Walters Hill Alternate Site Suitability Report Appendix B Technical Supplement City of Portland, Oregon Public Safety Systems Revitalization Project

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"Unleashing the Power of Technology"

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1. Microwave Path Profiles for Walters Hill Alternate Sites

This section contains the microwave path profiles for each of the Walters Hill alternate sites evaluated by ***FE***.

The technical parameters used for each site are as follows:

- Dish antenna height: 120 feet Above Ground Level (AGL)
- Microwave frequency band varies by site
    - 6700 MHz
    - 10700 MHz
    - 11700 MHz
- Assumes 20 feet of future tree growth
- Fresnel Zone clearance
- Earth curvature (K) factor: 1.33

1.1 Walters Hill Baseline Microwave Paths

1.1.1 Site Description

The proposed Walters Hill site is located at 1127 SW Blaine Court, Gresham, Oregon. The proposed site location has an elevation of 818 feet (ASL).

1.1.2 Path Profiles

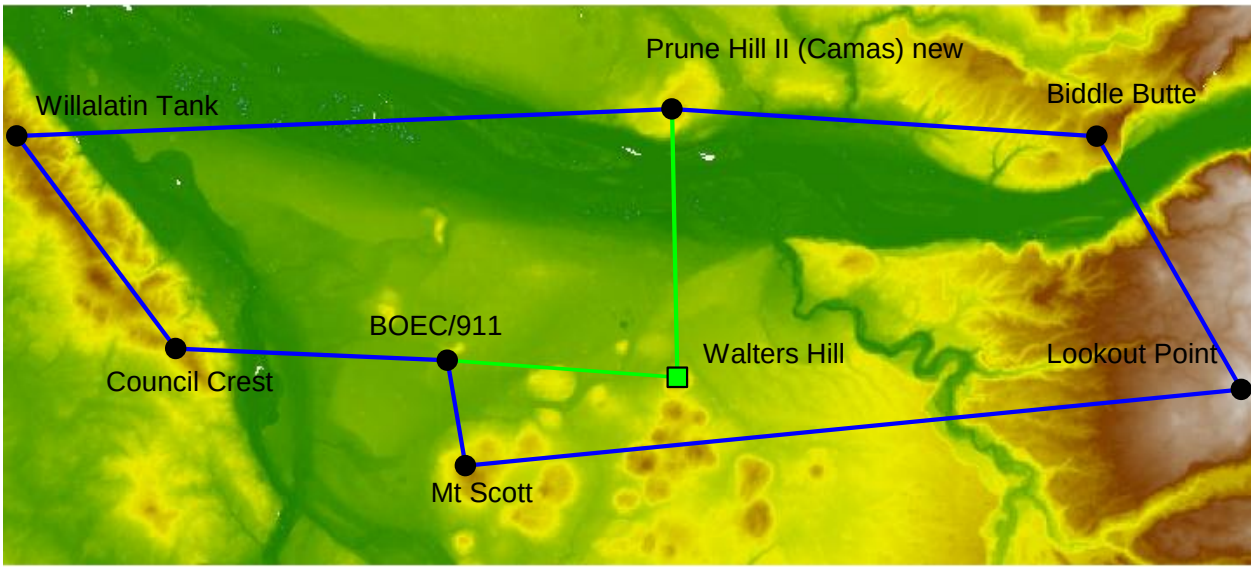

Figure 1 – Walters Hill Baseline Evaluated Microwave Paths

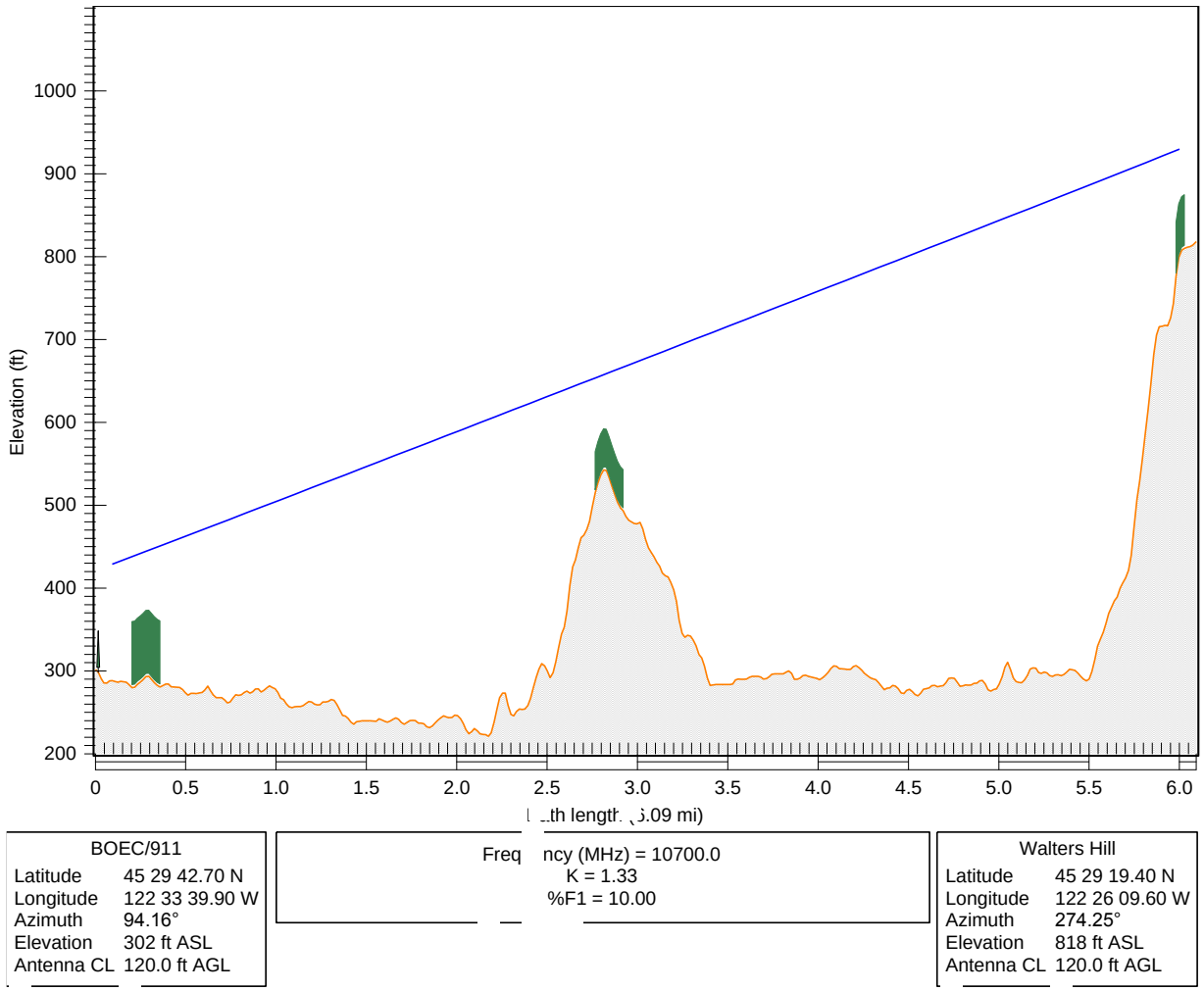

Figure 2 - Path Profile: Walters Hill to BOEC / 911

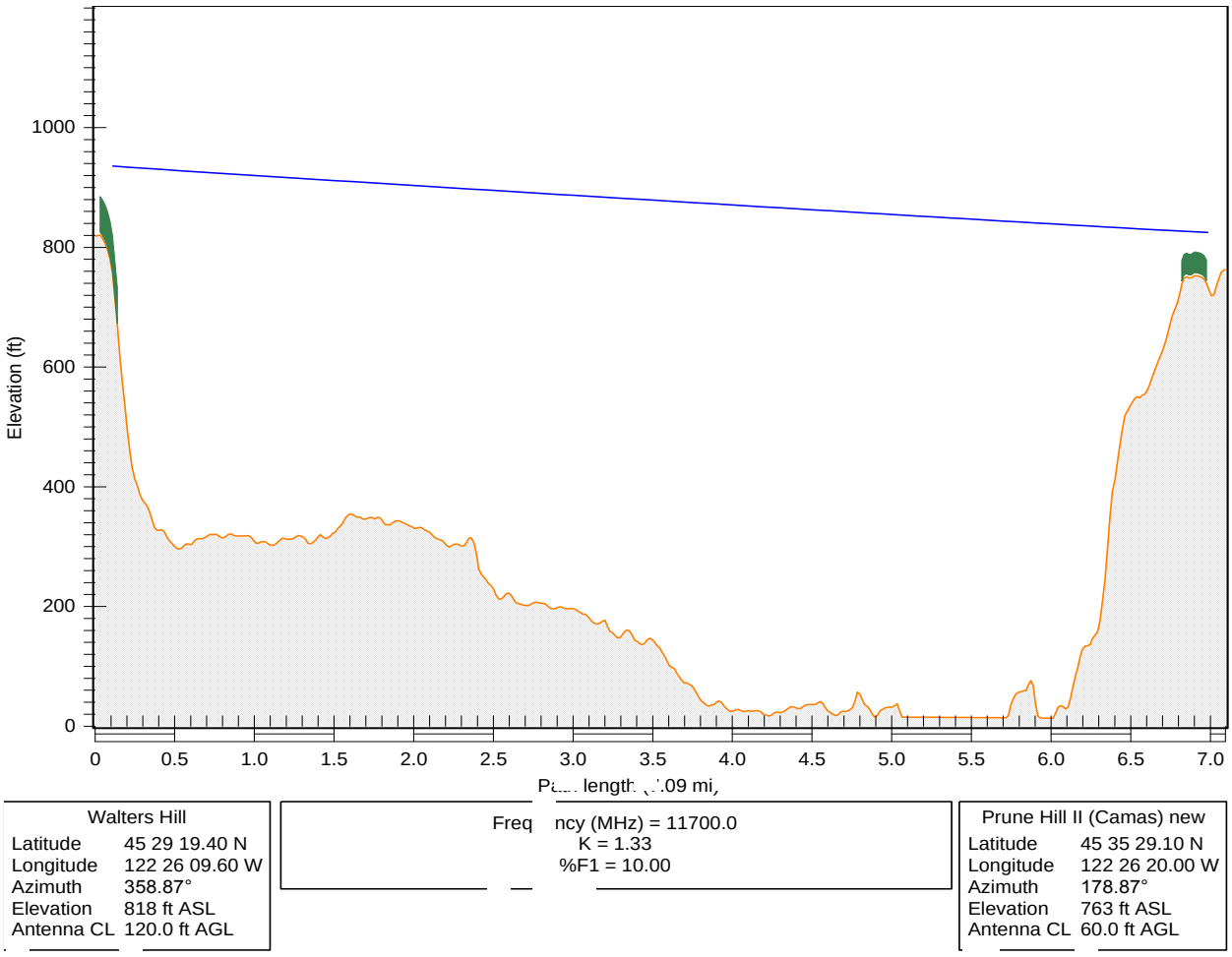

Figure 3 - Path Profile: Walters Hill to Prune Hill

1.3 Multnomah County Maintenance Yard

1.3.1 Site Description

The proposed alternate site "Multnomah County Maintenance Yard" is located on the Multnomah County Service Shop facility at 1620 SE 190th Ave, Gresham, OR. The proposed site location has an elevation of 243 feet (ASL).

