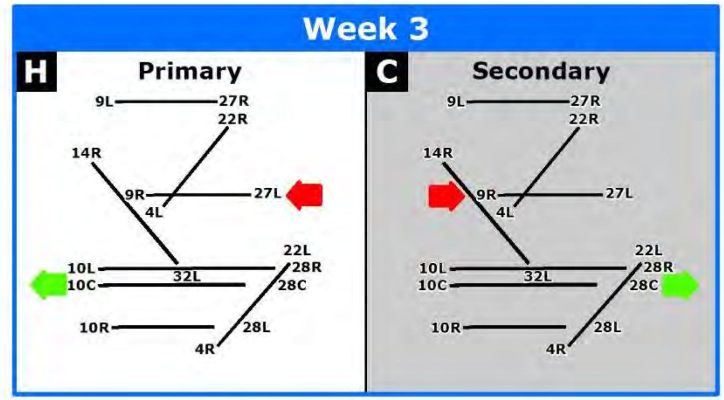
Source: National Climatic Data Center, 8/1/2005 - 7/31/2015, 10:00 p.m. to 6:59 a.m. http://www.ncdc.noaa.gov

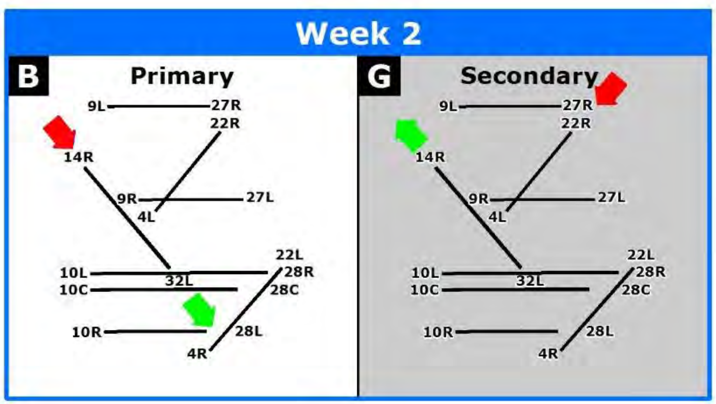
Does not include historical runway maintenance, inspections or other non-weather runway closures

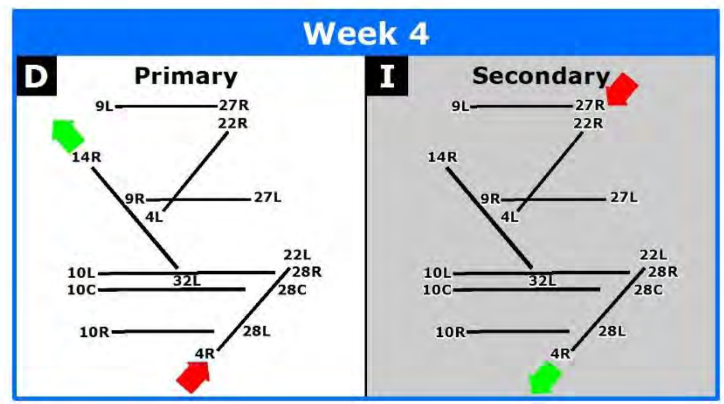
PROPOSED FLY QUIET II RUNWAY ROTATION PLAN (Weeks 1-4)

This chart illustrates the proposed runway use configurations for weeks 1 through 4 of the Fly Quiet II Runway Rotation Plan (out of a 12 week rotation schedule). For each week, a primary and secondary runway use configuration is provided to accommodate potential changes in wind direction. Historical wind data suggests that the primary runway use configuration can be used the majority of the time. The runway use configurations have been defined to balance noise exposure by community by complying with the criteria approved by the ONCC Fly Quiet Committee. The use of east flow, west flow, parallel, and diagonal runways is rotated on a weekly basis. Special procedures have been defined to accommodate additional aircraft that require added runway length.









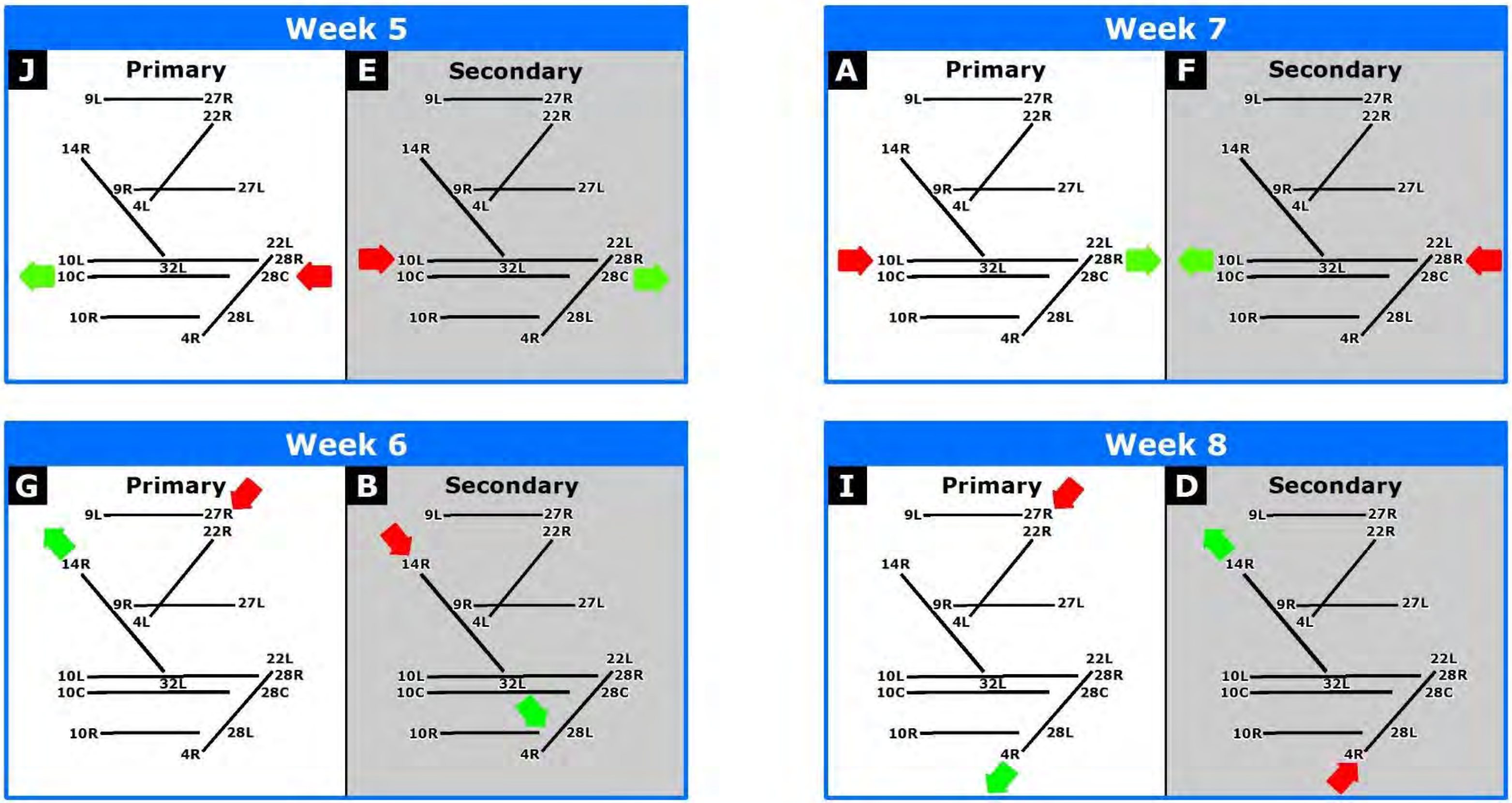
Notes

- Use of these runways is voluntary, pilots are encouraged to use designated nighttime preferential runways.
- Alternative runways may be used to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs. Available runways are determined by Chicago Department of Aviation (CDA) Operations, and prevailing winds.
- This proposed plan has not been approved by the Federal Aviation Administration (FAA).
- Runway 10L/28R, if closed for noise abatement, would be made available for flights that require additional runway length after operator coordination, at a minimum of 2 hours prior to arrival or departure, with Chicago Department of Aviation (CDA) Operations.

Arrivals
Departures

PROPOSED FLY QUIET II RUNWAY ROTATION PLAN (Weeks 5-8)

This chart illustrates the proposed runway use configurations for weeks 5 through 8 of the Fly Quiet II Runway Rotation Plan (out of a 12 week rotation schedule). For each week, a primary and secondary runway use configuration is provided to accommodate potential changes in wind direction. Historical wind data suggests that the primary runway use configuration can be used the majority of the time. The runway use configurations have been defined to balance noise exposure by community by complying with the criteria approved by the ONCC Fly Quiet Committee. The use of east flow, west flow, parallel, and diagonal runways is rotated on a weekly basis. Special procedures have been defined to accommodate additional aircraft that require added runway length.



