ATB UPDATE MEMO – WIND & ORIENTATION INTEGRATION (Rev A)

Project: Magnetic Rail Gun Launch Campus | Location: Heber–Overgaard, AZ | Date: 08 Nov 2025

1) Objective

Incorporate site-specific wind climatology for Heber–Overgaard, AZ into siting, axis alignment, and operational rules for the Mission Control Center (MCC), Launch Tower, and downwind exclusion zones.

2) Key Wind Findings (Climatology & Observations)

• Prevailing surface winds are predominantly from the west during spring/summer, shifting to southerly flows in early fall; typical mean speeds ~8–9 mph in spring.

• Local forecasts and station statistics confirm frequent W–SW and S–SW components; gusts exceeding 20 mph can occur seasonally.

• Climatological averages indicate calmer conditions in late summer; spring is windiest (April peak ~9 mph).

3) Design Implications (Layout & Orientation)

• Place MCC and other high-occupancy/critical facilities upwind (west/southwest) of the Launch Tower under typical patterns.

• Establish the formal visual axis (MCC → reflecting pond + 8 m promenade → Launch Tower) along an orientation that keeps MCC upwind or crosswind of prevailing flows.

• Define a downwind exclusion cone from the tower toward the east–northeast (±30°) with a conservative radius tied to failure-mode drift calculations.

4) Drift Basis & Operational Rule

Assuming exit velocity v0 = 1,500 m/s, ejection altitude 500 m AGL, no SRB ignition, and no aerodynamic drag (conservative): total time aloft ≈ 306 s. With a 20 mph crosswind, conservative drift ≈ 2.74 km. Operational rule: permit launches only when sustained winds ≤ 20 mph with gusts ≤ 25 mph; clear a ±30° downwind cone to ≥ 3.5 km. MCC nominal standoff: 2.0 km, positioned upwind of the tower.

5) Seasonal Directional Controls

• Spring–summer: dominant W→E component — ensure downwind cone aimed E/NE and keep tank farms, housing, SOEC outside this sector where feasible.

• Early fall: increased S→N component — temporarily rotate operational downwind cone to ENE/NNE sectors based on real-time direction.

• Install a 360° anemometer mast at the tower; integrate speed and direction gates into Launch Go/No-Go logic via MECSAI.

6) Deliverables & Actions

• Publish wind-sector overlay on civil site plan (Rev B): prevailing W/SW sectors highlighted; ±30° exclusion cone to 3.5 km.

• Update MCC axis plan to maintain upwind placement at 2.0 km with Washington Mall-style symmetry and illuminated cross-pond promenade.

• Add operating procedure: If wind direction places MCC within downwind cone at any speed > 10 mph, switch to Remote Ops Mode or scrub.

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