1.3.2 Path Profiles

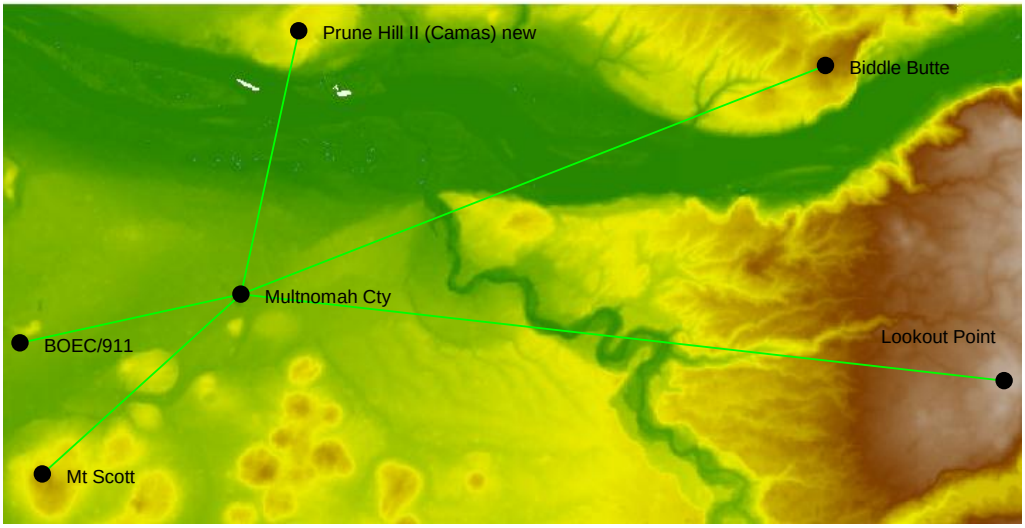

Figure 4 – Multnomah County Maintenance Yard Evaluated Microwave Paths

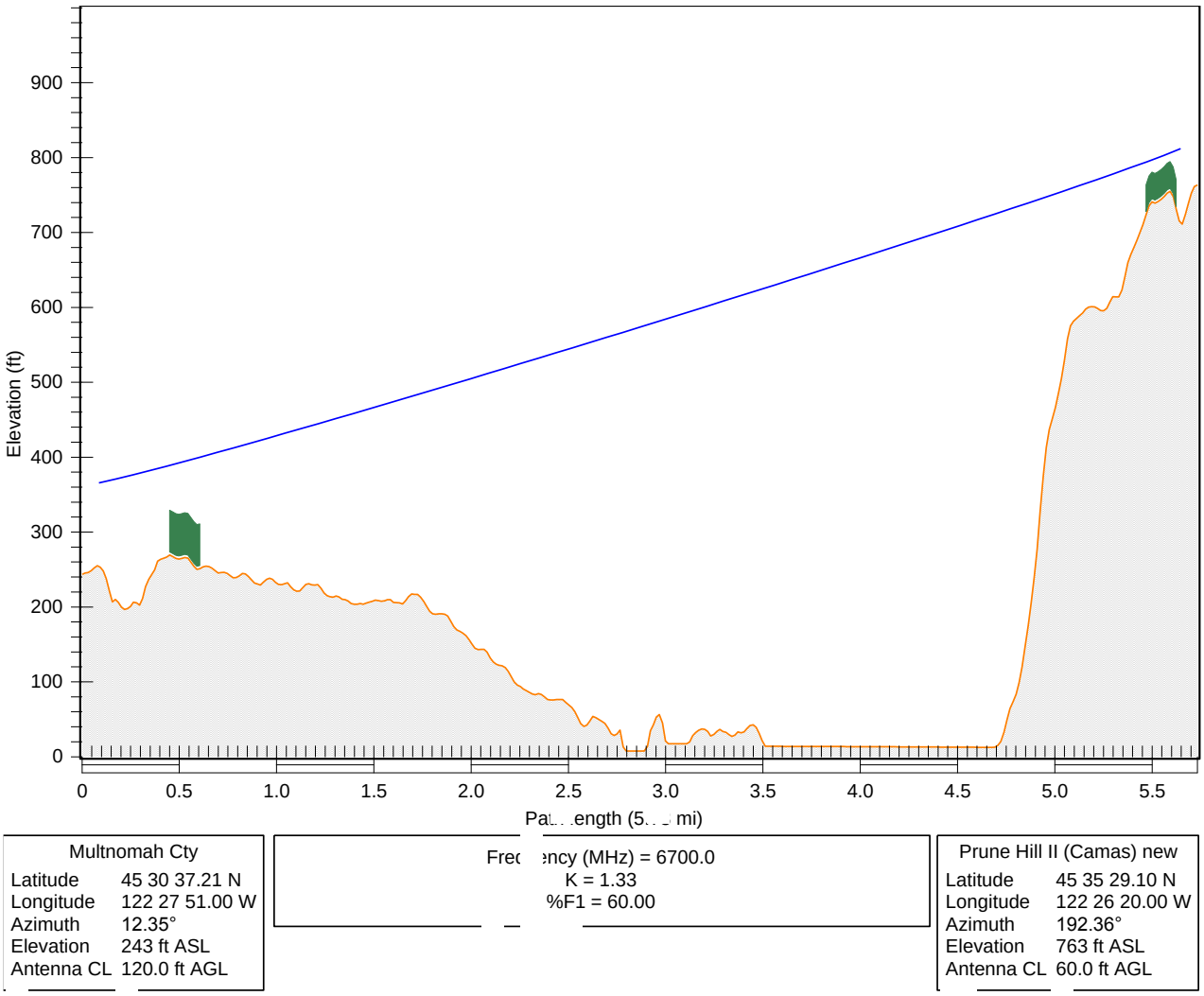

Figure 5 – Path Profile: Multnomah County Maintenance Yard to Prune Hill

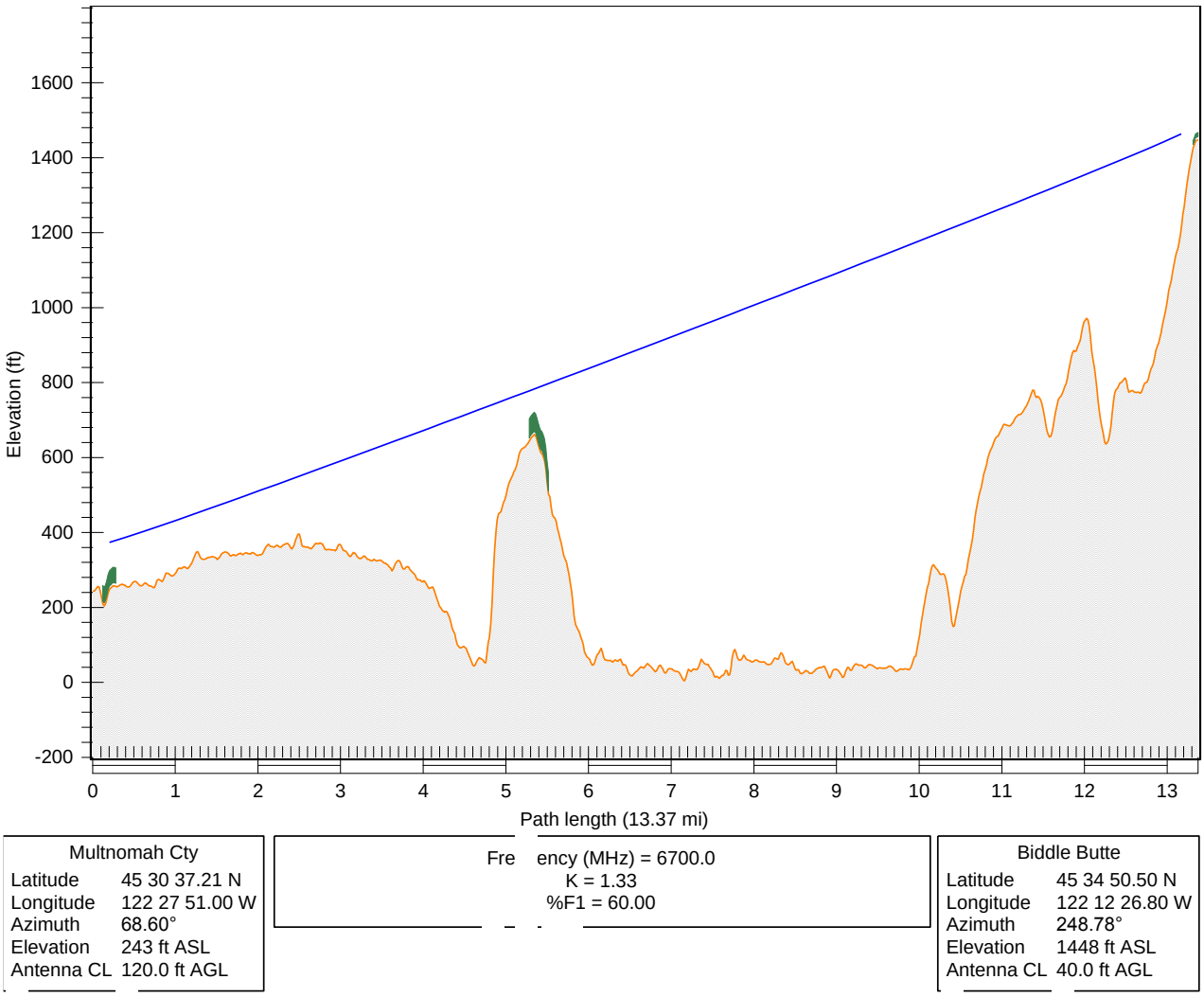

Figure 6 – Path Profile: Multnomah County Maintenance Yard to Biddle Butte

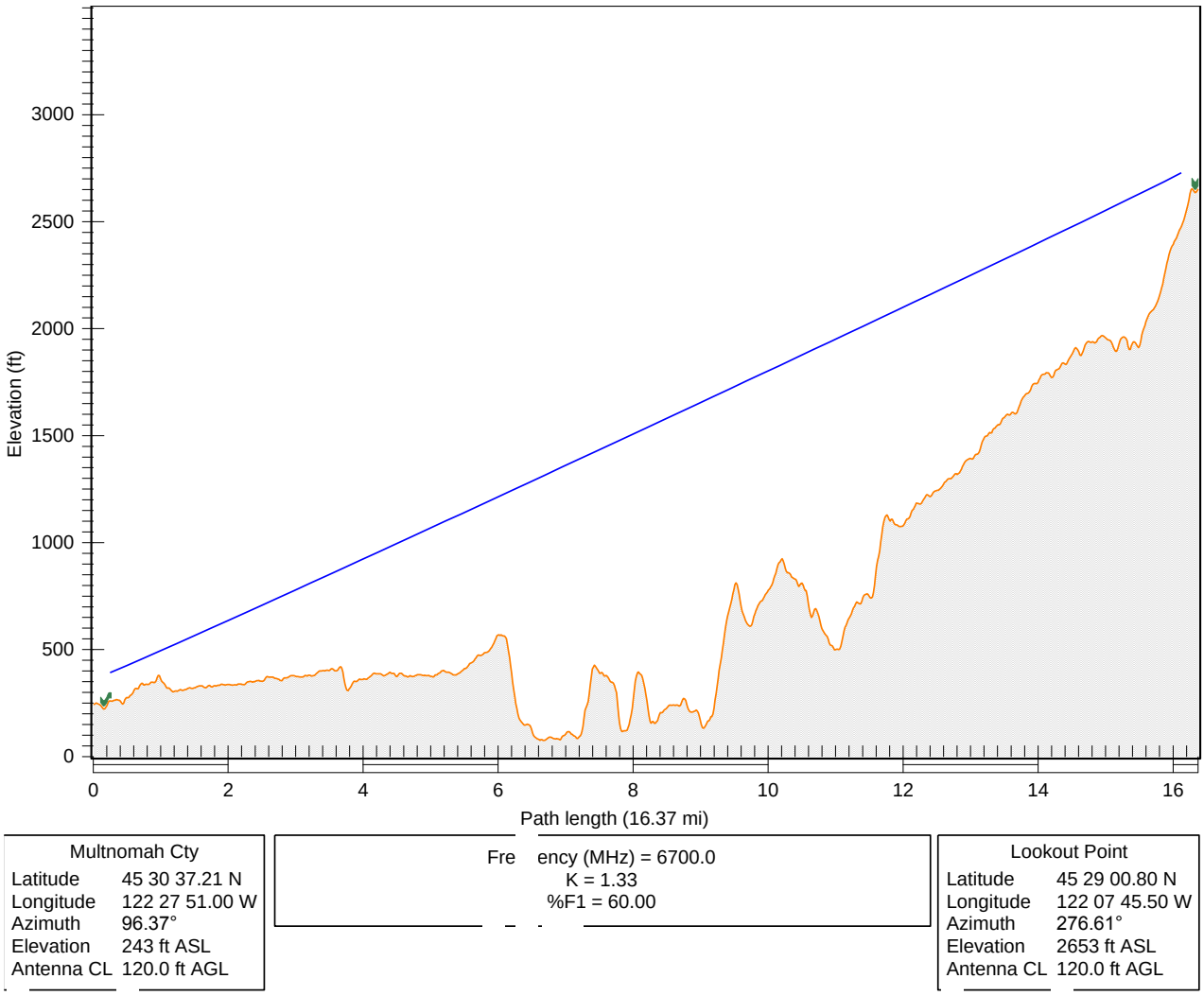

Figure 7 – Path Profile: Multnomah County Maintenance Yard to Lookout Point

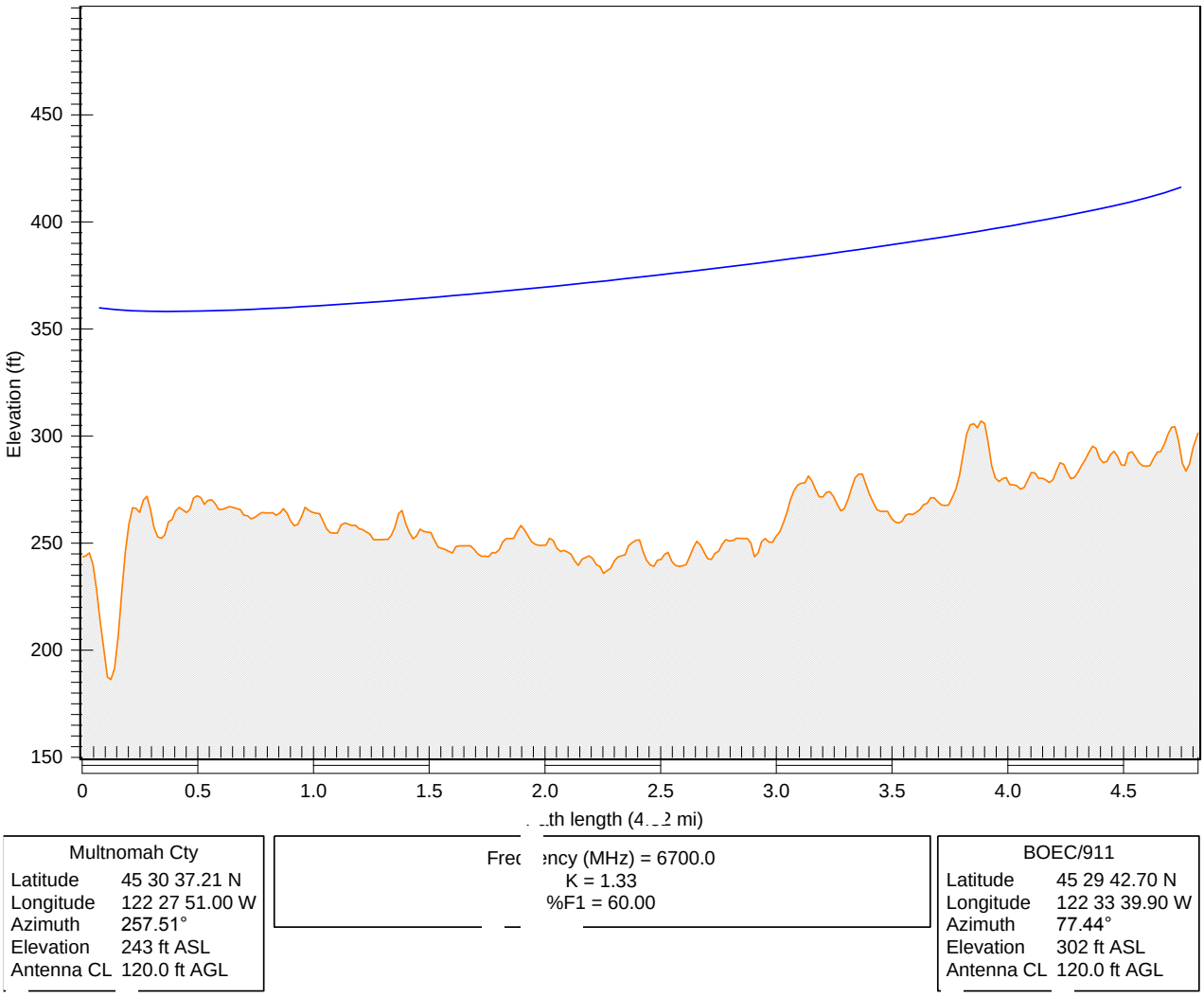

Figure 8 – Path Profile: Multnomah County Maintenance Yard to BOEC/911

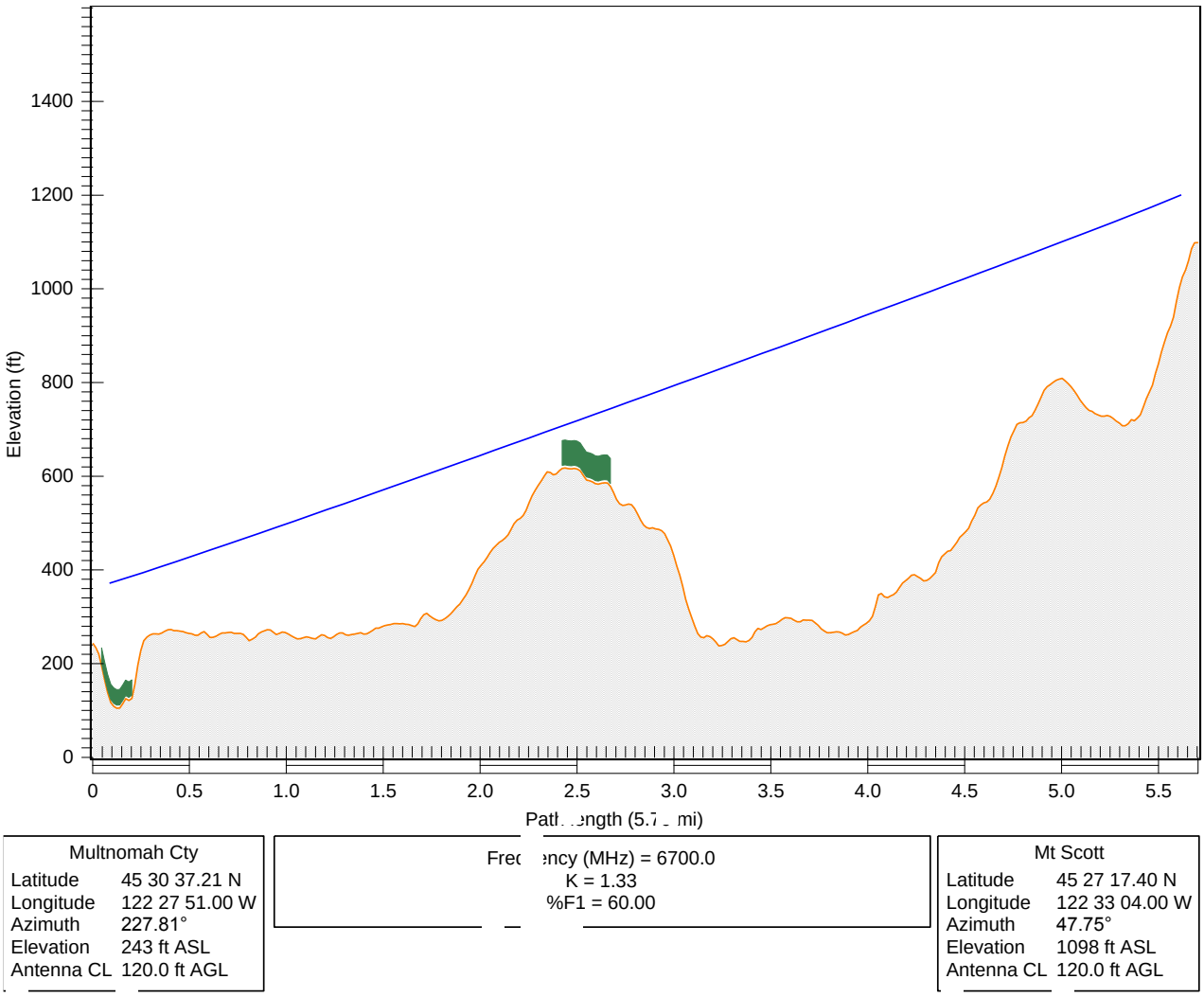

Figure 9 – Path Profile: Multnomah County Maintenance Yard to Mt. Scott

1.5 Mt. Hood Community College

1.5.1 Site Description

The proposed alternative "Mt. Hood CC" site is located on the Mt. Hood Community College campus at 26000 SE Stark Street in Gresham, OR. The proposed site location has an elevation of 302 feet above sea level (ASL).