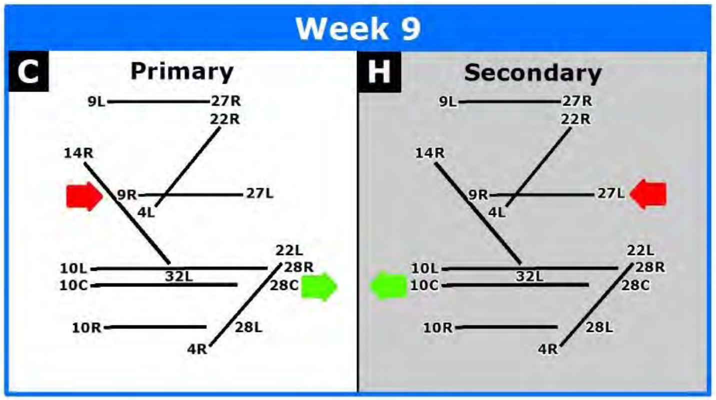
Notes

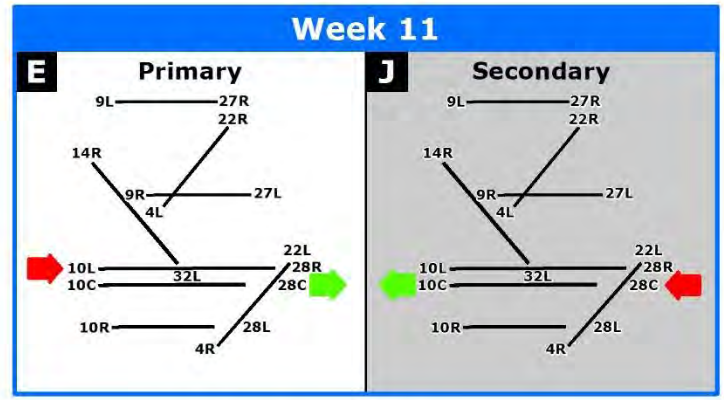
- Use of these runways is voluntary, pilots are encouraged to use designated nighttime preferential runways.
- Alternative runways may be used to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs. Available runways are determined by Chicago Department of Aviation (CDA) Operations, and prevailing winds.
- This proposed plan has not been approved by the Federal Aviation Administration (FAA).
- Runway 10L/28R, if closed for noise abatement, would be made available for flights that require additional runway length after operator coordination, at a minimum of 2 hours prior to arrival or departure, with Chicago Department of Aviation (CDA) Operations.

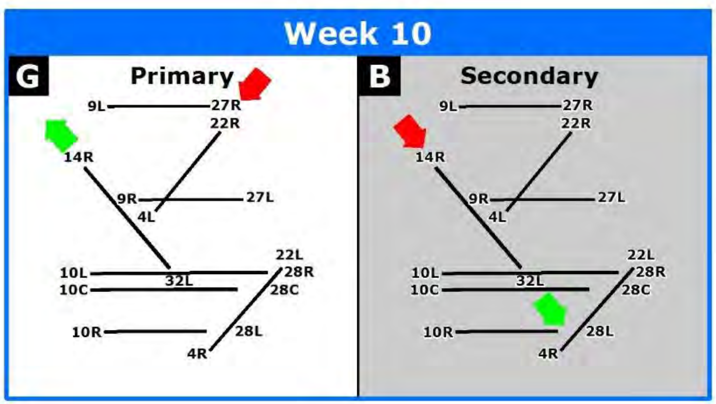
4/15/2016

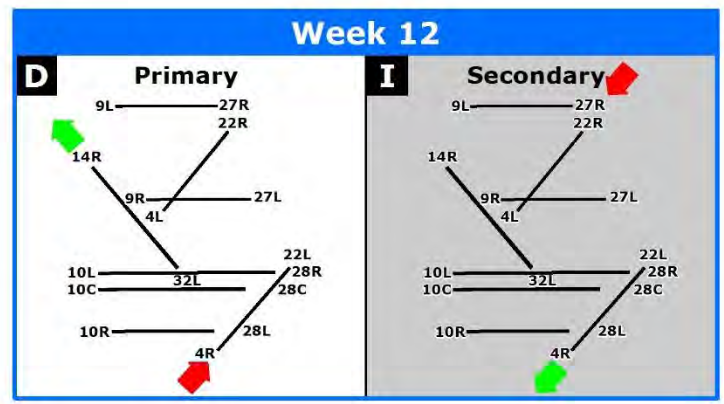
PROPOSED FLY QUIET II RUNWAY ROTATION PLAN (Weeks 9-12)

This chart illustrates the proposed runway use configurations for weeks 9 through 12 of the Fly Quiet II Runway Rotation Plan (out of a 12 week rotation schedule). For each week, a primary and secondary runway use configuration is provided to accommodate potential changes in wind direction. Historical wind data suggests that the primary runway use configuration can be used the majority of the time. The runway use configurations have been defined to balance noise exposure by community by complying with the criteria approved by the ONCC Fly Quiet Committee. The use of east flow, west flow, parallel, and diagonal runways is rotated on a weekly basis. Special procedures have been defined to accommodate additional aircraft that require added runway length.









Notes

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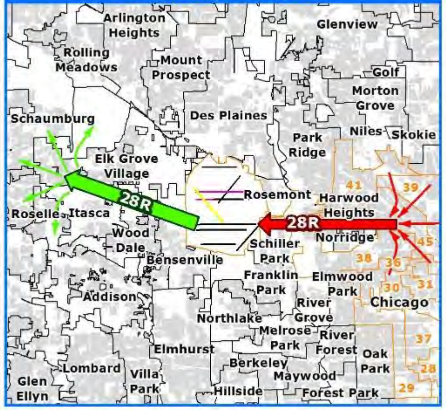
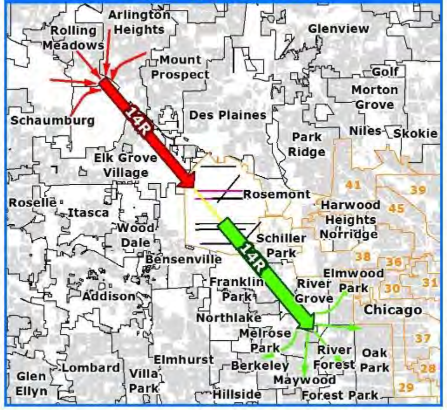
4/15/2016

