Planned Cougar RCS Test

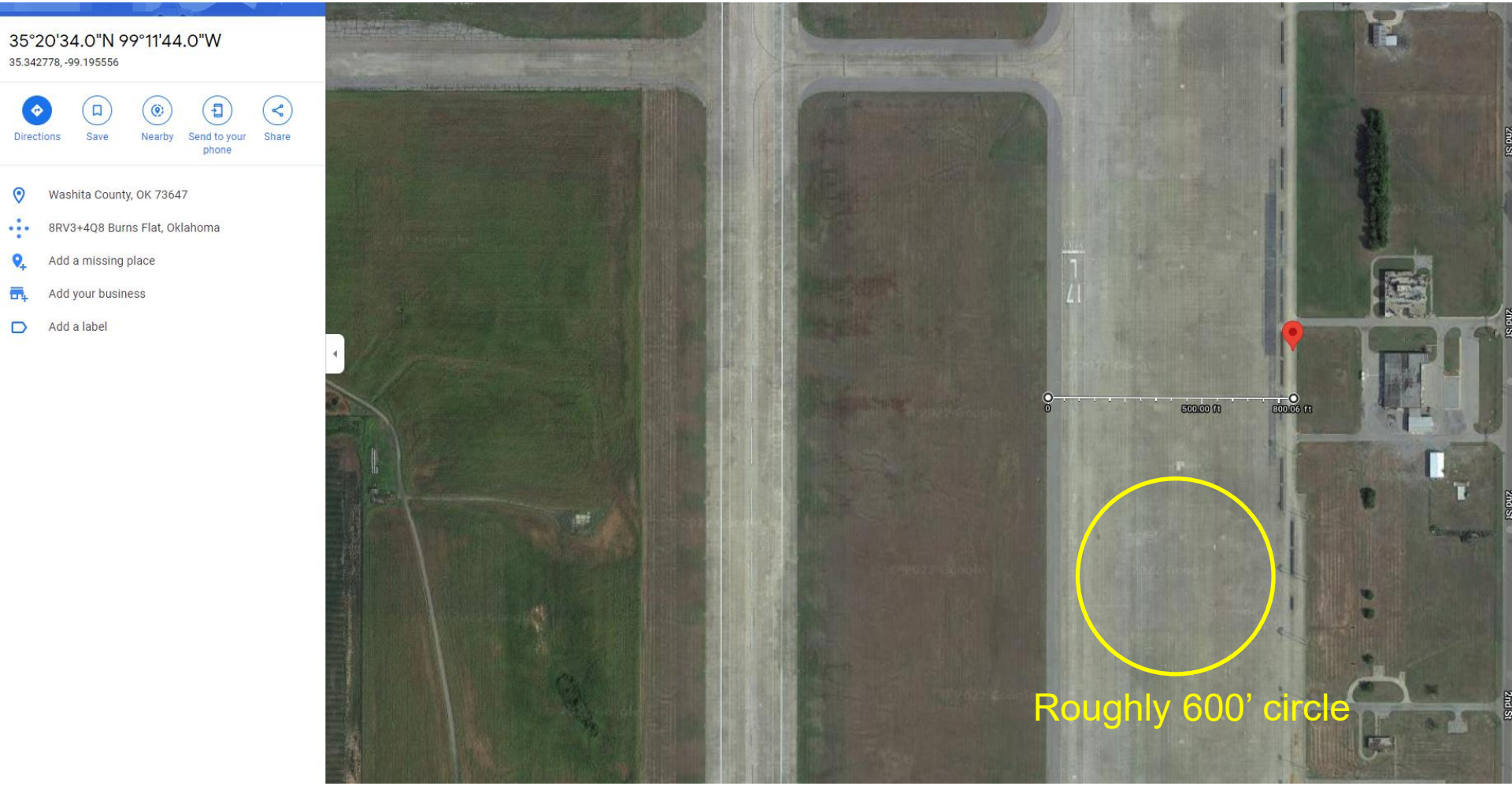
Resonant Sciences
Dayton, Ohio

Motivation and Overview

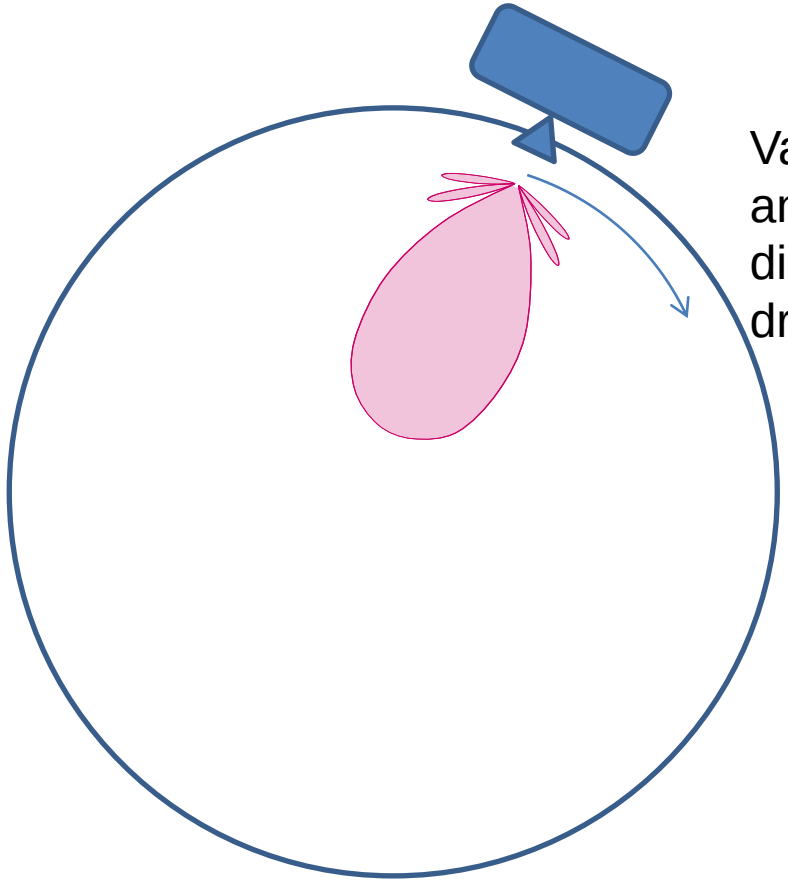
- Customer requested RCS assessment of Cougar
  - Site survey: 9-13 May 2022
  - Target measurement: 6-10 Jun 2022
- RS has developed plan for:
  - Frequency Range: 2-18 GHz
  - Polarizations: HH/VV
  - Aspect: 360° ground-bounce
  - Standoff: 300', elevation angle ~ 2°
- RS has been working through FCC approval for measurement at the Clinton Sherman Airport near Clinton, OK