1.5.2 Path Profiles

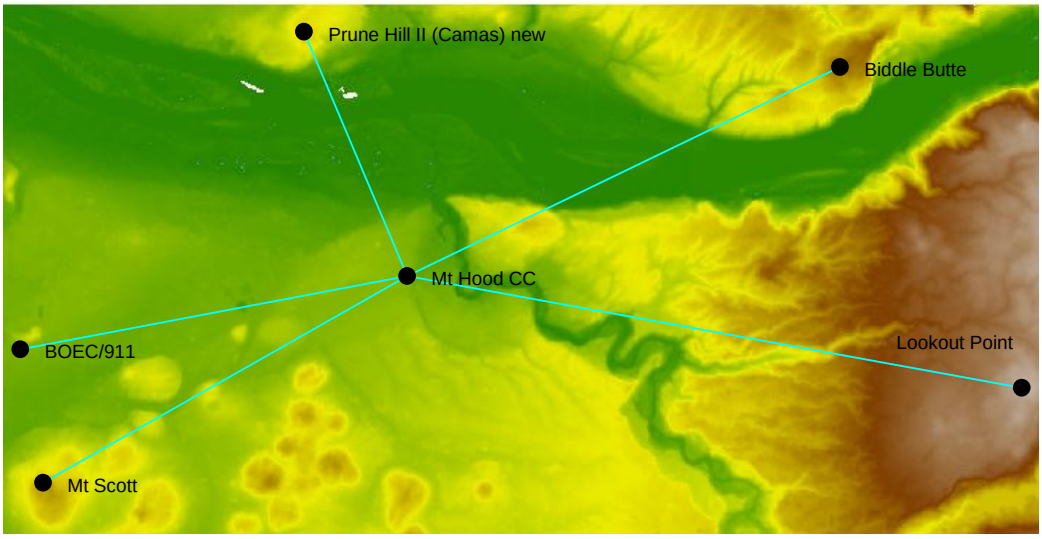

Figure 10 – Mt Hood CC Evaluated Microwave Paths

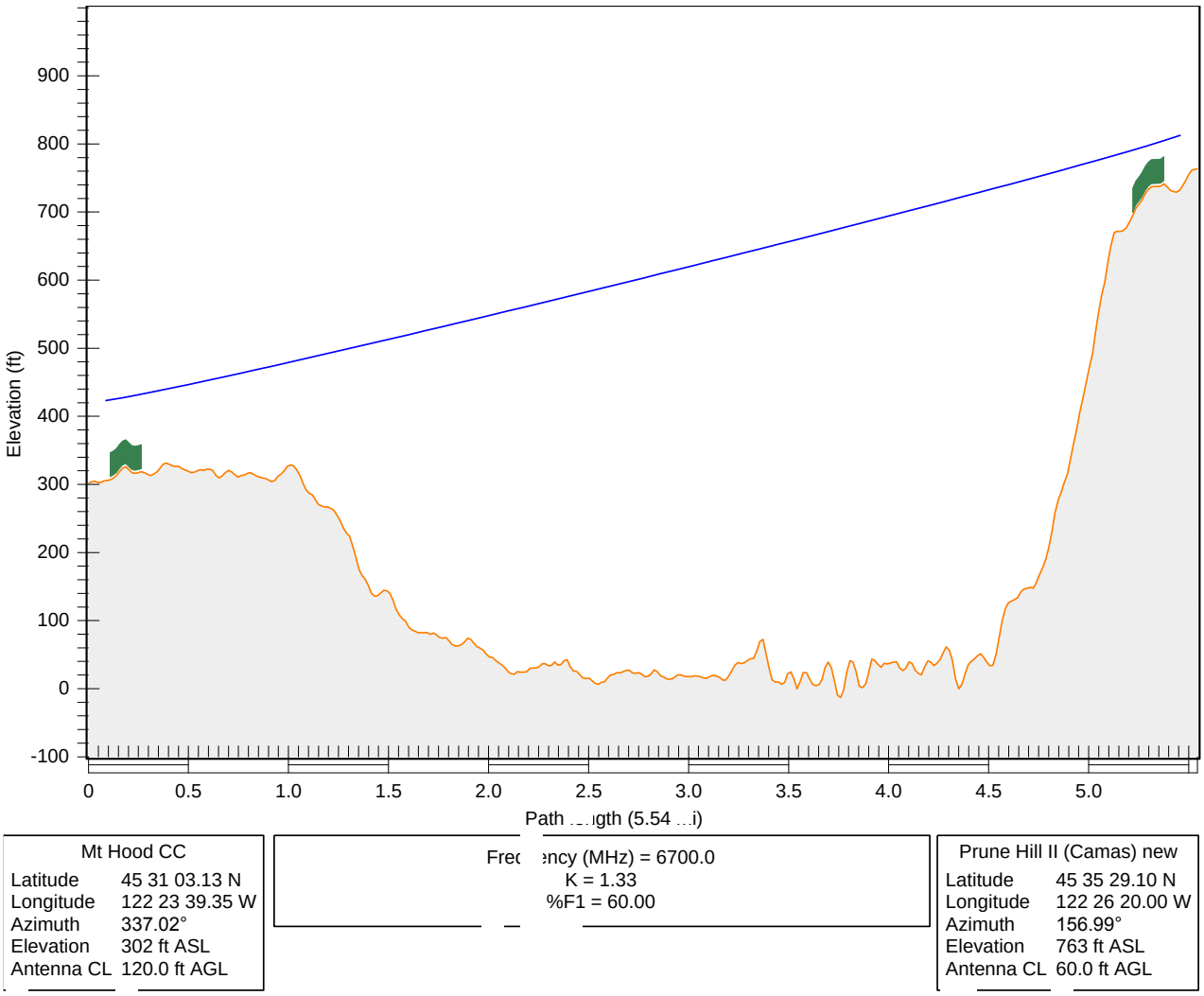

Figure 11 – Path Profile: Mt. Hood CC to Prune Hill

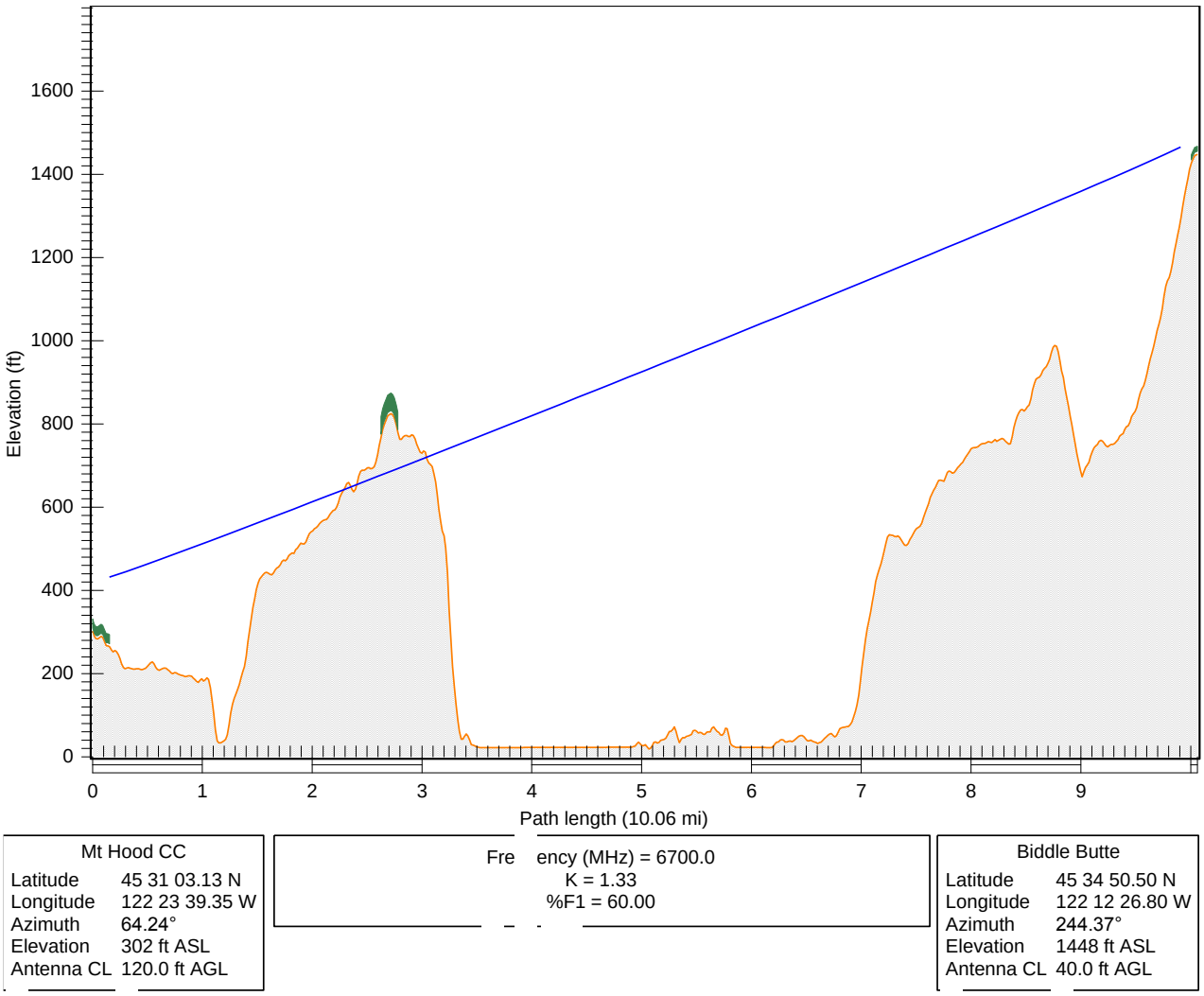

Figure 12– Path Profile: Mt. Hood CC to Biddle Butte

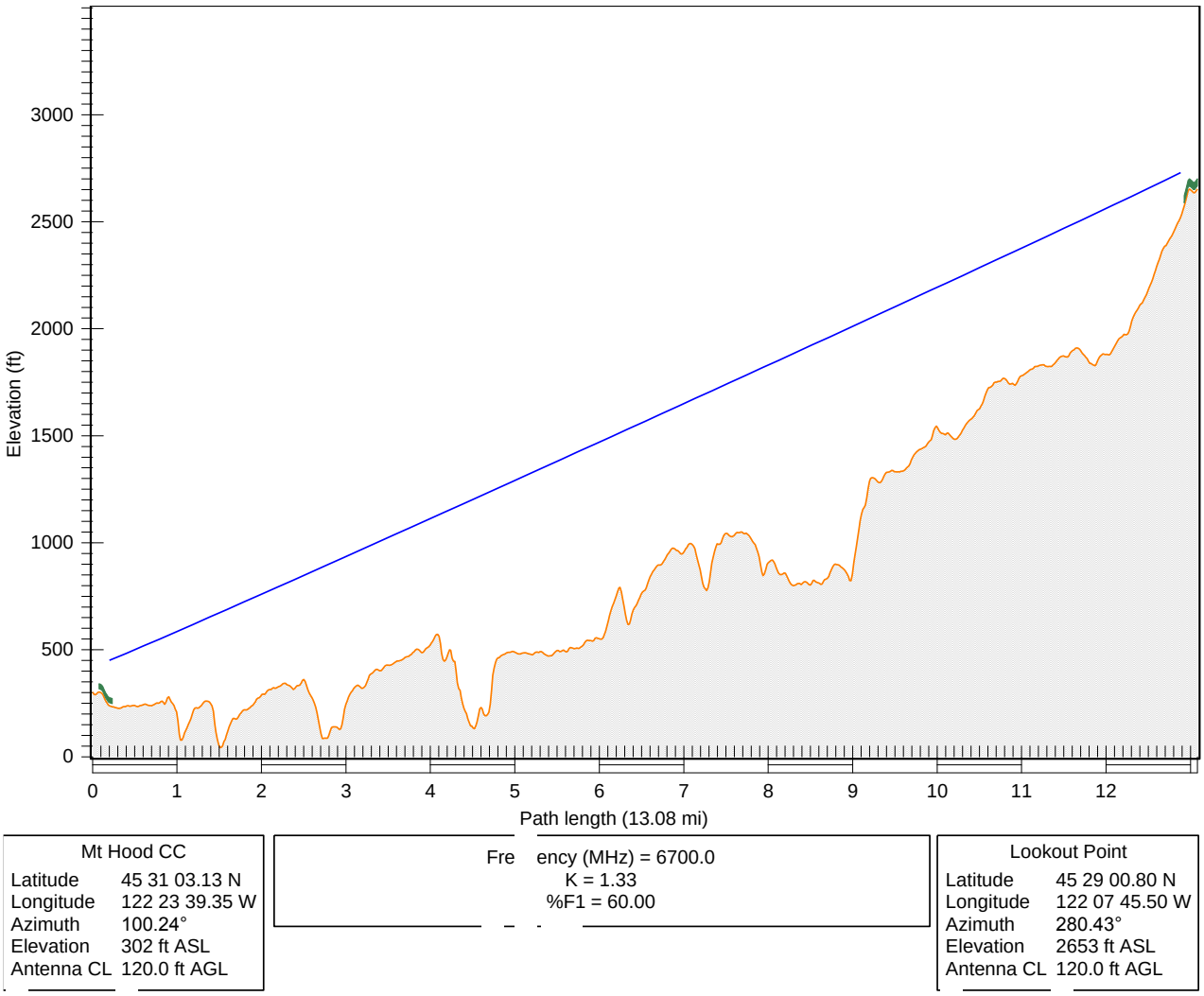

Figure 13 – Path Profile: Mt. Hood CC to Lookout Point