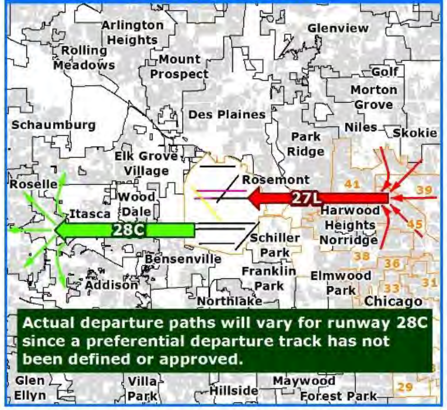
Week 1 - Primary Configuration F



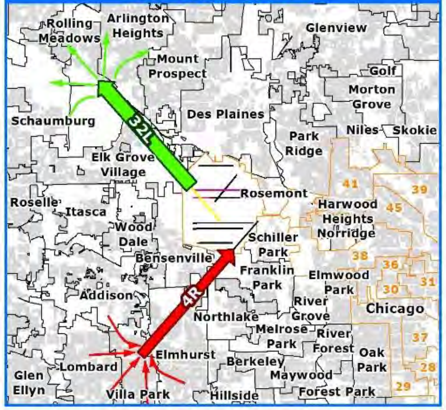
Week 2 - Primary Configuration B



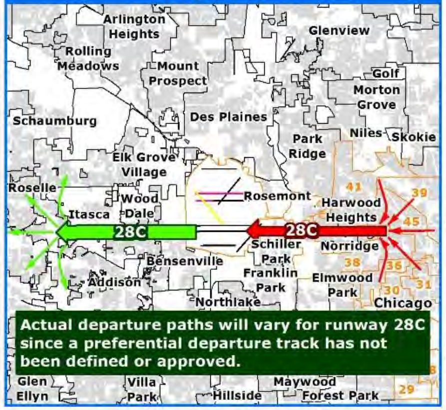
Week 3 - Primary Configuration H



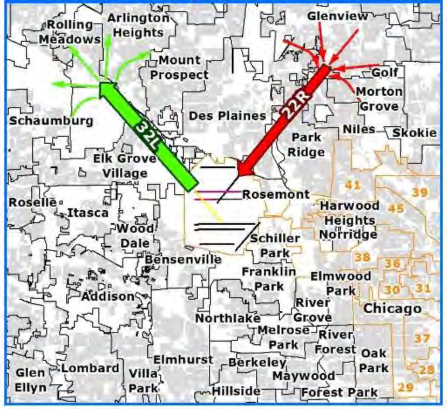
Week 4 - Primary Configuration D



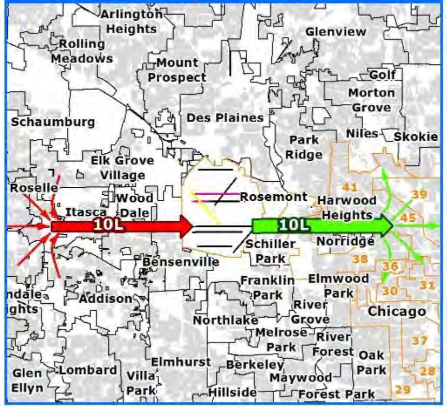
Week 5 - Primary Configuration J



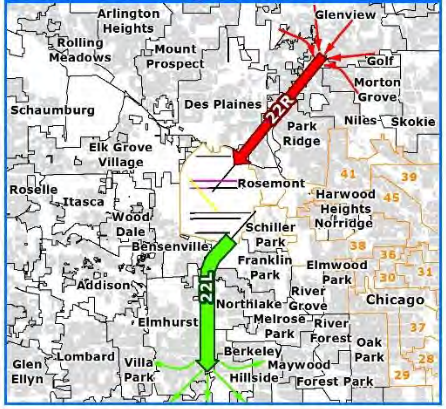
Week 6 - Primary Configuration G



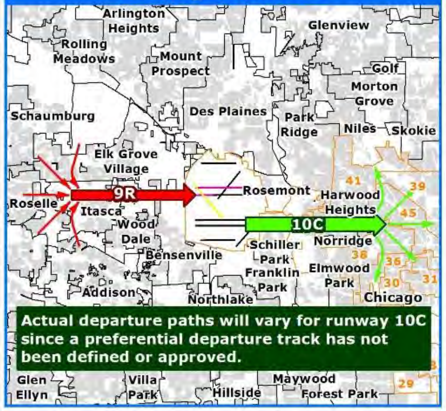
Week 7 - Primary Configuration A



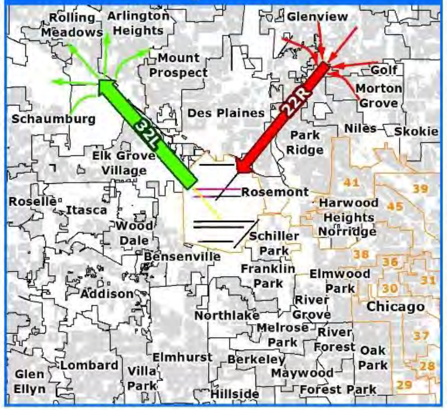
Week 8 - Primary Configuration I



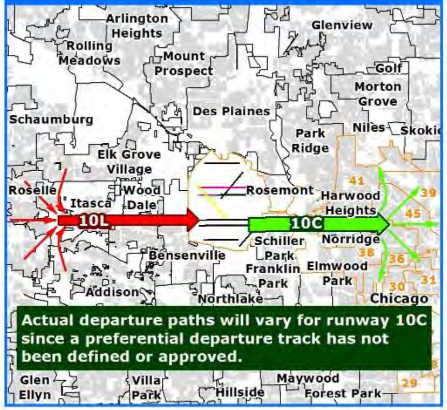
Week 9 - Primary Configuration C



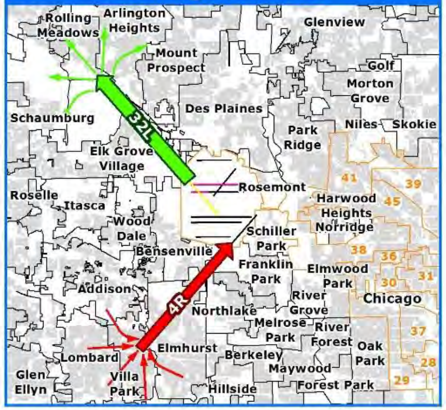
Week 10 - Primary Configuration G



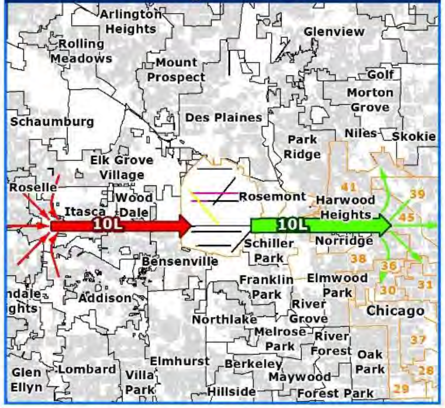
Week 11 - Primary Configuration E



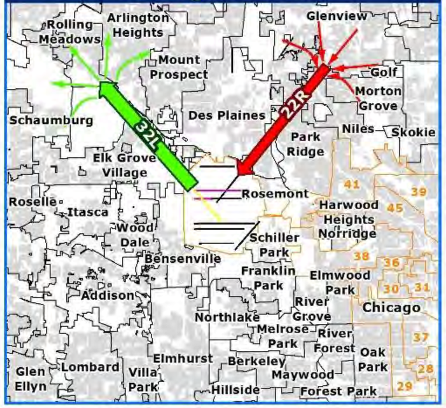
Week 12 - Primary Configuration D



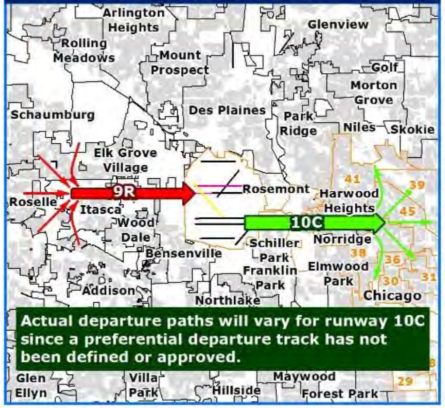
Week 1 - Secondary Configuration A



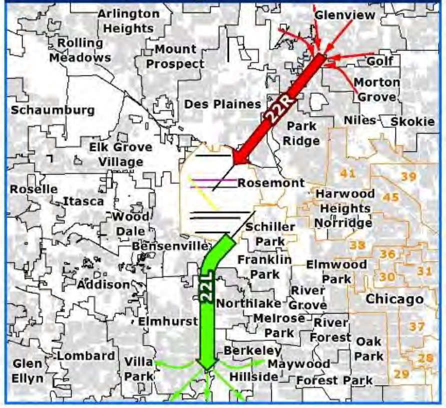
Week 2 - Secondary Configuration G



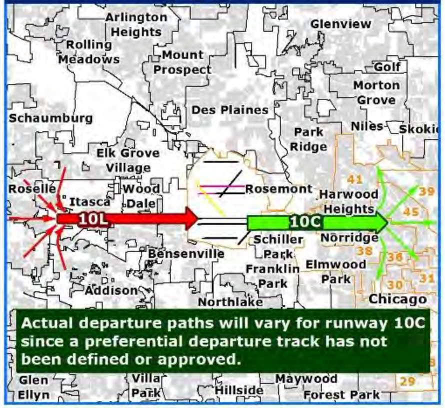
Week 3 - Secondary Configuration C



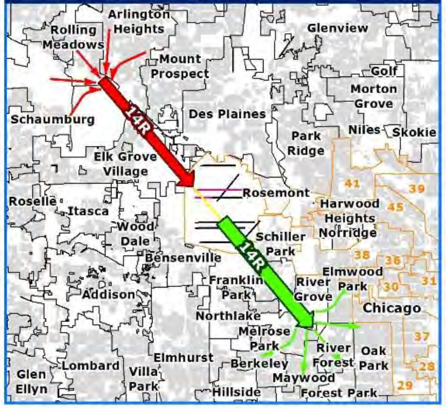
Week 4 - Secondary Configuration I



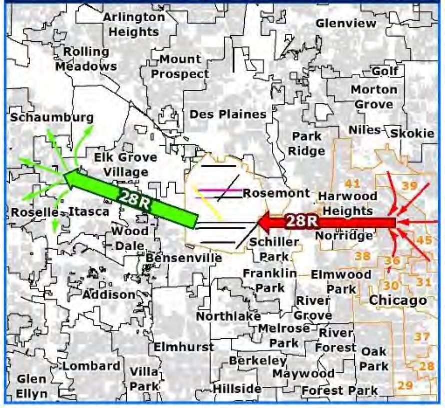
Week 5 - Secondary Configuration E



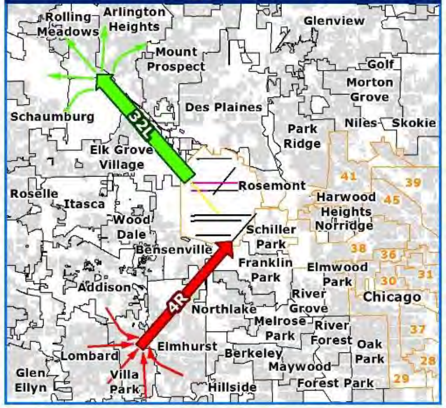
Week 6 - Secondary Configuration B



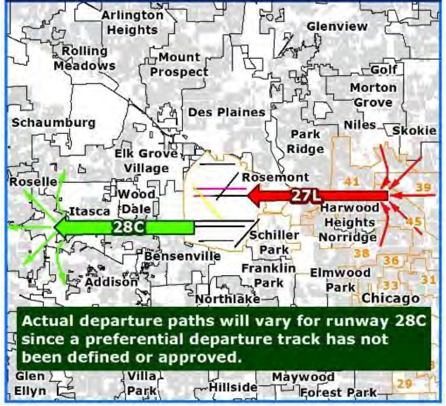
Week 7 - Secondary Configuration F



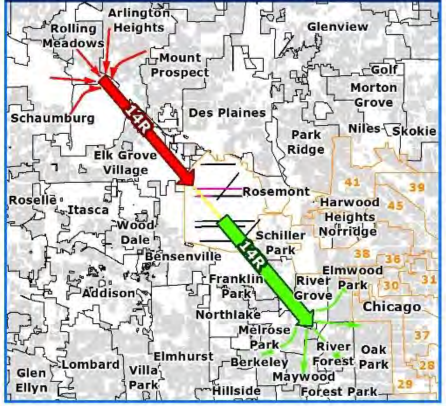
Week 8 - Secondary Configuration D



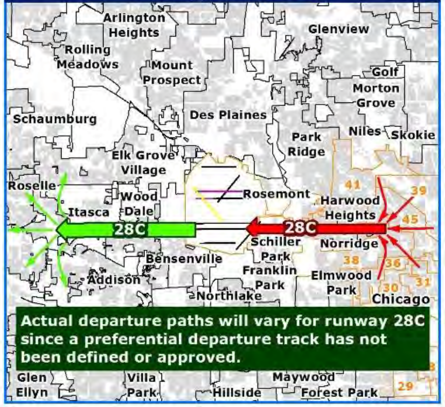
Week 9 - Secondary Configuration H



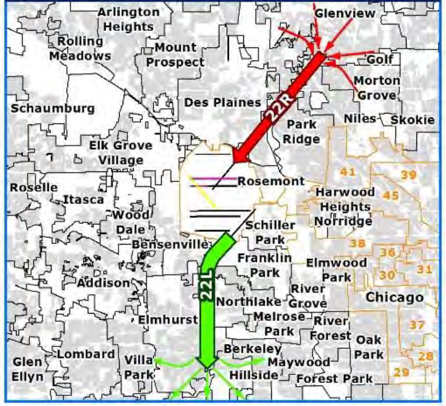
Week 10 - Secondary Configuration B



Week 11 - Secondary Configuration J

