

EXHIBIT 4 — AERONAUTICAL COMPATIBILITY ANALYSIS

Quonset State Airport (KOQU)

1. Purpose

The proposed site lies approximately 1.45 statute miles from Quonset State Airport, a joint civil-military airfield. This exhibit is submitted proactively, without request, to demonstrate compatibility with aeronautical use of that facility.

2. Geometry and airfield

Proposed station	41.598087° N, 71.440214° W
KOQU airport reference point	41.59722° N, 71.41222° W
Separation	1.45 statute miles (7,640 ft)

KOQU is a joint civil-military public airport in Class D airspace with an active control tower. Runways 16/34 (7,504 ft, HIRL, MALSR on 16, ILS/DME) and 5/23 (4,000 ft). The airfield hosts Quonset Point Air National Guard Station, home of the 143rd Airlift Wing operating C-130J and C-130J-30 aircraft, and an Army Aviation Support Facility for the 1st Battalion, 126th Aviation Regiment operating UH-60 aircraft. Reported traffic approximately 19,400 annual operations, roughly 44 percent military.

The Applicant treats this as an active instrument airfield with military airlift and rotary-wing operations and analyzes it accordingly.

3. Failure modes considered

Two mechanisms are evaluated. They have different governing criteria and are treated separately.

3.1 Receiver desensitization

The re-radiated emission acts as in-band interference, degrading carrier-to-noise ratio and, at sufficient level, preventing acquisition or tracking.

Criterion. ICAO Annex 10 Volume I Appendix B, harmonized with RTCA DO-229, specifies that airborne receivers shall function in the presence of in-band CW interference below **−150.5 dBW (−120.5 dBm)** for GPS C/A-code tracking.

3.2 False acquisition — hazardously misleading information

The more serious mechanism, and the one behind documented incidents. A receiver acquiring a re-radiated signal in preference to the direct signal computes the position of the *outdoor receive antenna* rather than its own. The result is not loss of function but a confidently reported wrong position.

Criterion. A receiver preferentially tracks the re-radiated signal only where it is comparable to or stronger than the direct signal. Where the direct signal dominates, the re-radiated component is a delayed replica — ordinary multipath — which correlator design rejects. The Applicant therefore evaluates the range at which the two are equal and treats it as the bounding radius of concern. Nominal direct GPS L1 C/A power is -128.5 dBm (IS-GPS-200 minimum, 5° elevation, 3 dBi linear antenna).

4. Analysis

Free-space propagation at 1575.42 MHz, **no building attenuation credited**, evaluated at the **requested ceiling of -70.58 dBm** rather than the lower configured operating level.

Figure 4 — Received level versus distance, evaluated at the requested ceiling

Free space at 1575.42 MHz, EIRP -70.58 dBm, no building attenuation credited.

