

Executive Summary

Low visibility conditions have a substantial and operationally significant impact on departure punctuality for Boeing 737 and 757 flights at New York City airports. When visibility deteriorates from high levels (around 10 miles) to poor conditions (around 2 miles), the expected departure delay increases by approximately 25 minutes, and the risk of significant delays rises markedly. This relationship remains strong even after accounting for airport differences, time of day, and other weather factors, indicating that reduced visibility directly constrains airport throughput rather than merely coinciding with other disruptions.

From an operational perspective, poor visibility appears to trigger system-wide capacity reductions (e.g., increased aircraft separation and slower ground movements), shifting the entire delay distribution upward rather than affecting only extreme cases. While all three airports are affected, baseline delay levels differ, suggesting that local infrastructure and traffic patterns influence resilience to adverse conditions.

Implications for decision-making:

- Anticipate significant schedule disruption during forecasted low-visibility periods, especially below approximately 5 miles.
- Consider proactive measures such as schedule buffering, pre-emptive delay programs, and targeted passenger communication to mitigate network ripple effects.
- Prioritize operational resources and contingency planning at airports with higher baseline delays, where low visibility amplifies existing congestion.

Overall, visibility conditions represent a predictable and quantifiable driver of departure performance, making them a suitable input for operational planning, disruption management, and customer communication strategies.