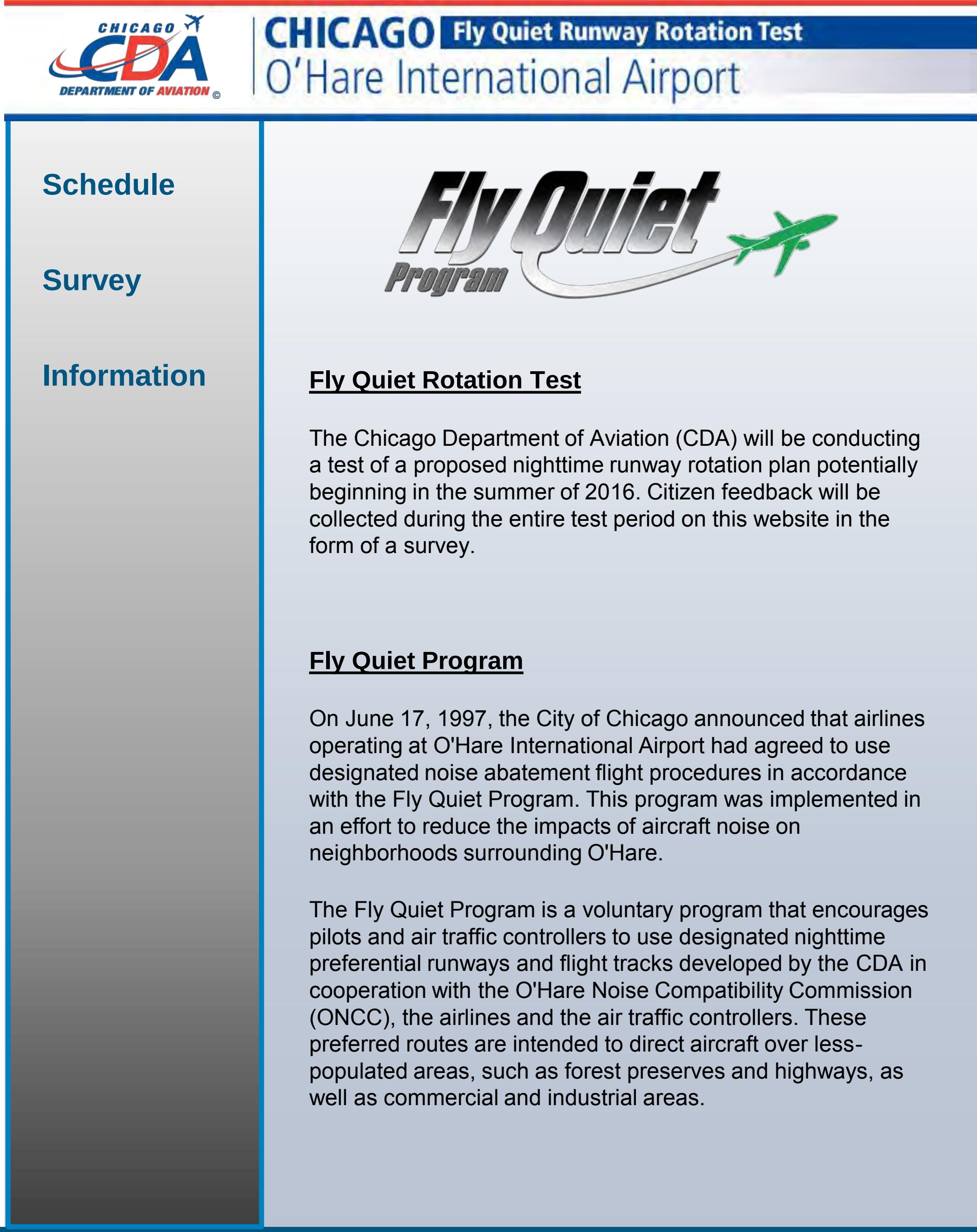


Week 12 - Secondary Configuration I



COMMUNITY OUTREACH/FEEDBACK DURING THIS SUMMER'S RUNWAY ROTATION TEST

- Fly Quiet Website
  - Summary of Test Plan
  - Published Rotation Schedule
  - Feedback Survey
  - Adherence Updates
- Weekly Adherence Monitored
- ONCC will Review Feedback



CHICAGO Fly Quiet Runway Rotation Test
O'Hare International Airport

Schedule

Survey

Information

Fly Quiet Program

Fly Quiet Rotation Test

The Chicago Department of Aviation (CDA) will be conducting a test of a proposed nighttime runway rotation plan potentially beginning in the summer of 2016. Citizen feedback will be collected during the entire test period on this website in the form of a survey.

Fly Quiet Program

On June 17, 1997, the City of Chicago announced that airlines operating at O'Hare International Airport had agreed to use designated noise abatement flight procedures in accordance with the Fly Quiet Program. This program was implemented in an effort to reduce the impacts of aircraft noise on neighborhoods surrounding O'Hare.

The Fly Quiet Program is a voluntary program that encourages pilots and air traffic controllers to use designated nighttime preferential runways and flight tracks developed by the CDA in cooperation with the O'Hare Noise Compatibility Commission (ONCC), the airlines and the air traffic controllers. These preferred routes are intended to direct aircraft over less-populated areas, such as forest preserves and highways, as well as commercial and industrial areas.

FLY QUIET RUNWAY ROTATION PLAN – NEXT STEPS

1. ONCC Votes on plan.
2. If plan is approved by the ONCC, CDA submits detailed plan to FAA for review and approval of the six-month test.
3. If Plan is not approved, existing conditions continue.

