

**Auburn Range 2 (Ground Reflection Range) RF Test System  
STA Information for Boeing Auburn**

**Exhibit 1 Summary  
See Descriptions and Drawings for Details**

| Test System | Location       | Frequency Bands |           | Radiated Power   |
|-------------|----------------|-----------------|-----------|------------------|
|             |                | Start           | Stop      |                  |
| Range 2     | 17-81 Building | 30 MHz          | 1.232 GHz | -0.7 to -5.4 dBm |
|             |                |                 |           |                  |
|             |                |                 |           |                  |

## **Exhibit 1**

### **Auburn Range 2 (Ground Reflection Range)**

**Purpose:** Range 2 is an open air ground reflection antenna range used to test the operational characteristics of commercial aircraft full scale antennas or to validate aircraft antenna patterns using scale models. These tests are used to qualify new antennas or new aircraft configurations, verify manufacturing processes or evaluate repairs to damaged antennas. Antenna radiation pattern, directivity, gain, side lobes and f/b ratio are some of the parameters that can be measured. Boeing also sells antenna measurement services to non-Boeing and non-aviation related industries.

**Equipment:** The 17-81 building is a small cubicle used as a control room for Range 2. The transmit antenna is mounted on a 40 foot tower (ASR# 0383317 and FAA 2004-ANM-573-OE) adjacent to the 17-81 building. The transmit antenna height can be varied from approximately 6 feet to 36 feet. Antennas or model aircraft are mounted on a 25 foot high antenna positioner located at a distance of 250 feet on a bearing of 143° true from the transmit antenna. An alternate antenna positioner location is at a distance 125 feet but requires the physical relocation of the antenna positioner to be used. Low level CW signals from calibrated laboratory grade synthesized RF sources are transmitted from the transmit antenna. The transmit antenna is raised or lowered to peak the received signal by matching the phase of the direct path and reflected path signals. The desired measurements are then taken. A partially wooded wetland extends an additional 1300 feet beyond the receive antenna tower.

An equipment list, block diagram and site layout are attached.

**Frequency:** Full scale or scale model antennas are tested from 30 MHz to 1.2 GHz.

**Power:** Operation of this range with a maximum of -0.7 dBm at 30 MHz to -5.4 dBm at 1.2 GHz radiated power or 0 dBm at the RF source is requested. The RF path loss between the RF source and the transmit antenna is 0.7 to 5.4 dB minimum.