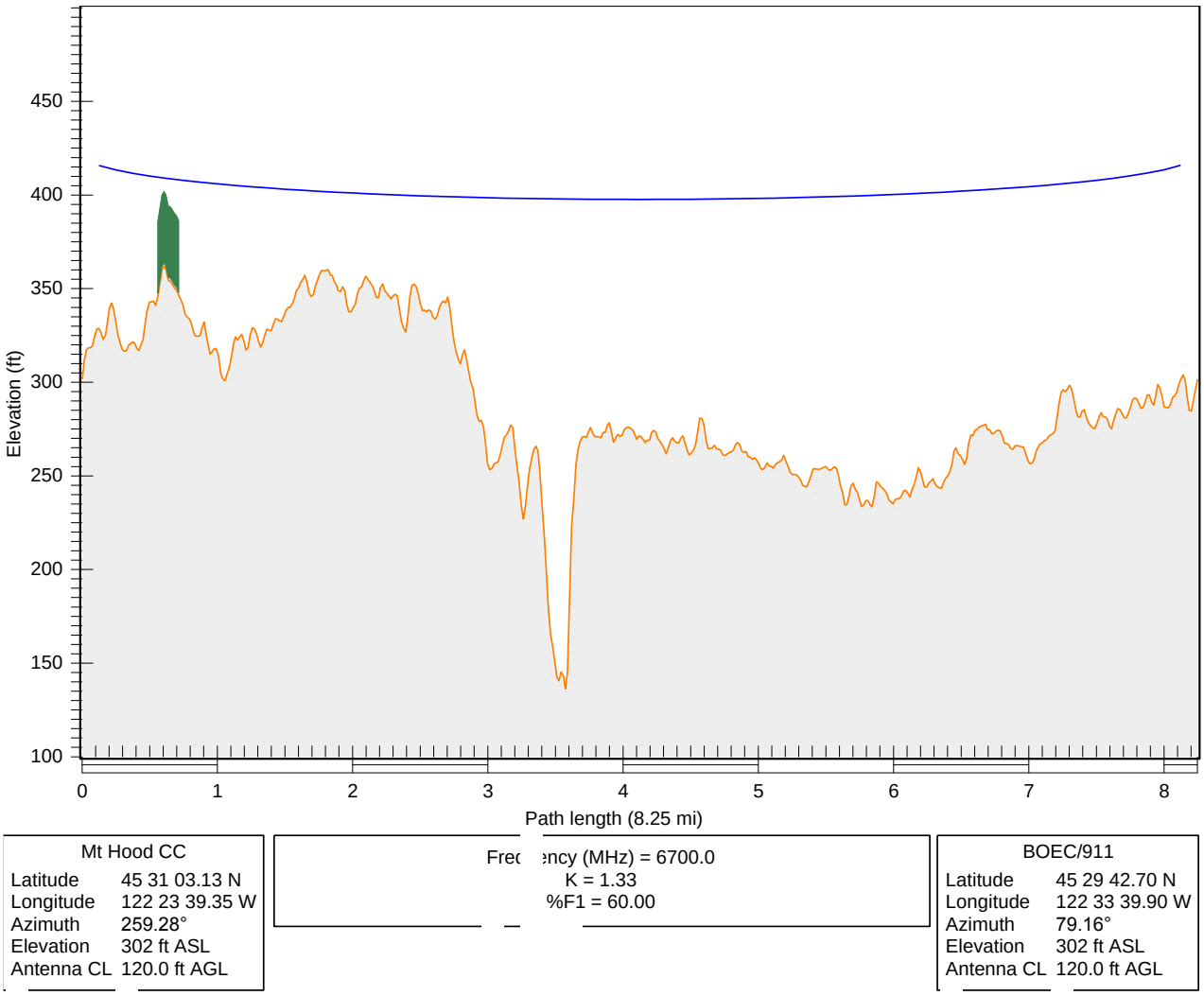

Figure 14 – Path Profile: Mt. Hood CC to BOEC/911

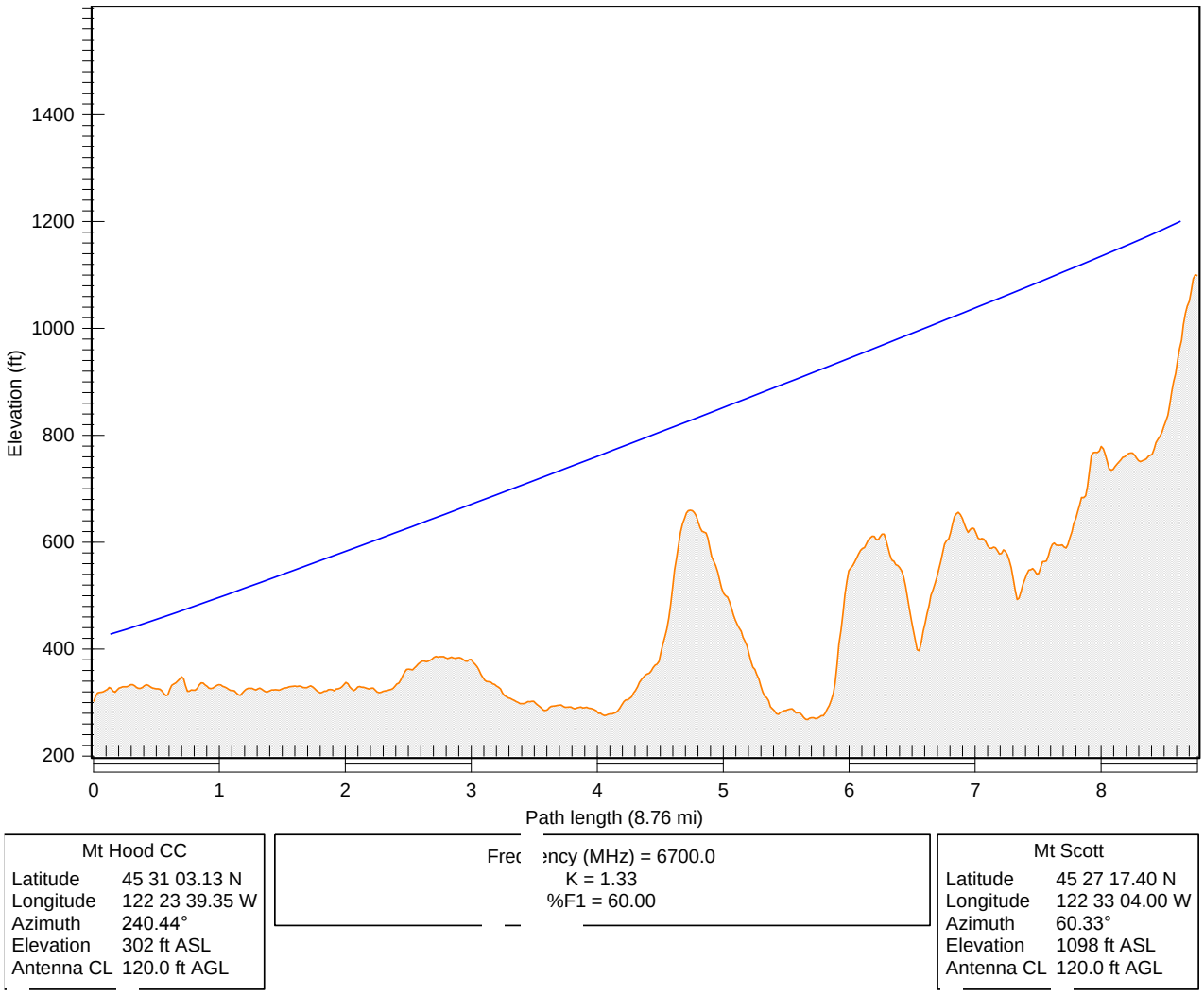

Figure 15 – Path Profile: Mt. Hood CC to Mt. Scott

1.6 Powell Butte

1.6.1 Site Description

The proposed alternate site "Powell Butte" is located at 16160 SE Powell Boulevard, Portland, OR. The proposed site location has an elevation of 488 feet (ASL).