APPENDIX 14

O'HARE NOISE COMPATIBILITY COMMISSION

TECHNICAL COMMITTEE MEETING
TUESDAY, APRIL 19, 2016 9:00 A.M.
MOUNT PROSPECT VILLAGE HALL
50 S. Emerson Street, Mount Prospect, IL
AGENDA

FINAL ACTION MAY BE TAKEN BY THE COMMISSION ON ANY ITEM LISTED ON THIS AGENDA

1. Call to Order
2. Roll Call
3. Pledge of Allegiance
4. Approval of Minutes – March 22, 2016 ONCC Technical Meeting Minutes
5. ONCC Technical Committee Discussion
   A. Long-Term Portable Noise Monitor
   B. Annual Operations 2015
   C. Terminal Forecast
6. Briefing on Proposed Fly Quiet Rotation Program – Discussion
7. Next ONCC Technical Committee Meeting Date – **May 17, 2016** – Village of Mount Prospect 50 S. Emerson Street, Mount Prospect, IL
8. Comments from ONCC Members
9. Comments from the Audience:
   The Commission encourages orderly public participation and has established the following guidelines for presenting comments and questions at our meetings:
   - *Questions or comments should be limited to items placed on the meeting agenda, or those that are included as part of the Commission's work plan, which focuses on aircraft noise management at Chicago O'Hare International Airport.*
   - *Before making comments or asking questions, identify yourself to the Commission Chair and members by providing them with your name and address.*
10. Adjournment

Next ONCC Meeting:
Friday, May 6, 2016, Café la Cave, 2777 S. Mannheim Road, Des Plaines, IL. 8:00 a.m.

O’Hare Noise Compatibility Commission – Technical Committee

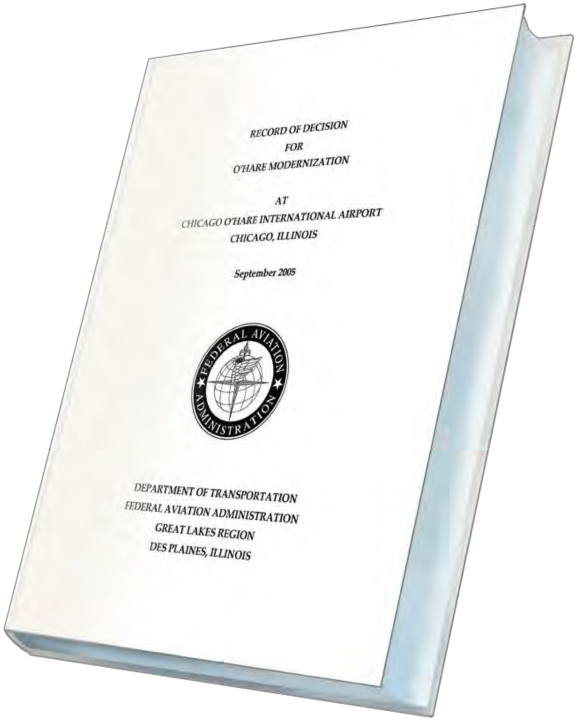
April 19, 2016

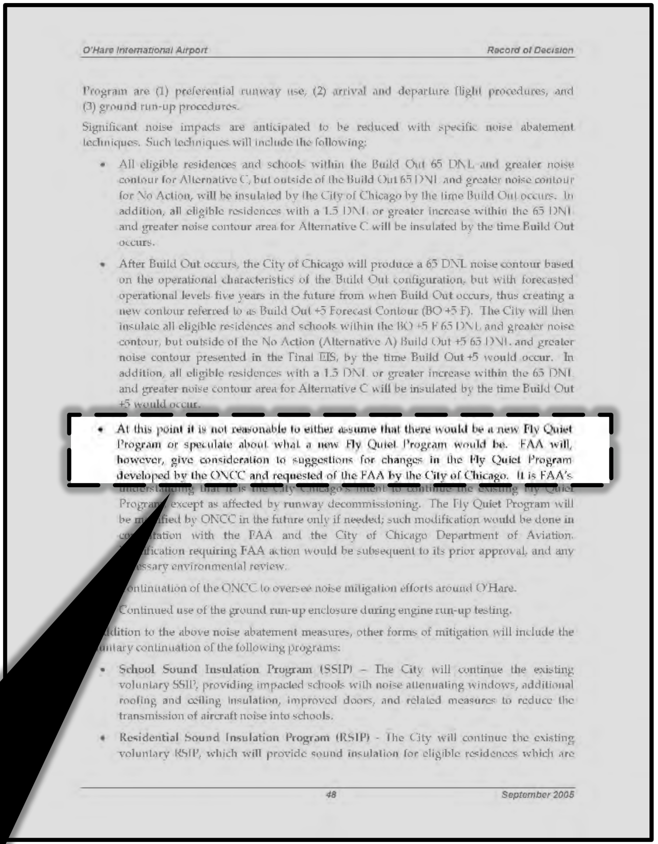
Proposed Interim Fly Quiet Runway Rotation Plan

CHICAGO

O’HARE MODERNIZATION ROD - FLY QUIET

Record of Decision (ROD) was issued on September 30, 2005





O'Hare International Airport — Record of Decision

Program are (1) preferential runway use, (2) arrival and departure flight procedures, and (3) ground run-up procedures.

Significant noise impacts are anticipated to be reduced with specific noise abatement techniques. Such techniques will include the following:

- All eligible residences and schools within the Build Out 65 DNL and greater noise contour for Alternative C, but outside of the Build Out 65 DNL and greater noise contour for No Action, will be insulated by the City of Chicago by the time Build Out occurs. In addition, all eligible residences with a 1.5 DNL or greater increase within the 65 DNL and greater noise contour area for Alternative C will be insulated by the time Build Out occurs.
- After Build Out occurs, the City of Chicago will produce a 65 DNL noise contour based on the operational characteristics of the Build Out configuration, but with forecasted operational levels five years in the future from when Build Out occurs, thus creating a new contour referred to as Build Out +5 Forecast Contour (BO +5 F). The City will then insulate all eligible residences and schools within the BO +5 F 65 DNL and greater noise contour, but outside of the No Action (Alternative A) Build Out +5 65 DNL and greater noise contour presented in the Final EIS, by the time Build Out +5 would occur. In addition, all eligible residences with a 1.5 DNL or greater increase within the 65 DNL and greater noise contour area for Alternative C will be insulated by the time Build Out +5 would occur.
- At this point it is not reasonable to either assume that there would be a new Fly Quiet Program or speculate about what a new Fly Quiet Program would be. FAA will, however, give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago. It is FAA's understanding that it is the City Chicago's intent to continue the existing Fly Quiet Program except as affected by runway decommissioning. The Fly Quiet Program will be m…fied by ONCC in the future only if needed; such modification would be done in co…tation with the FAA and the City of Chicago Department of Aviation. …ification requiring FAA action would be subsequent to its prior approval, and any …essary environmental review.
- …ontinuation of the ONCC to oversee noise mitigation efforts around O'Hare.
- Continued use of the ground run-up enclosure during engine run-up testing.

…dition to the above noise abatement measures, other forms of mitigation will include the …untary continuation of the following programs:

- **School Sound Insulation Program (SSIP)** – The City will continue the existing voluntary SSIP, providing impacted schools with noise attenuating windows, additional roofing and ceiling insulation, improved doors, and related measures to reduce the transmission of aircraft noise into schools.
- **Residential Sound Insulation Program (RSIP)** - The City will continue the existing voluntary RSIP, which will provide sound insulation for eligible residences which are

48 — September 2005

“At this point it is not reasonable to either assume that there would be a new Fly Quiet Program or speculate about what a new Fly Quiet Program would be. FAA will, however, give consideration to suggestions for changes in the Fly Quiet Program developed by the ONCC and requested of the FAA by the City of Chicago.”

FAA Record of Decision for O’Hare Modernization, September 30, 2005, page 48)

MISSION STATEMENT FOR FLY QUIET ENHANCEMENT

O'HARE NOISE COMPATIBILITY COMMISSION

The ONCC acknowledges that aircraft noise at night impacts the residents in communities around O'Hare and that conditions have changed since Fly Quiet Program inception in 1997. The ONCC desires to evaluate ways to modify the Fly Quiet Program and make recommendations to the Chicago Department of Aviation (CDA) based on ONCC consensus.

Accomplished through a Six-Month Test

Fly Quiet II (Overnight)

Fly Quiet II is a redefinition of the existing program which includes a runway rotation plan to spread out community noise exposure. This program applies to overnight hours in which demand can be served by a single arrival or departure runway.