**Emissions:** The emissions will be CW.

**Mitigation Features:** A partially wooded wetland extends an additional 1300 feet beyond the receive antenna tower.

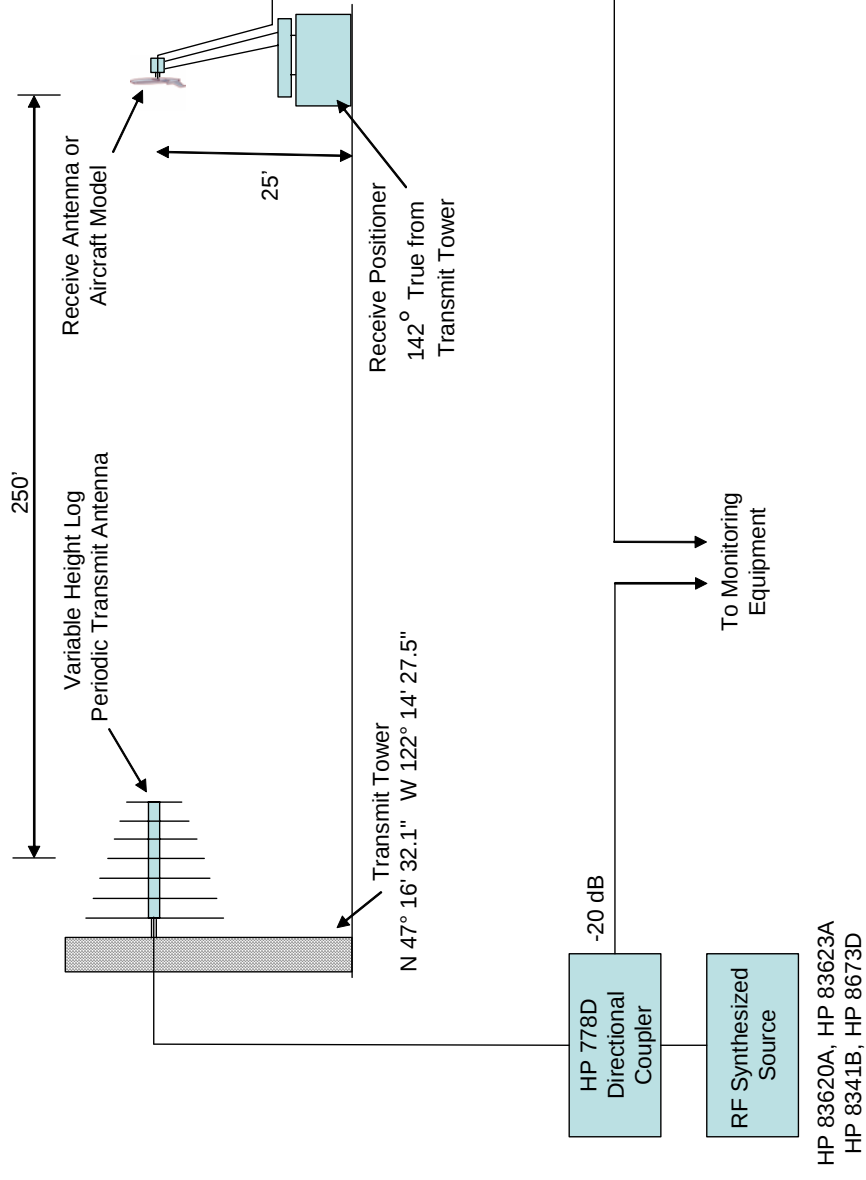
Pictures are attached.