1.6.2 Path Profiles

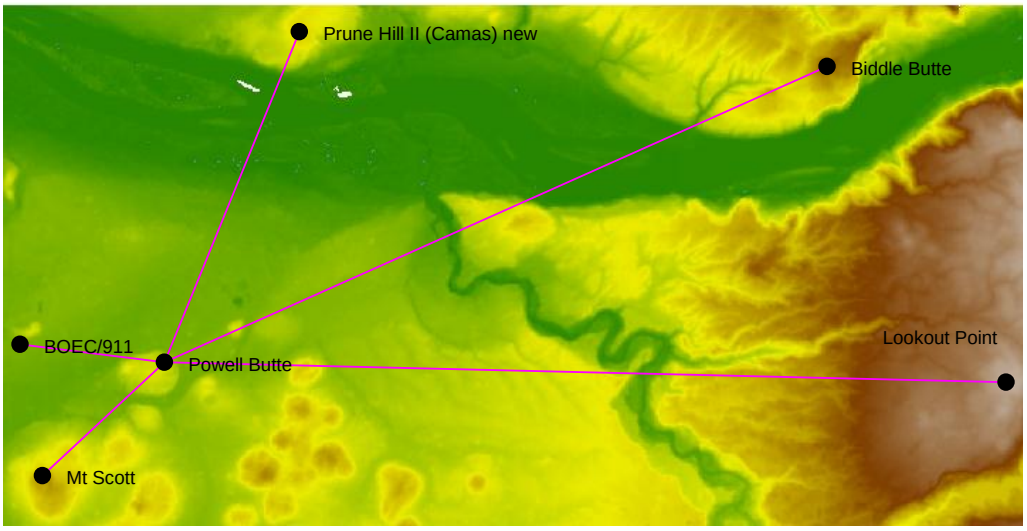

Figure 16 – Powell Butte Evaluated Microwave Paths

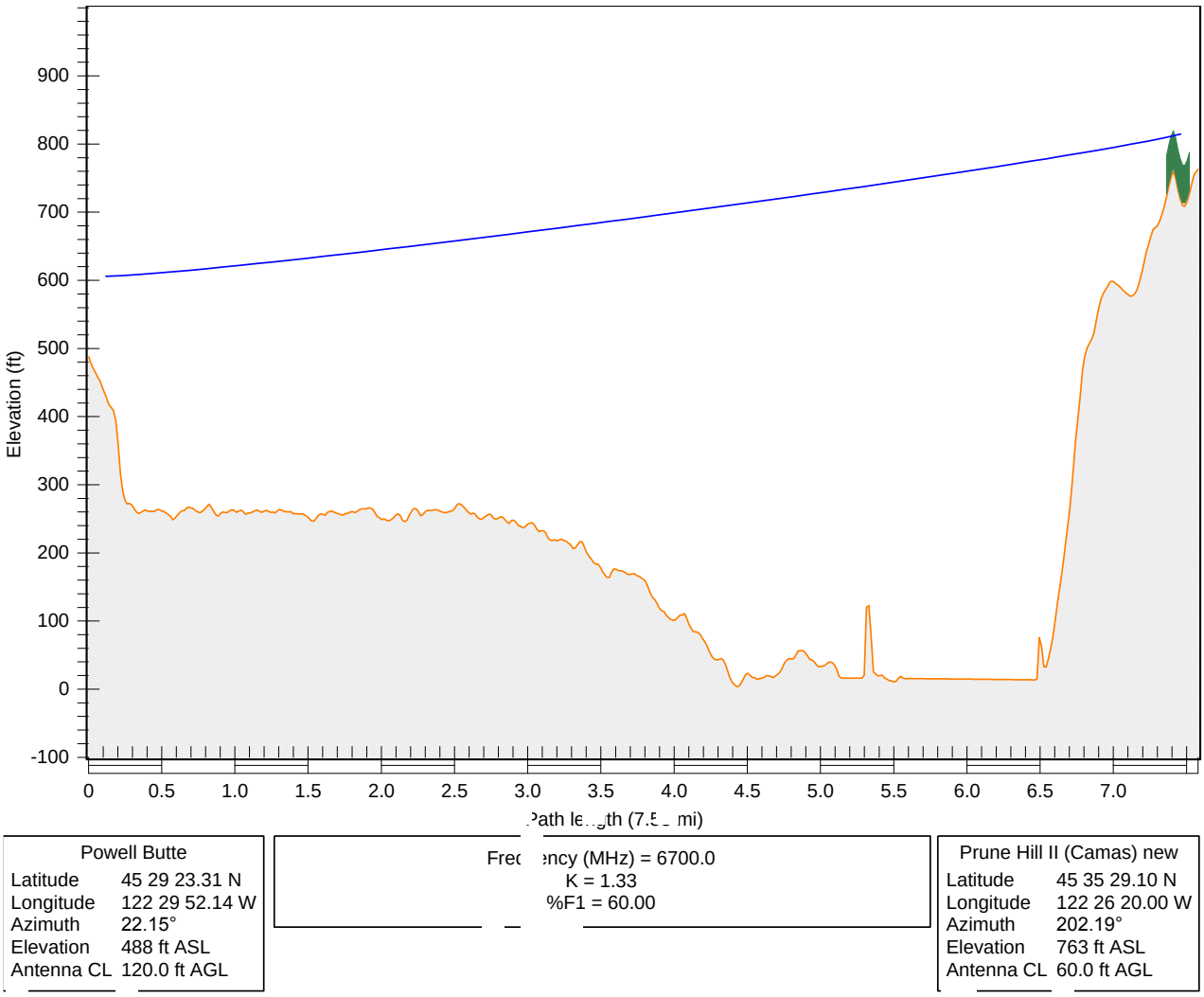

Figure 17 – Path Profile: Powell Butte to Prune Hill

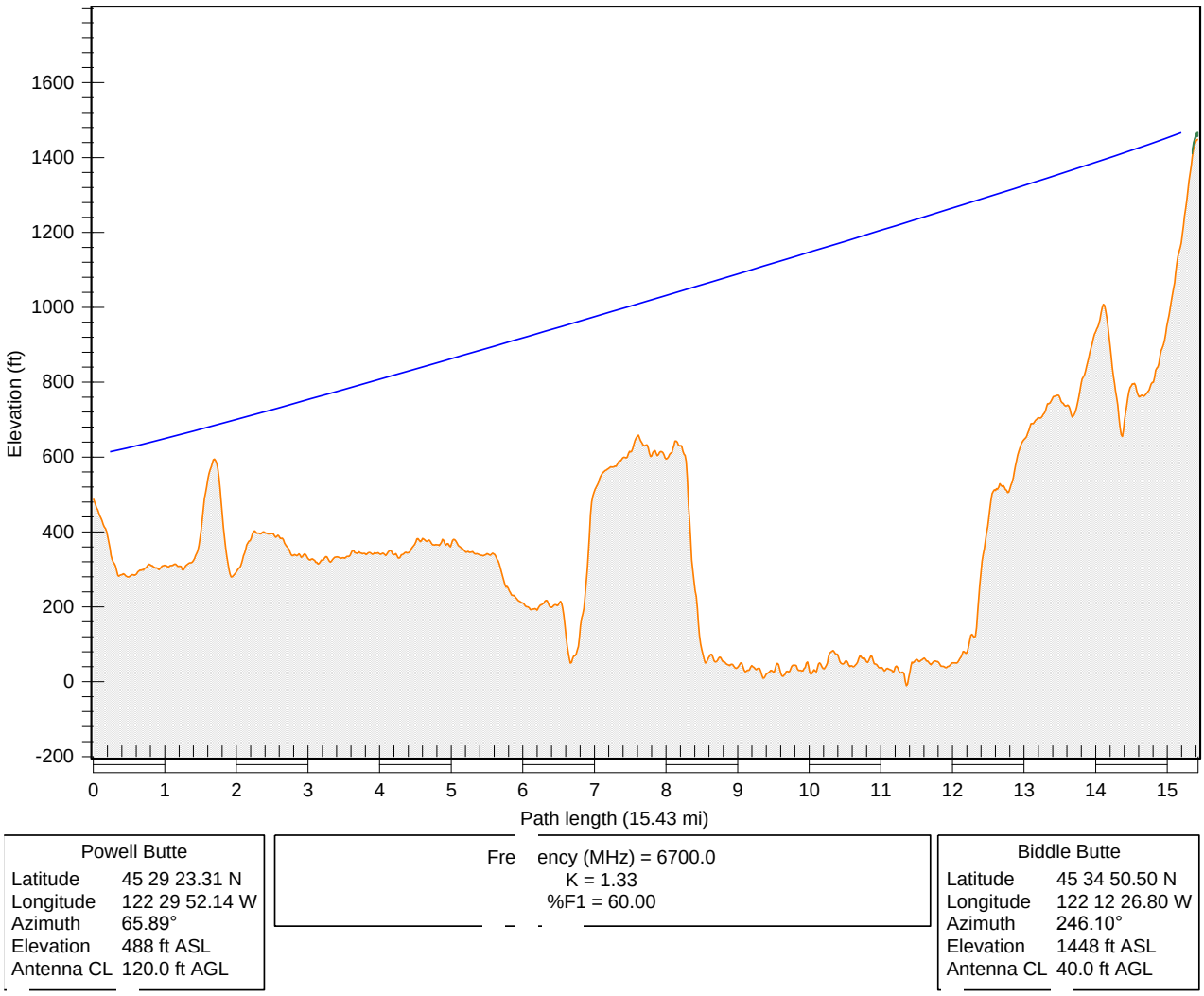

Figure 18 – Path Profile: Powell Butte to Biddle Butte

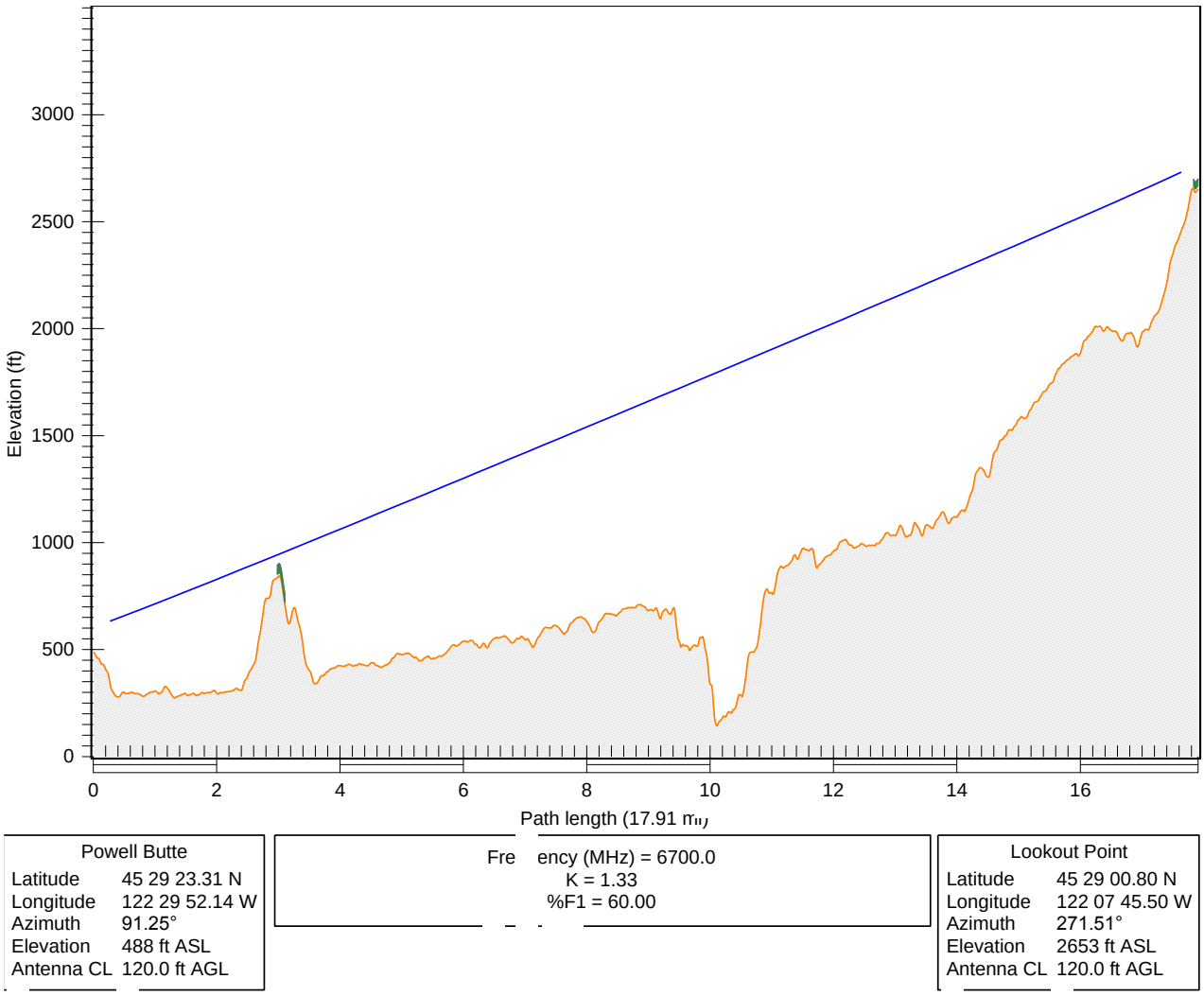

Figure 19 – Path Profile: Powell Butte to Lookout Point

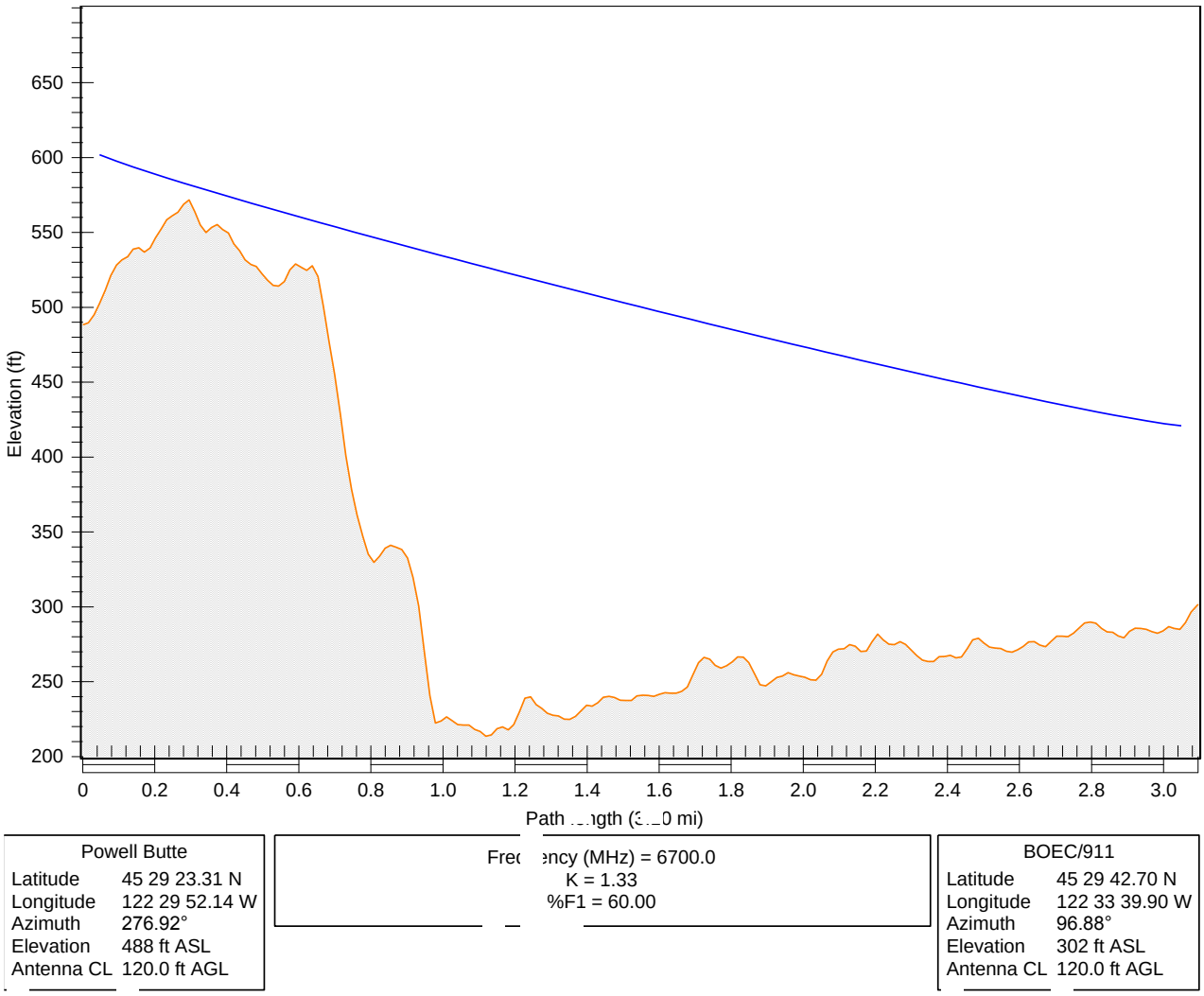

Figure 20 – Path Profile: Powell Butte to BOEC/911

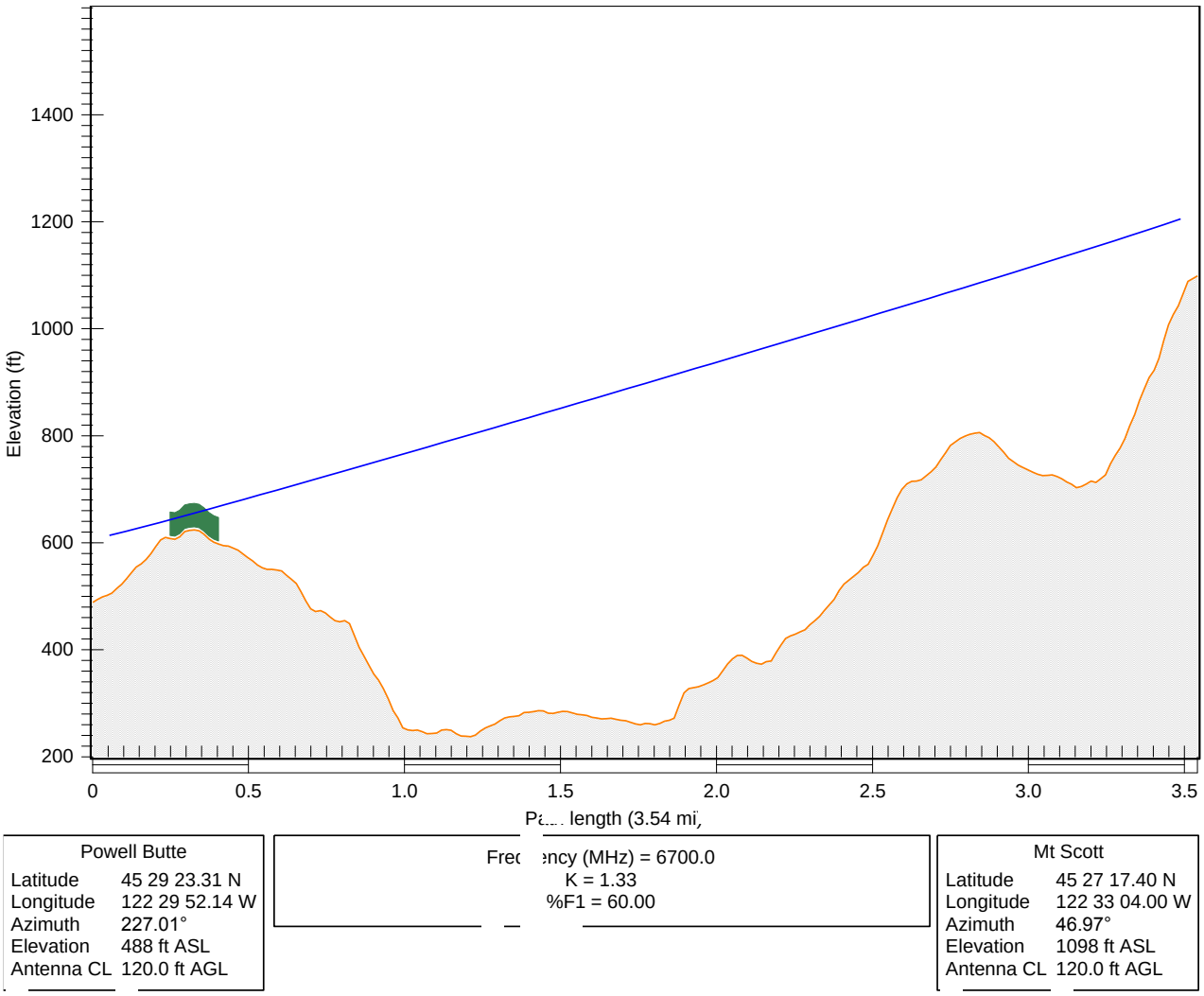

Figure 21 – Path Profile: Powell Butte to Mt. Scott

1.8 Regner Road (a.k.a. East of Regner Rd.)

1.8.1 Site Description

The proposed alternate site "Regner Road" is an existing water tank located near SE Gabbert Rd in Gresham, OR. The proposed site location has an elevation of 917 feet (ASL).