FLY QUIET ROTATION – TENTATIVE TIMELINE

ONCC RESPONSIBILITY		Timeline	CDA & FAA RESPONSIBILITY
Decision on Implementation			NEPA Analysis on Revised Plan (FAA)
ONCC Reviews Feedback Suggest Changes if Needed		2017	CDA Revise Plan if needed based on ONCC feedback
		December November	
Develop Criteria for Post-Test Analysis			Six Month Test (FAA) Collect Feedback (CDA)
		July June	CDA Submits Plan to FAA Analyze Test Plan
ONCC Approves Test Plan (Tentative)	May 6	May	
		April	CDA Develops Plan with Stakeholder Input
ONCC Reviews Criteria	March 11	March	
Fly Quiet Committee Established Criteria	February 16	February	
		2016	

APPROVED CRITERIA

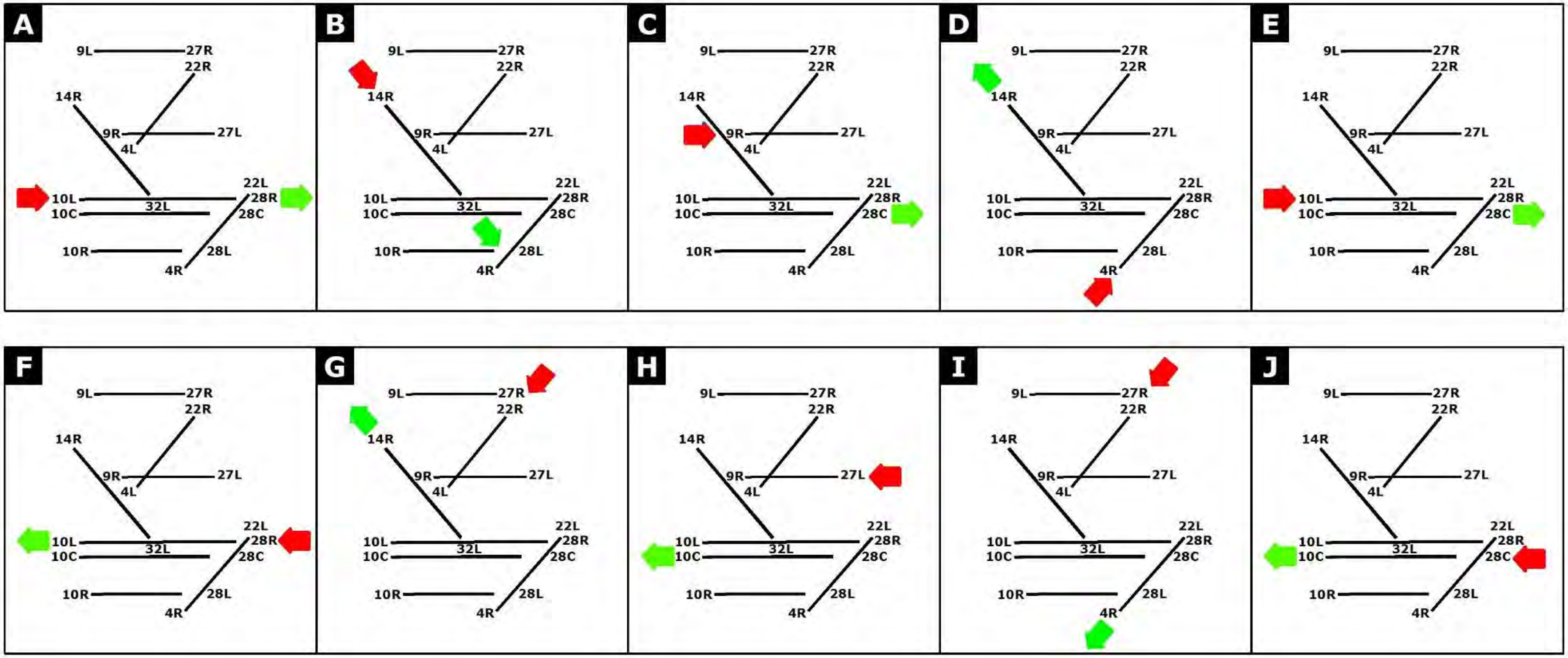
Departure Procedures | Three Fly Quiet Programs | **Fly Quiet II Rotation**

1. **Establish Rotation Plan (SOC FQ-18)** – Request the FAA/CDA establish a weekly runway rotation program for Fly Quiet II (Overnight hours) to achieve a more balanced distribution of noise exposure. Each period may consist of one arrival and one departure runway or one mixed use runway (runway used for both arrivals and departures).
2. **Alternate East and West Flow (5 knot Tailwind)** – Minimize the potential for consecutive periods of east flow or west flow runway use to the extent possible, except when conditions require the opposite flow due to a tailwind exceeding 5 knots.
3. **Avoid Consecutive Community Impacts** – Minimize the potential for impacting communities with the same operation type (arrival or departure) two periods in a row.
4. **Reduce Use of 10L/28R** – Include Runway 10L/28R in the rotation but reduce its use if needed by assigning it for departing aircraft that require additional runway length to the extent possible. Prioritize the use of other runways to the extent possible for flights that do not require additional runway length.
5. **Include 14R and 32L (FAiR Recommendation)** – Include 14R arrivals and 32L departures until the permanent closing of 14R/32L. Once this occurs, the compatible land use corridor to the northwest could be utilized with other runways to the extent possible.
6. **Conduct a Test and Monitor Performance** – Ask FAA to Conduct a 6-month test that applies these principles. Request CDA records nightly runway use and collects citizen feedback for ONCC review.
7. **Require ONCC Review** – Final rotation plans including any changes are to be reviewed by ONCC after the test prior to finalization and publication.

SUMMARY – FLY QUIET RUNWAY ROTATION PLAN

1. Applies during overnight hours when demand allows for one arrival/one departure runway
2. Balanced Approach for 12 Weekly Periods
   - 6 Parallel Configurations and 6 Diagonal Configurations
   - 6 West Flow and 6 East Flow
3. Reflects Stakeholder input
   - ONCC – Meets ONCC Criteria
   - SOC – Supports this Plan
   - FAiR – Use of Diagonals
4. Includes mixed-use runways
5. Includes procedures to limit use of longest runways
6. Primary and secondary runway use configurations defined to accommodate wind conditions
7. Communication Protocols defined for CDA and Airlines

PROPOSED FLY QUIET II RUNWAY CONFIGURATIONS



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POTENTIAL USAGE BASED ON HISTORICAL WINDS

CONFIGURATION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A, C, E	53.4%	60.0%	76.7%	76.2%	81.6%	83.6%	83.1%	89.9%	84.9%	72.0%	63.1%	61.5%
B	61.0%	59.2%	70.2%	74.3%	83.7%	88.1%	89.1%	89.5%	83.0%	72.3%	69.8%	66.9%
D	56.8%	65.3%	69.9%	65.5%	69.5%	76.7%	79.1%	82.7%	78.1%	67.0%	56.4%	56.0%
F, H, J	91.2%	87.5%	78.1%	74.2%	86.3%	91.3%	94.8%	94.8%	92.5%	91.0%	89.4%	88.9%
G	72.5%	71.2%	59.0%	56.2%	66.7%	74.3%	85.6%	85.3%	77.5%	75.3%	67.0%	70.8%
I	87.6%	81.3%	74.1%	74.2%	81.2%	85.4%	91.2%	92.5%	88.8%	87.7%	87.5%	87.5%

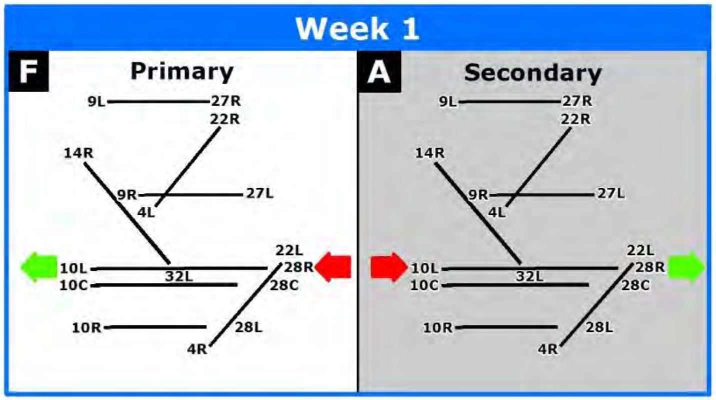
Percentages are based on a tailwind limit of 5 knots and a crosswind limit of 25 knots; includes wind gusts.

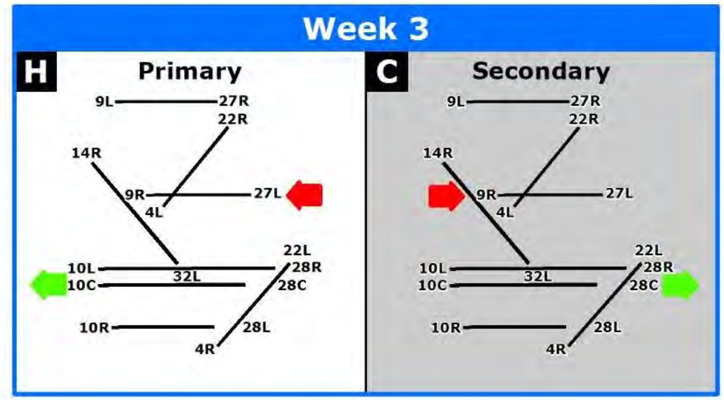
Source: National Climatic Data Center, 8/1/2005 - 7/31/2015, 10:00 p.m. to 6:59 a.m. http://www.ncdc.noaa.gov