## Attachment 1

### Radome 2 Equipment List

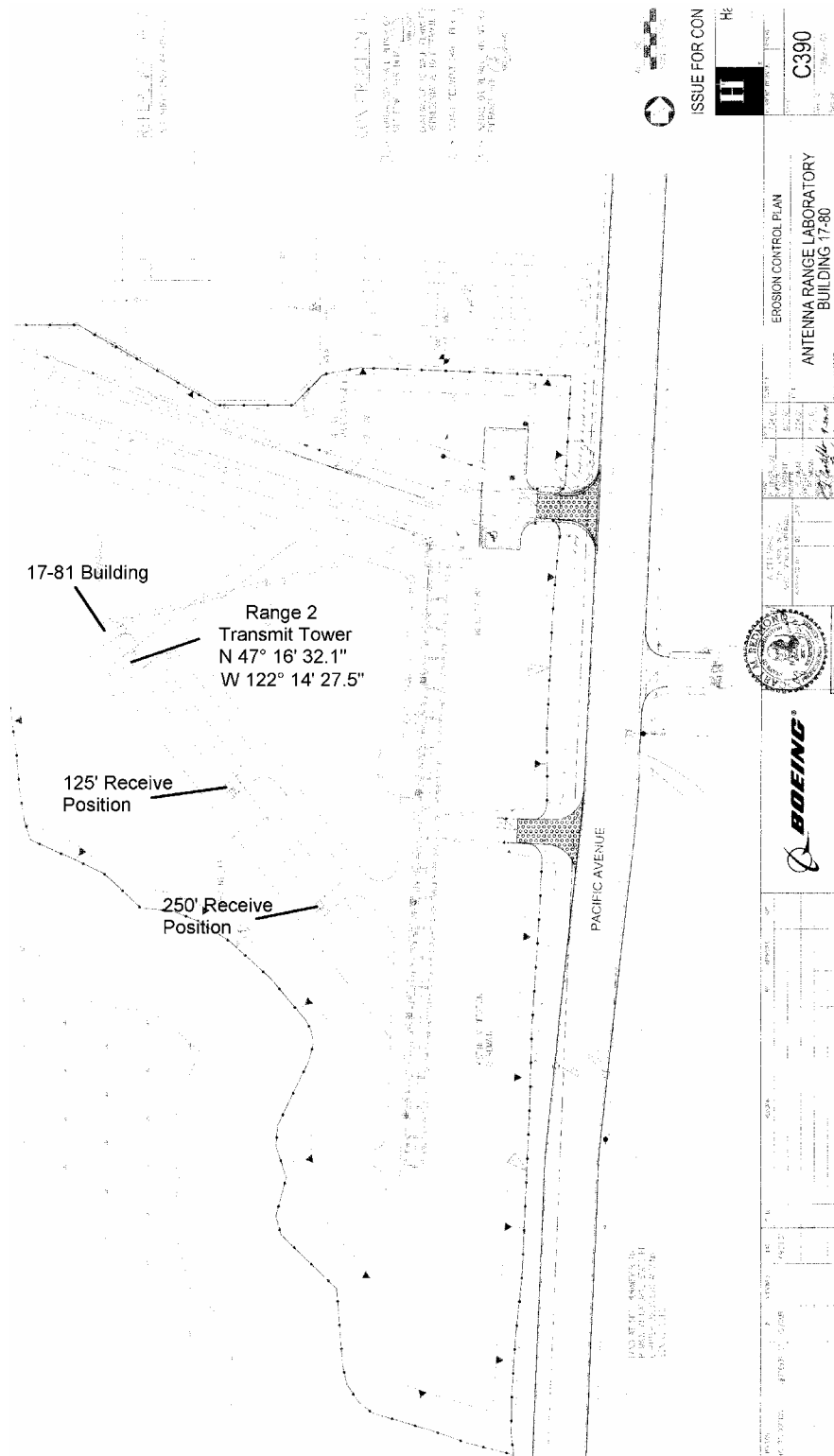
| Frequency (GHz)   | Efficiency | Gain (dBi) | Beam Width (Deg) | Antennas and Equipment Used on Range 2                                                           |
|-------------------|------------|------------|------------------|--------------------------------------------------------------------------------------------------|
| 30 MHz to 1.2 GHz | 0.75       | 9          | 75               | Two stacked AEL 534B Log Periodic Dipole Arrays<br>Gain: 9 dBi Maximum<br>Beamwidth: 75° Maximum |
|                   |            |            |                  |                                                                                                  |
|                   |            |            |                  | <b>Other RF Equipment Used</b>                                                                   |
|                   |            |            |                  |                                                                                                  |
|                   |            |            |                  | <b>RF Sources which are used interchangeably:</b>                                                |
|                   |            |            |                  | Hewlett Packard 83620A (10 MHz - 20 GHz)                                                         |
|                   |            |            |                  | Hewlett Packard 83623A (10 MHz - 20 GHz)                                                         |
|                   |            |            |                  | Hewlett Packard 8341B (10 MHz - 20 GHz)                                                          |
|                   |            |            |                  | Hewlett Packard 8673D (10 MHz - 26.5 GHz)                                                        |
|                   |            |            |                  |                                                                                                  |
|                   |            |            |                  | <b>Other Components:</b>                                                                         |
|                   |            |            |                  |                                                                                                  |
|                   |            |            |                  |                                                                                                  |
|                   |            |            |                  | RG-214 Coaxial Cable - 60 feet                                                                   |
|                   |            |            |                  | HP 778D .1 - 2 GHz 20 dB Directional Coupler                                                     |
|                   |            |            |                  |                                                                                                  |
|                   |            |            |                  | <b>Transmitter Information:</b>                                                                  |
|                   |            |            |                  | 17-81 Building, Auburn, WA                                                                       |
|                   |            |            |                  | Lat/Lon: N 47° 16' 32.1" W 122° 14' 27.5"                                                        |
|                   |            |            |                  | Antenna Height: 6 - 36 feet                                                                      |
|                   |            |            |                  | Beam Direction: 143° True                                                                        |
|                   |            |            |                  | Beam Elevation Angle: 0°                                                                         |
|                   |            |            |                  | Signal Modulation: CW                                                                            |
|                   |            |            |                  | Bandwidth: CW                                                                                    |
|                   |            |            |                  | Maximum RF Source Power: 0 dBm                                                                   |
|                   |            |            |                  | Transmission Line Loss: 0.7 to 5.4 dB                                                            |
|                   |            |            |                  | Maximum Power at Antenna Input: -0.7 to -5.4 dBm                                                 |