1.8.2 Path Profiles

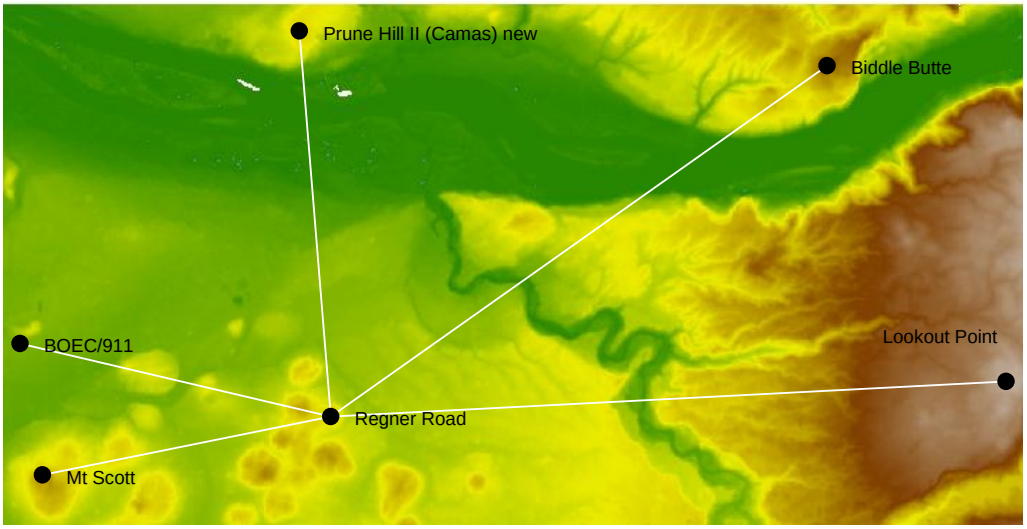

Figure 22 – Regner Road Evaluated Microwave Paths

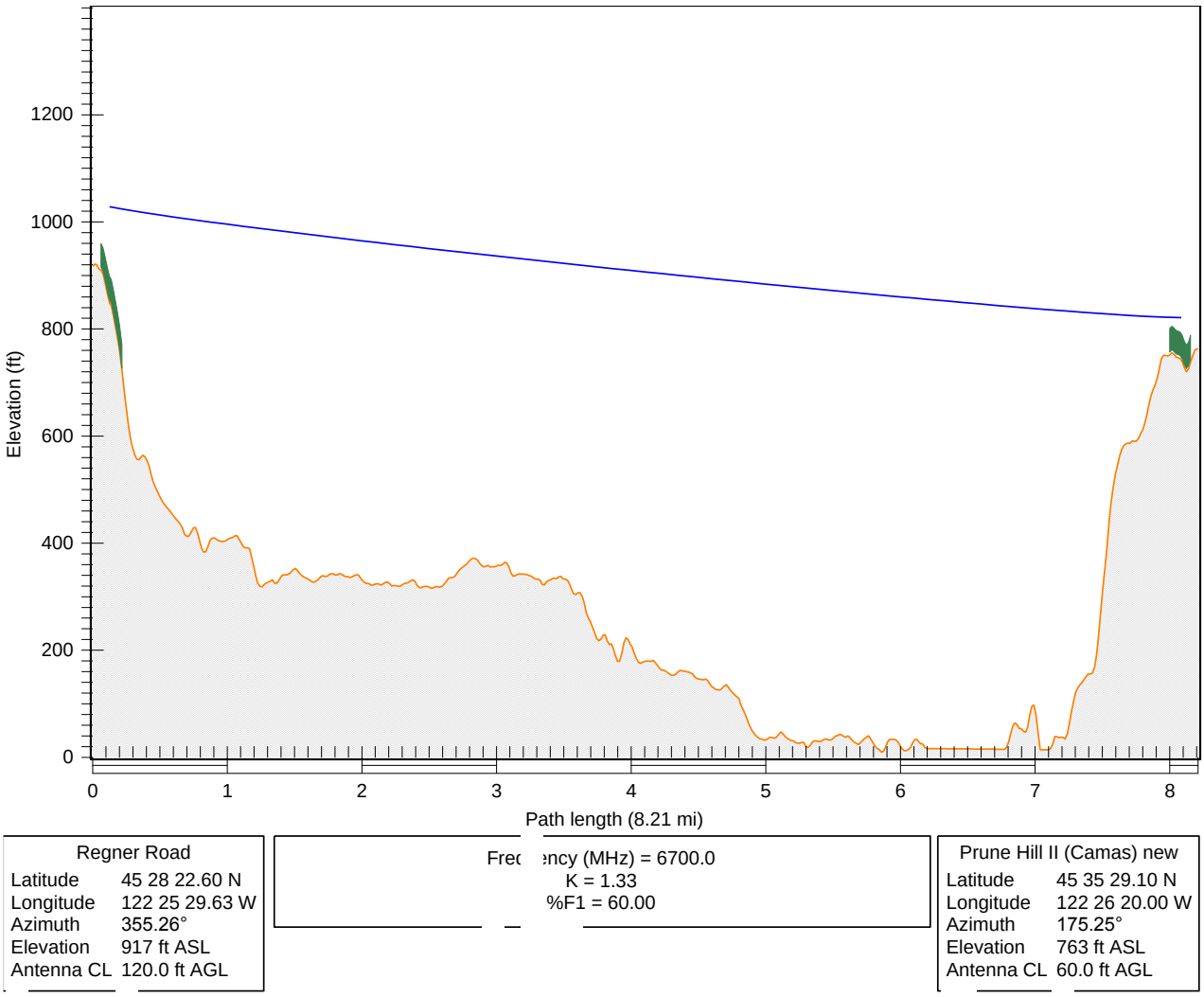

Figure 23 – Path Profile: Regner Rd. to Prune Hill

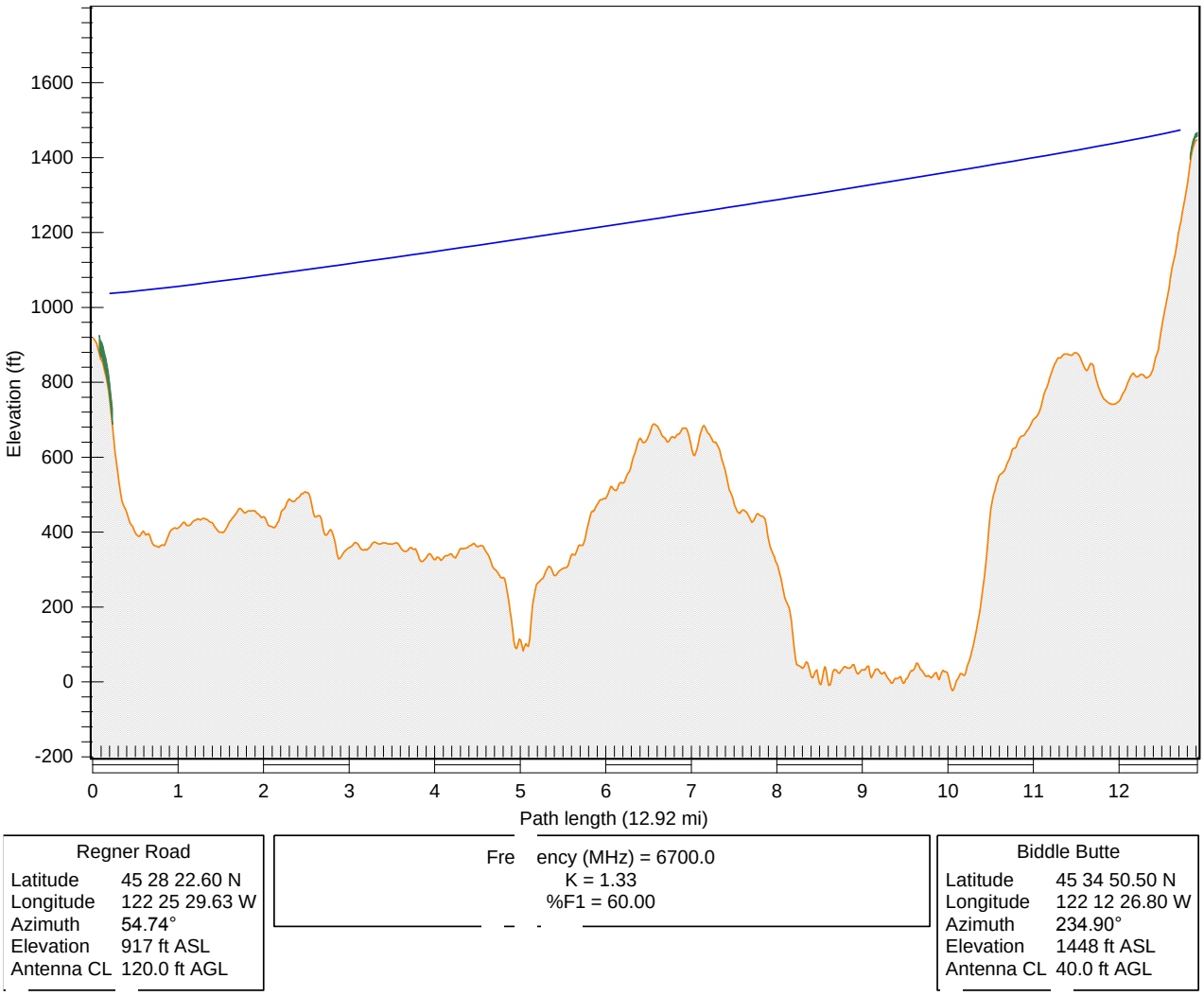

Figure 24 – Path Profile: Regner Rd. to Biddle Butte

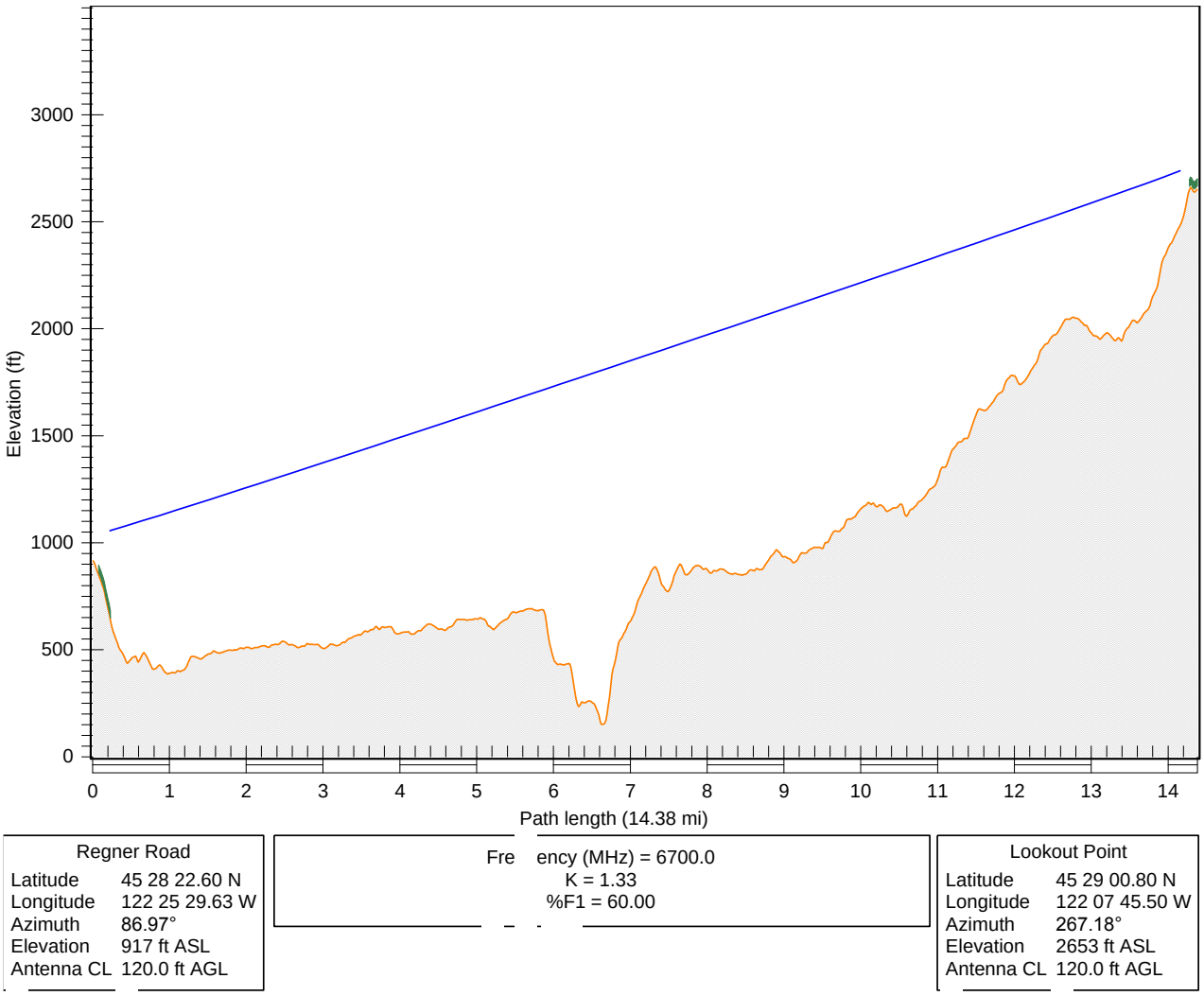

Figure 25 – Path Profile: Regner Rd. to Lookout Point

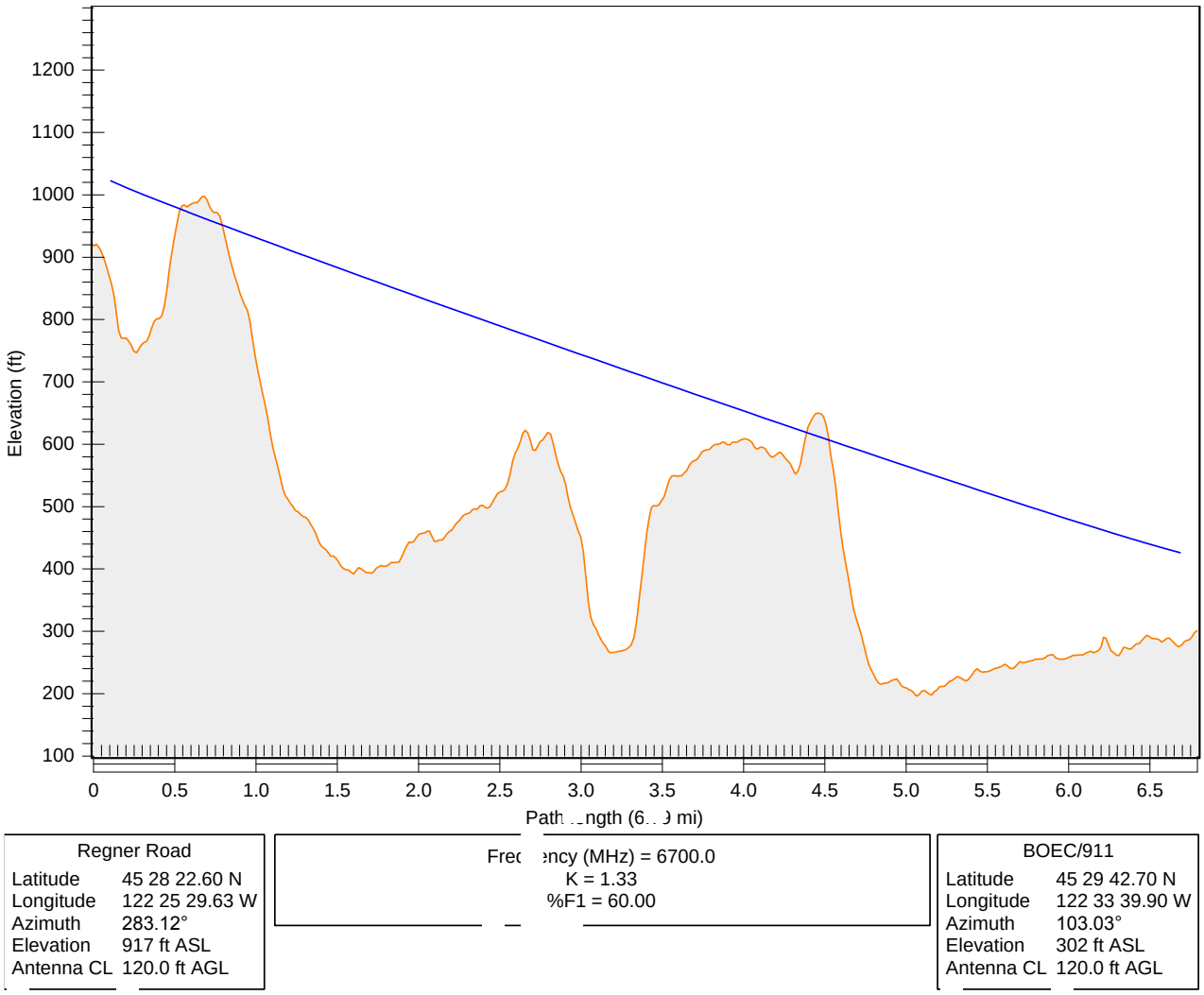

Figure 26 – Path Profile: Regner Rd. to BOEC/911

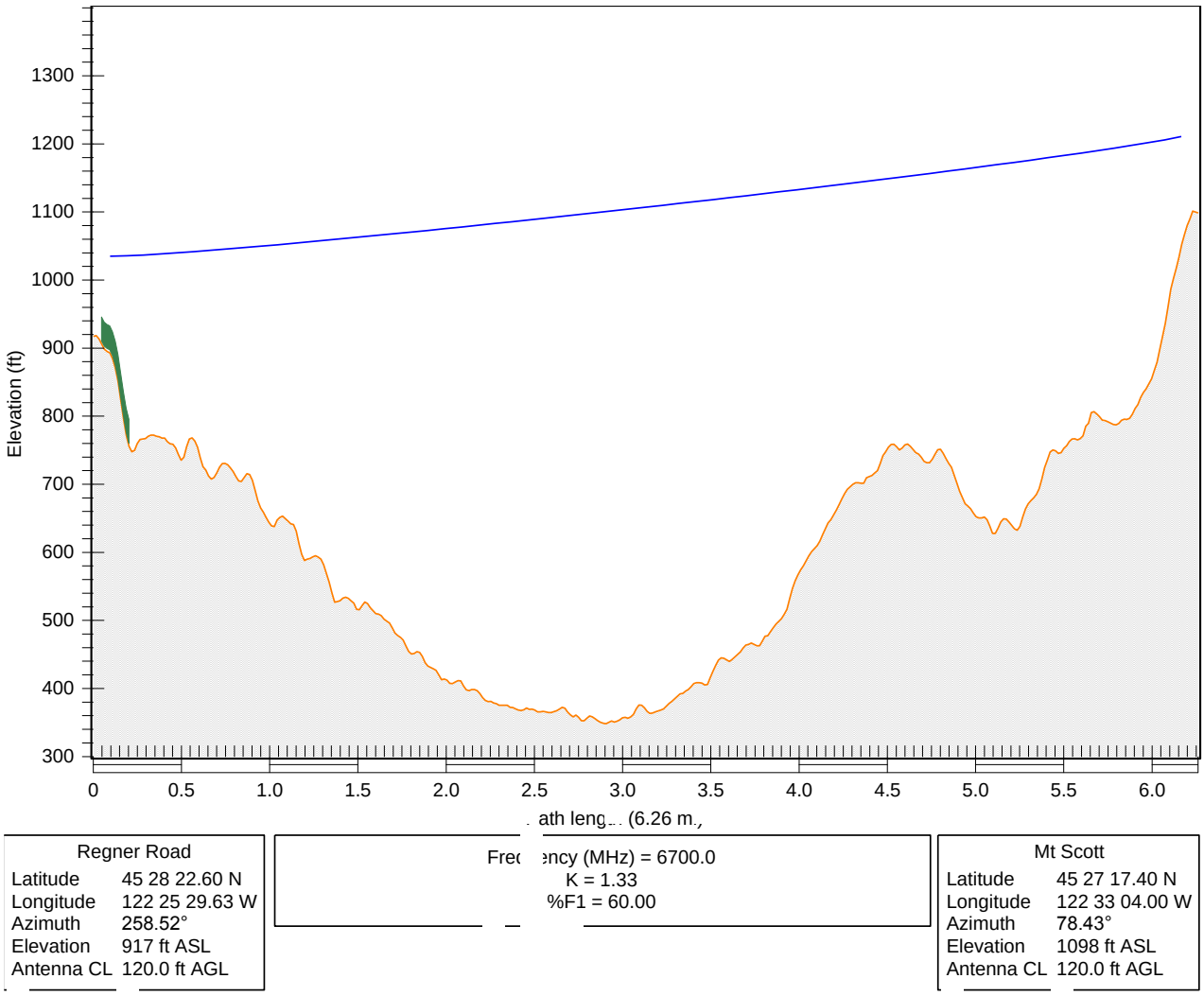

Figure 27 – Path Profile: Regner Rd. to Mt. Scott

1.9 Rocky Butte

1.9.1 Site Description

The proposed alternate site known as “Rocky Butte” has an existing 120’ tower located at 3024 NE Rocky Butte Rd. in Portland OR. The proposed site location has an elevation of 508 feet (ASL). Due to the excessive distance between Rocky Butte and the two easternmost sites in the proposed microwave loop (Biddle Butte and Lookout Point), ***FE*** did not run path profiles from Rocky Butte to those locations.