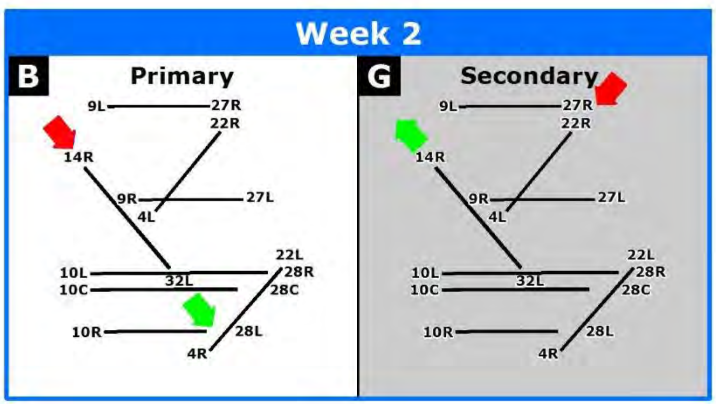
Does not include historical runway maintenance, inspections or other non-weather runway closures

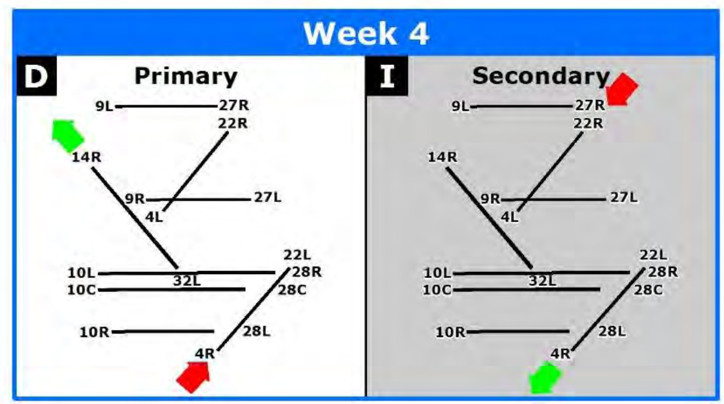
PROPOSED FLY QUIET II RUNWAY ROTATION PLAN (Weeks 1-4)

This chart illustrates the proposed runway use configurations for weeks 1 through 4 of the Fly Quiet II Runway Rotation Plan (out of a 12 week rotation schedule). For each week, a primary and secondary runway use configuration is provided to accommodate potential changes in wind direction. Historical wind data suggests that the primary runway use configuration can be used the majority of the time. The runway use configurations have been defined to balance noise exposure by community by complying with the criteria approved by the ONCC Fly Quiet Committee. The use of east flow, west flow, parallel, and diagonal runways is rotated on a weekly basis. Special procedures have been defined to accommodate additional aircraft that require added runway length.









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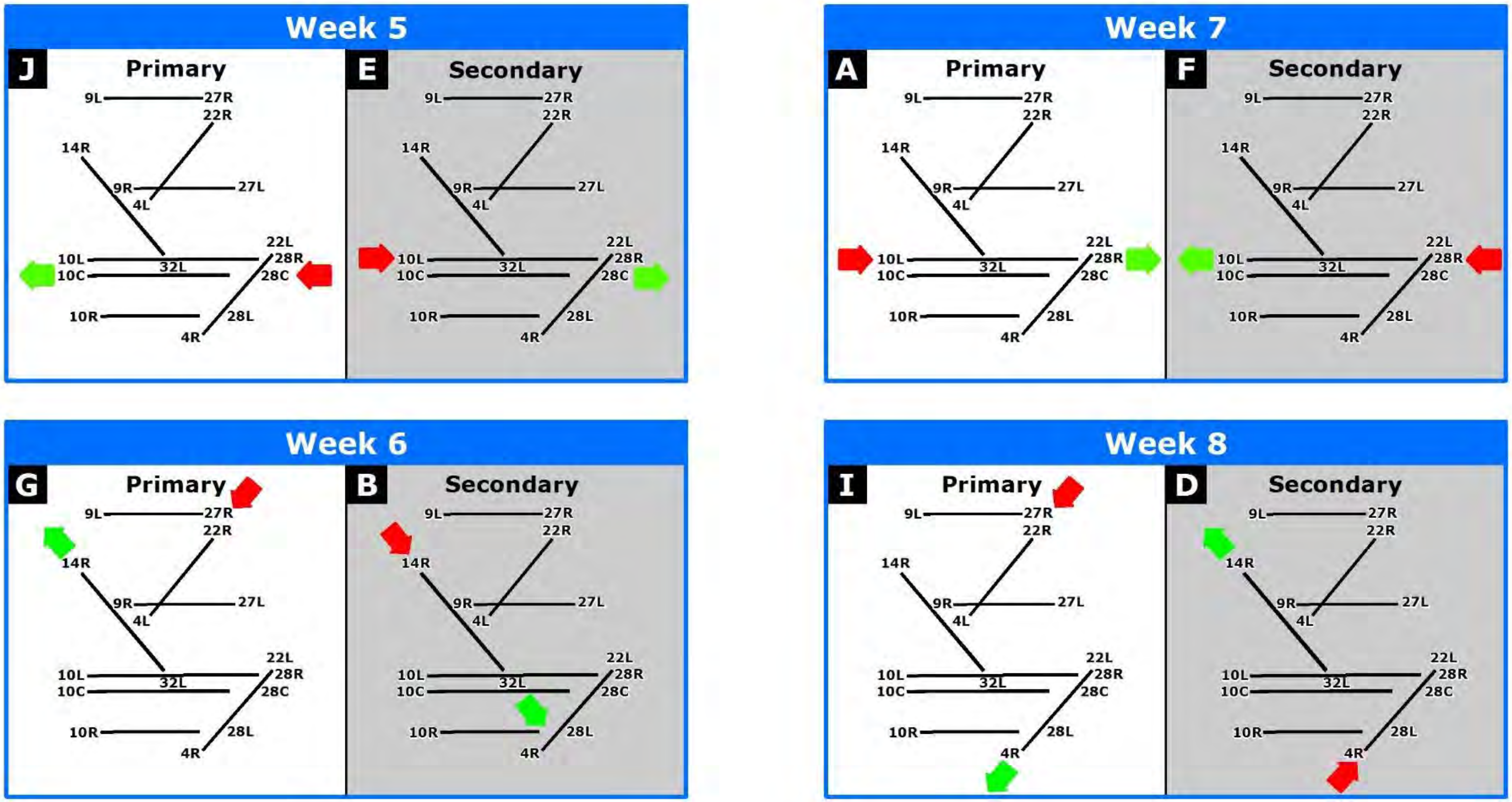
Arrivals
Departures

PROPOSED FLY QUIET II RUNWAY ROTATION PLAN (Weeks 5-8)

This chart illustrates the proposed runway use configurations for weeks 5 through 8 of the Fly Quiet II Runway Rotation Plan (out of a 12 week rotation schedule). For each week, a primary and secondary runway use configuration is provided to accommodate potential changes in wind direction. Historical wind data suggests that the primary runway use configuration can be used the majority of the time. The runway use configurations have been defined to balance noise exposure by community by complying with the criteria approved by the ONCC Fly Quiet Committee. The use of east flow, west flow, parallel, and diagonal runways is rotated on a weekly basis. Special procedures have been defined to accommodate additional aircraft that require added runway length.



Notes

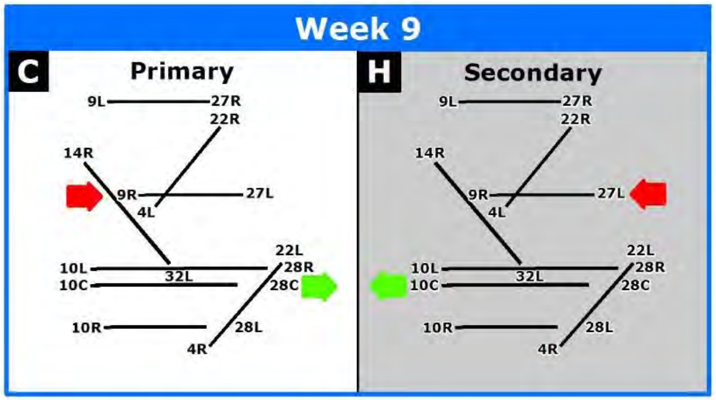
- Use of these runways is voluntary, pilots are encouraged to use designated nighttime preferential runways.
- Alternative runways may be used to allow for construction, snow removal, runway maintenance, runway inspection and specific aircraft operational needs. Available runways are determined by Chicago Department of Aviation (CDA) Operations, and prevailing winds.
- This proposed plan has not been approved by the Federal Aviation Administration (FAA).
- Runway 10L/28R, if closed for noise abatement, would be made available for flights that require additional runway length after operator coordination, at a minimum of 2 hours prior to arrival or departure, with Chicago Department of Aviation (CDA) Operations.