Example Dornier 328

Clinton Sherman Airport



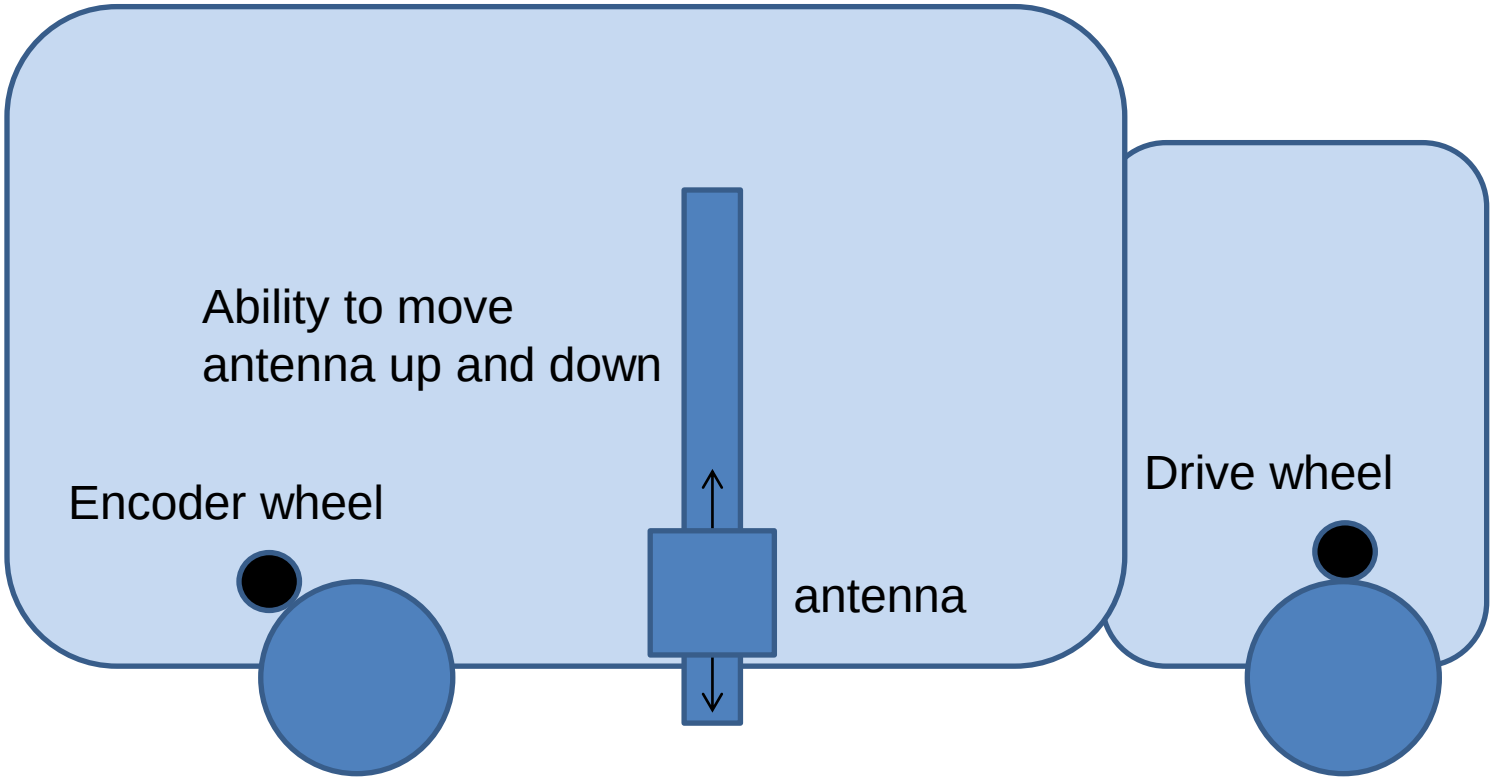
Drive Path of MTB



Van containing radar and supporting directional antenna drives in a circle

Collection geometry

General Hardware Approach



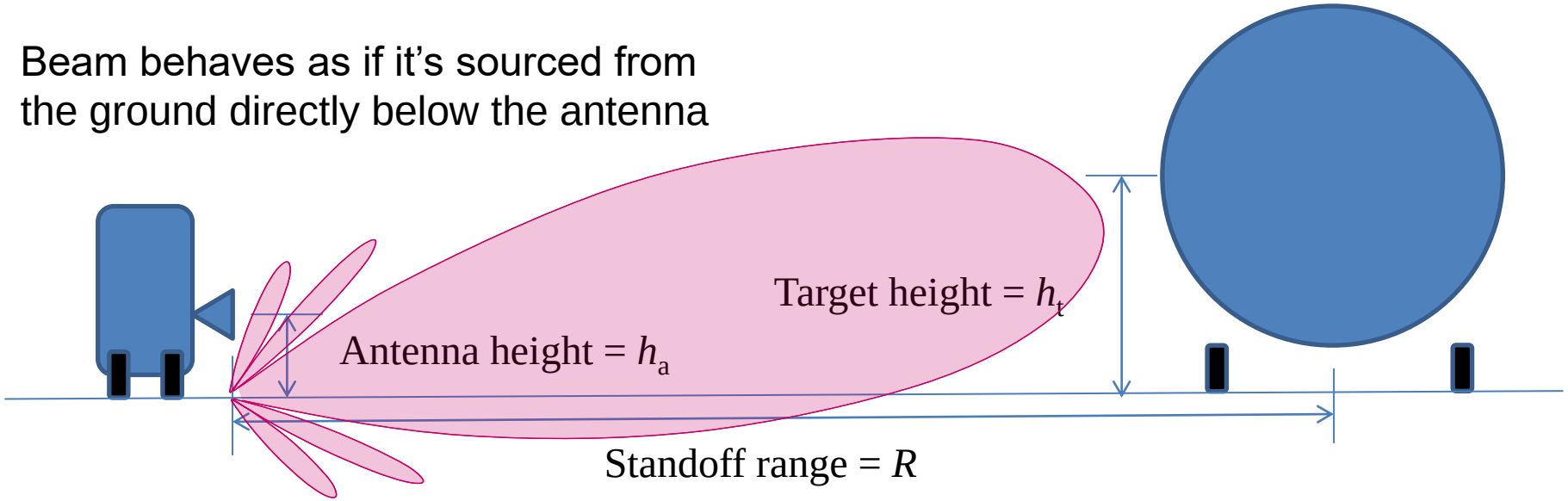
Drive wheel is used to move the truck (via friction) at a slow and constant pace (i.e., no one driving and riding the brakes). Encoder wheel is separate and serves to tell the radar how far the truck has moved.

Site Survey

- The basic ground-bounce equation dictates that the band must be broken up
  - e.g., 2-4 GHz, 4-8 GHz, 8-18 GHz (TBD)
- The height of the antenna may need to be adjusted dynamically
  - Ground plane is unlikely to be perfectly flat – site survey will determine the optimal height required at each point on the collection circle
  - Would need to decide whether we want to dynamically adjust
    - As an example, errors at WAFB if not adjusted can exceed 7 dB

Ground Bounce Calculation

Beam behaves as if it's sourced from the ground directly below the antenna



Calculation to ensure the ground-bounce peak beam is on the target

$$h_a = \frac{R\lambda}{4h_t} = \left.\frac{300\,ft \times (0.0546 \text{ to } 0.4918)\,ft}{4 \times 10\,ft}\right|_{18GHz \text{ to } 2GHz} = 0.4098 \text{ to } 3.6884\,ft$$