## Attachment 2



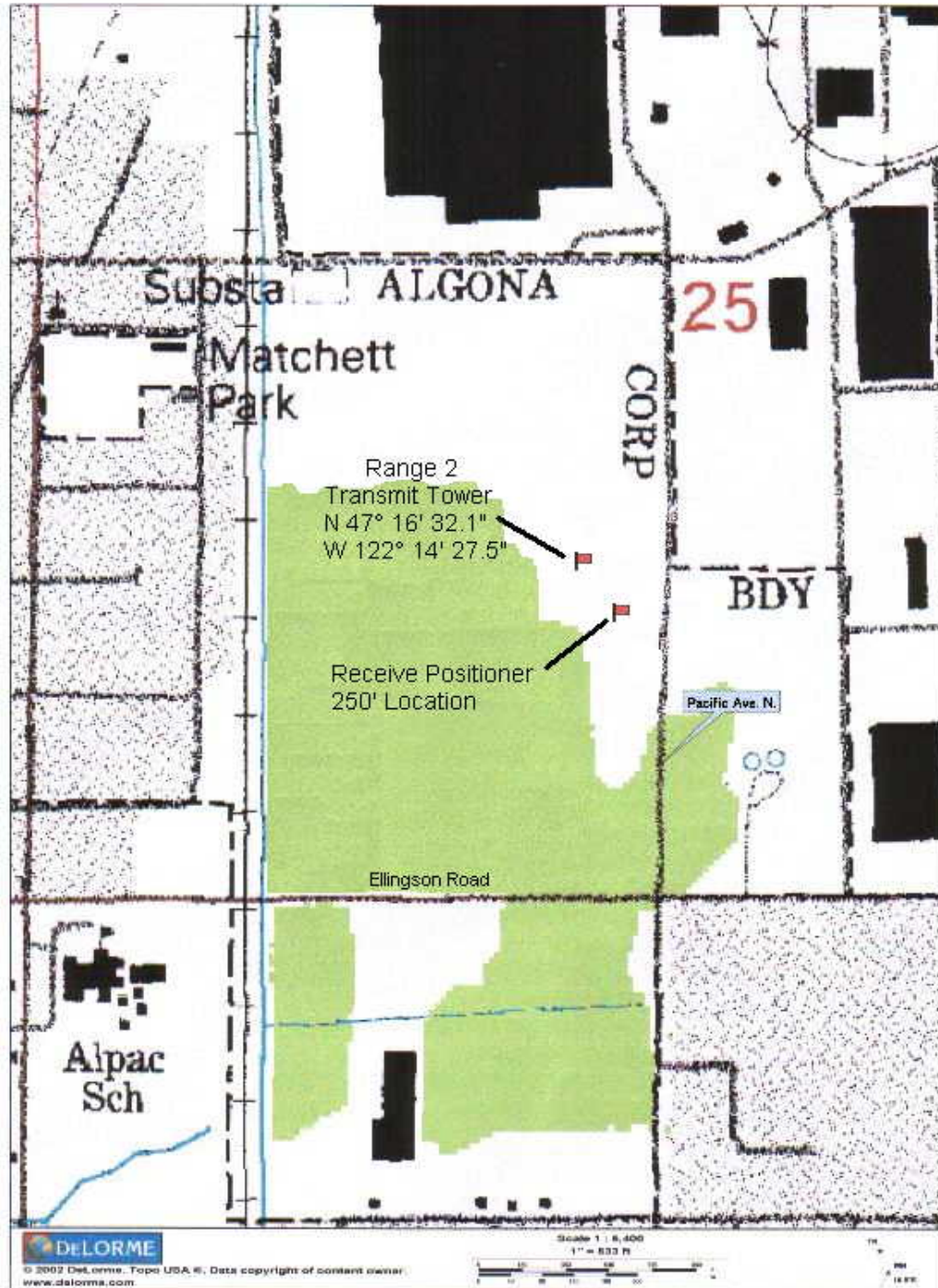
Auburn Range 2 Block Diagram

## Site Layout



## Attachment 4

### Site Map





## **Attachment 5**

### **Range 2 Topography**