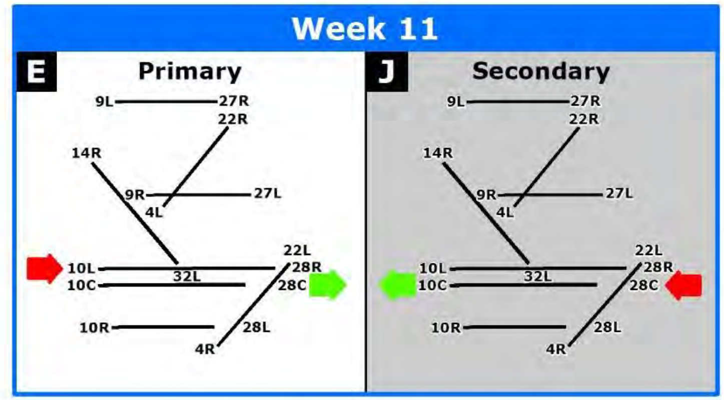
Arrivals
Departures

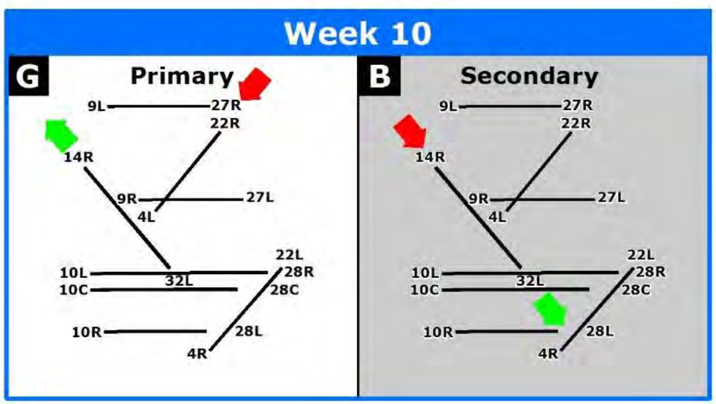
4/15/2016

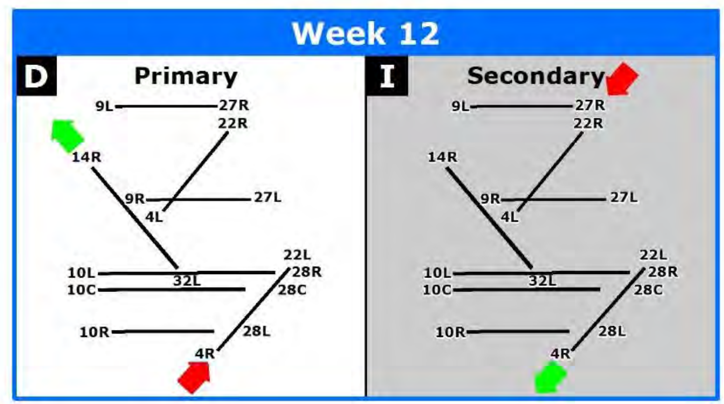
PROPOSED FLY QUIET II RUNWAY ROTATION PLAN (Weeks 9-12)

This chart illustrates the proposed runway use configurations for weeks 9 through 12 of the Fly Quiet II Runway Rotation Plan (out of a 12 week rotation schedule). For each week, a primary and secondary runway use configuration is provided to accommodate potential changes in wind direction. Historical wind data suggests that the primary runway use configuration can be used the majority of the time. The runway use configurations have been defined to balance noise exposure by community by complying with the criteria approved by the ONCC Fly Quiet Committee. The use of east flow, west flow, parallel, and diagonal runways is rotated on a weekly basis. Special procedures have been defined to accommodate additional aircraft that require added runway length.









Notes

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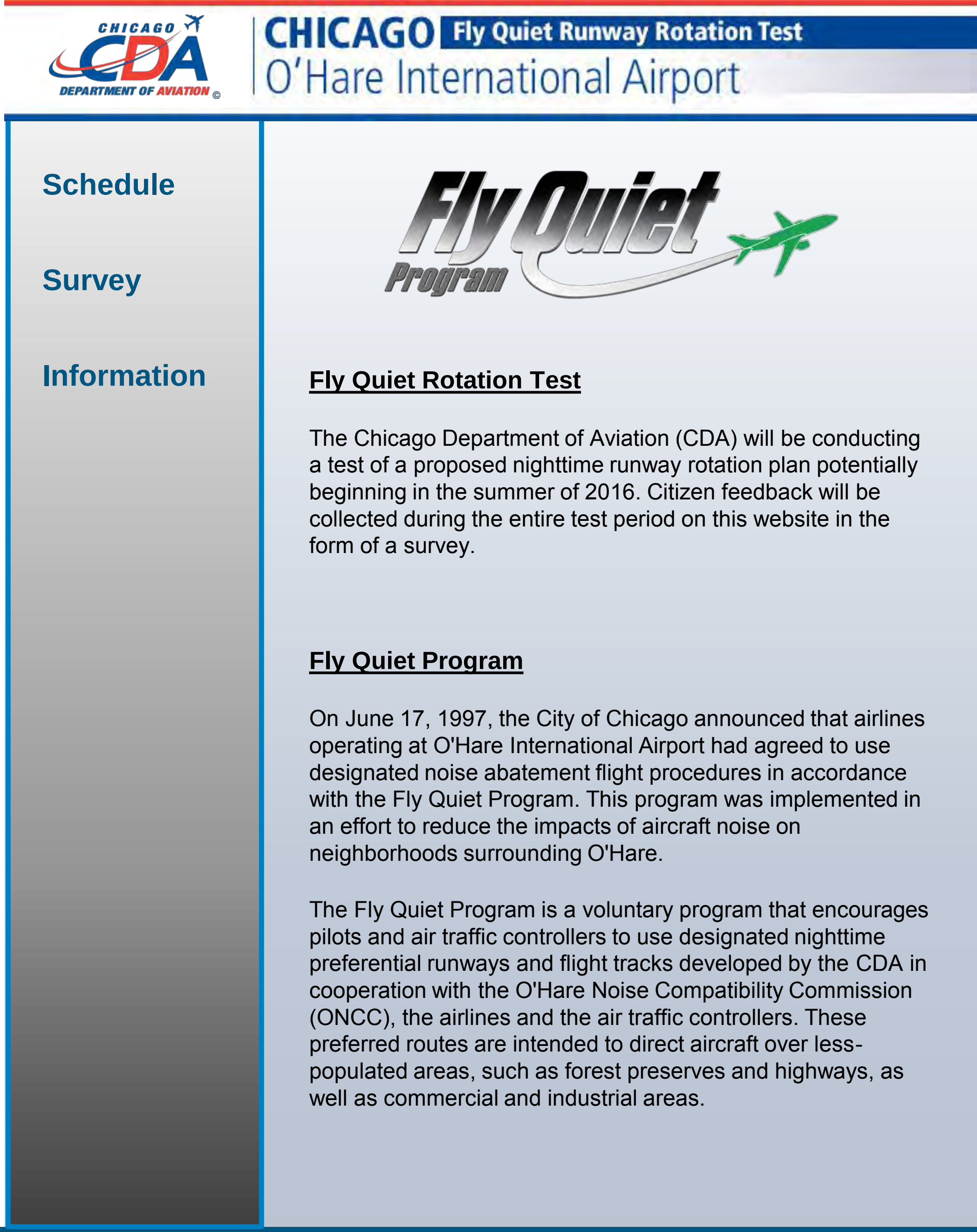
4/15/2016

COMMUNITY OUTREACH/FEEDBACK DURING THIS SUMMER'S RUNWAY ROTATION TEST

- Fly Quiet Website
  - Summary of Test Plan
  - Published Rotation Schedule
  - Feedback Survey
  - Adherence Updates
- Weekly Adherence Monitored
- ONCC will Review Feedback



NEWSROOM

CDA Briefs Technical Committee on Fly Quiet Rotation Plan

April 19, 2016

The Chicago Department of Aviation briefed the ONCC Technical Committee on a six-month Fly Quiet Rotation Plan test during the April 19 meeting. The nighttime rotation plan, calls for 12 one-week periods that incorporate parallel and diagonal runways and six east flow and six west flow configurations.

Before the presentation, ONCC Chair and Mount Prospect Mayor Arlene A. Juracek reminded the members that it was "important to do our homework" and engage in dialog, analyze the viewpoints and take a "regional approach" to mitigate aircraft noise.

The Commission is looking for a two thirds majority vote to change the status quo and pass the Fly Quiet rotation plan at its May 6 meeting. Once passed, the plan can be submitted with the "confidence of community consensus" to the Federal Aviation Administration for implementation by June or July.

At the Technical Committee briefing, CDA Consultant explained that the refined Fly Quiet rotation plan provided aircraft noise balance and runway use predictability, which he felt could be achieved because of the historical data of nighttime wind conditions. Calmer nighttime winds allow for a better balance of noise.

The plan will avoid consecutive community impacts, provide a primary and secondary runway plan, monitor the weekly events and provide community outreach through a dedicated website. The Fly Quiet website will provide a summary of the test plan, a weekly rotation schedule, runway usage updates and a community survey.

View Presentation

News Archives

» 2016

» 2015

» 2014

» 2013

» 2012