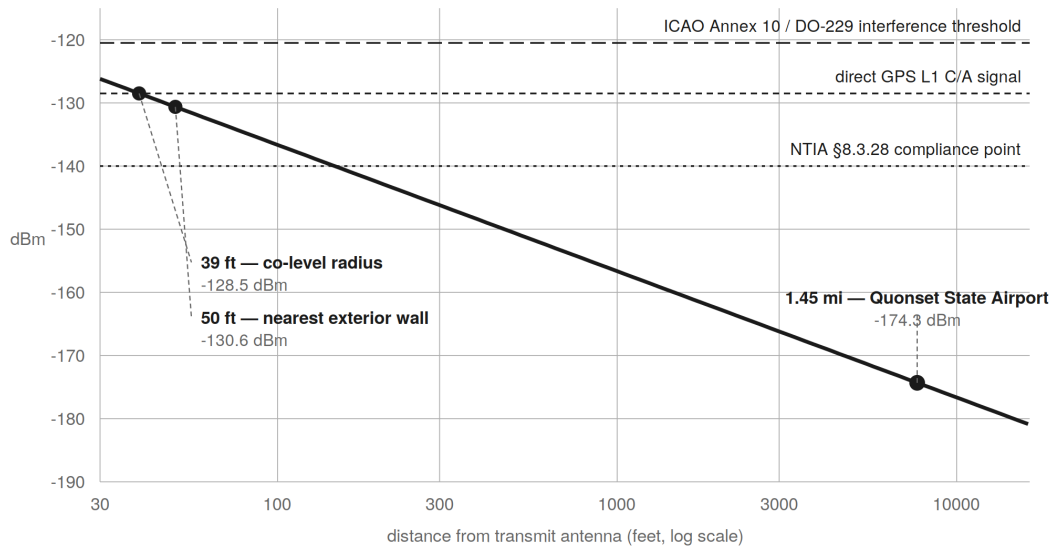


Exhibit 4 §4 — both criteria satisfied within the building envelope

Distance	Path loss	Received	vs. direct GPS	vs. ICAO threshold
39 ft	57.87 dB	-128.50 dBm	0.0 dB	-8.0 dB
50 ft	59.91 dB	-130.54 dBm	-2.0 dB	-10.0 dB
100 ft	65.93 dB	-136.56 dBm	-8.1 dB	-16.1 dB
330 ft	76.39 dB	-147.02 dBm	-18.5 dB	-26.5 dB
1,640 ft	90.37 dB	-161.00 dBm	-32.5 dB	-40.5 dB
3,280 ft	96.39 dB	-167.02 dBm	-38.5 dB	-46.5 dB
7,640 ft (KOQU ARP)	103.73 dB	-174.32 dBm	-45.8 dB	-53.8 dB

Distance	Path loss	Received	vs. direct GPS	vs. ICAO threshold
16,400 ft	110.37 dB	−181.00 dBm	−52.5 dB	−60.5 dB

4.1 Bounding radius for false acquisition

Co-level radius at the requested ceiling: 39 ft. Beyond it the direct signal exceeds the re-radiated signal and a receiver preferentially tracks the direct signal.

The transmit antenna stands not less than 50 ft from the nearest exterior wall. **The bounding radius is therefore contained within the building envelope and does not reach the exterior.** The mechanism is geometrically incapable of affecting any aircraft. At the configured operating level the radius reduces to 4 ft.

4.2 Interference at the airfield

At the KOQU reference point the level is **−174.32 dBm**:

- **53.8 dB below** the ICAO Annex 10 / RTCA DO-229 threshold
- **45.8 dB below** the direct GPS signal aircraft already receive there
- **34.3 dB below** the NTIA § 8.3.28(6) compliance point

4.3 Insensitivity to geometry

The airport reference point is not the nearest airfield feature; runway thresholds extend closer. This does not affect the conclusion. The re-radiated signal is below the direct GPS signal at every distance beyond 39 ft and below the ICAO threshold beyond 50 ft — **both criteria satisfied within the Applicant's own building envelope.** No plausible measurement of the airfield boundary alters the result.

The analysis credits no building attenuation, no ground or structural obstruction across 1.4 miles of intervening industrial development, and assumes isotropic radiation at the maximum requested EIRP toward the airfield.

5. Operational safeguards

1. **Configuration control.** Attenuator at mechanical endstop, witness-marked, documented photographically.
2. **Notification.** Written notice to the Quonset State Airport operator and, as directed, the 143rd Airlift Wing, before commencing operation, per § 8.3.28(7).
3. **Stop buzzer.** Contact reachable at all times during operation with authority and physical means to de-energize immediately, per § 8.3.28(9).
4. **Non-interference status.** Operation unprotected and non-interference, ceasing immediately on notification of harmful interference to any authorized service.

6. Conclusion

At the requested EIRP the proposed system cannot affect aeronautical GNSS receivers at Quonset State Airport. The false-acquisition mechanism is bounded by an 39 ft radius contained within the building envelope. The interference mechanism is satisfied with 53.8 dB of margin against the applicable international standard. Both conclusions hold under free-space assumptions crediting none of the substantial additional attenuation the installation will present.

Sources

Fact	Source
Emission limit, calculation method, prohibition on crediting building attenuation	NTIA <i>Manual of Regulations and Procedures for Federal Radio Frequency Management</i> § 8.3.28
CW interference threshold –150.5 dBW for C/A-code tracking	ICAO Annex 10 Vol. I App. B, harmonized with RTCA DO-229
Minimum (–158.5 dBW) and maximum (–153.0 dBW) received GPS L1 C/A power	IS-GPS-200 Rev N
KOQU runways, Class D airspace, ILS/MALSR	FAA airport data; Rhode Island Airport Corporation
143rd Airlift Wing C-130J; 1-126th Aviation UH-60	Rhode Island National Guard; public airfield tenant listings
Traffic ~19,400 annual operations	FAA; figure still current in published sources as of 2026

Airfield data verified against FAA published data effective 6 August 2026: both runways active, field elevation 18 ft MSL, 143rd Airlift Wing and 1st Battalion 126th Aviation Regiment resident. The Applicant notes that a proposal to decommission Runway 5/23 is under FAA review; that change would not affect the conclusions of this exhibit, which depend on separation distance rather than airfield configuration.