1.9.2 Path Profiles

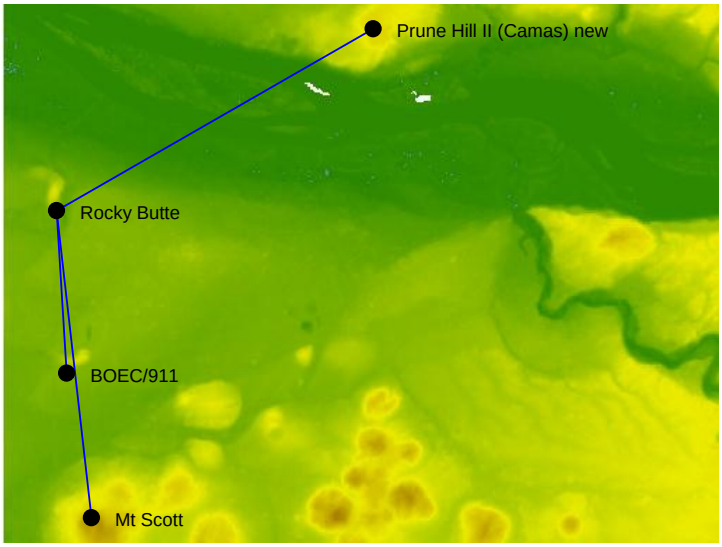

Figure 28 – Rocky Butte Evaluated Microwave Paths

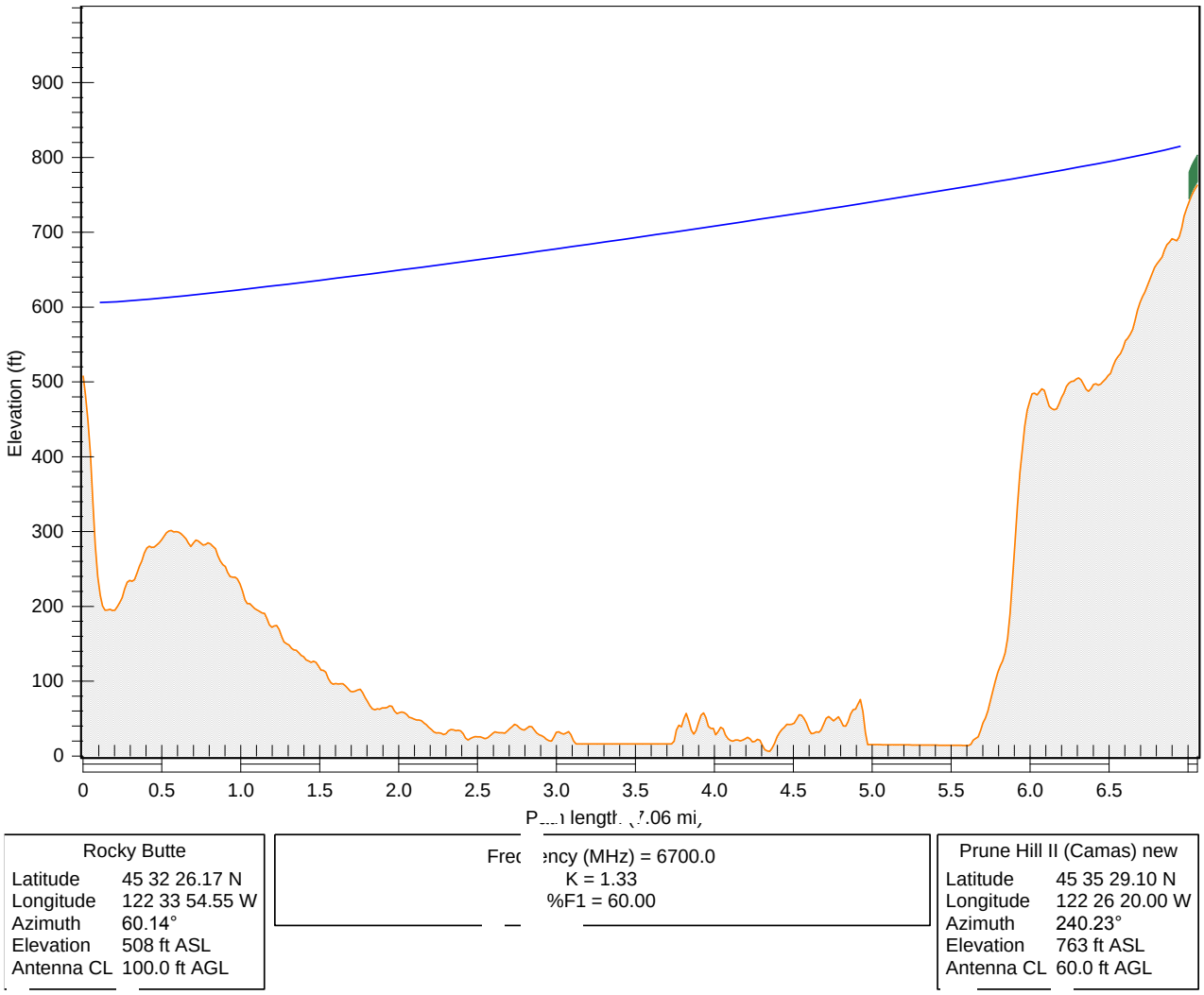

Figure 29 – Path Profile: Rocky Butte to Prune Hill

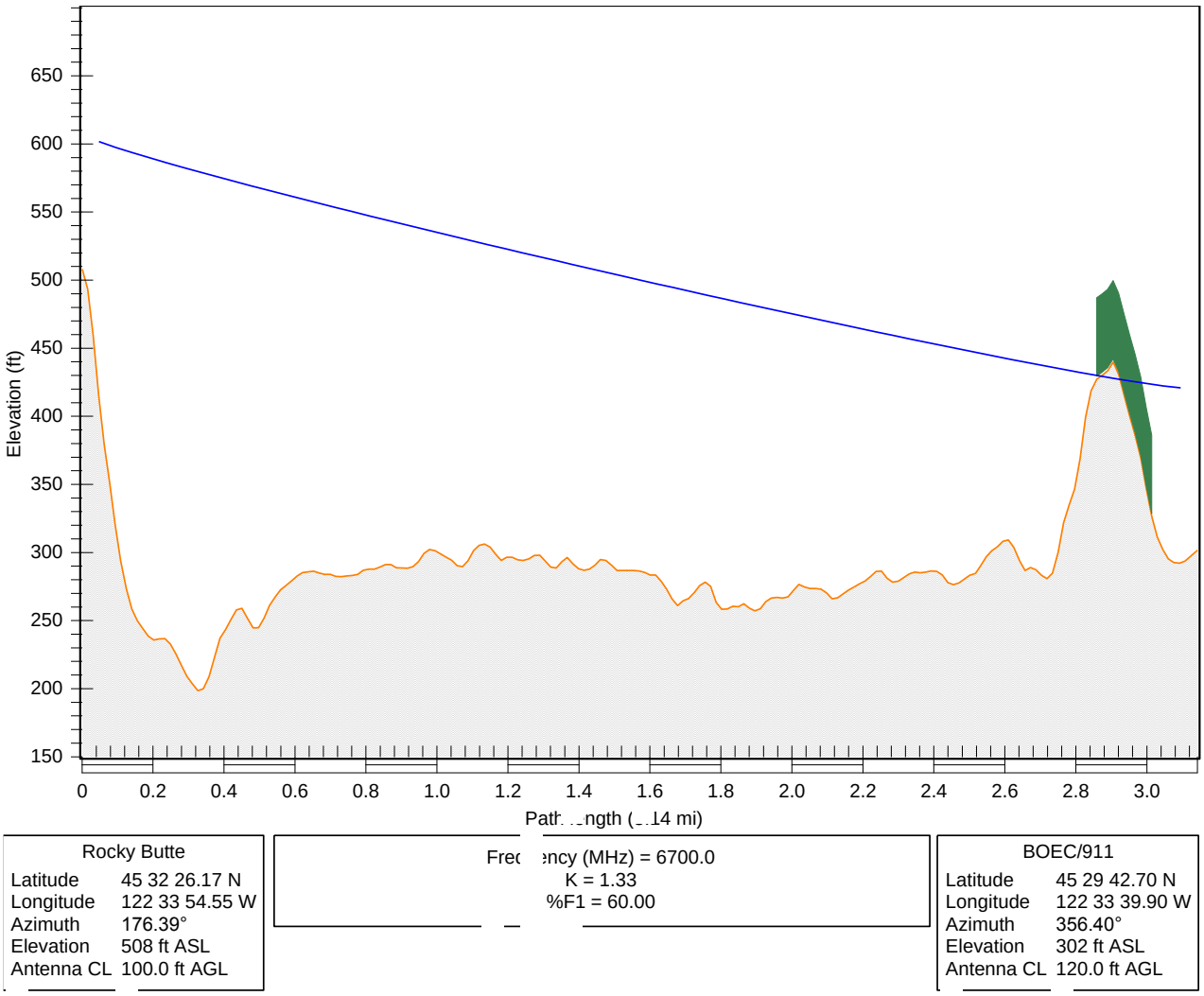

Figure 30 – Path Profile: Rocky Butte to BOEC/911

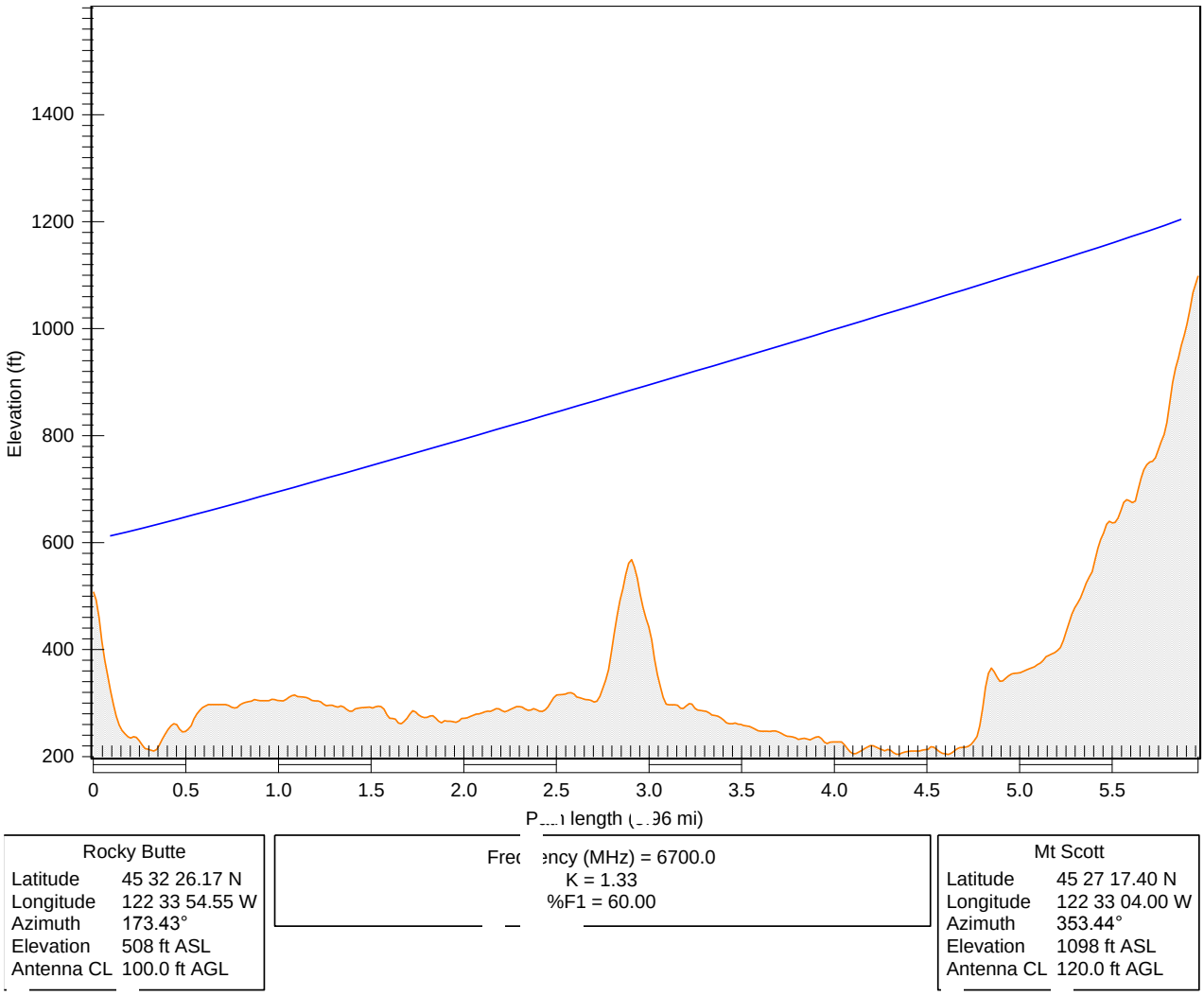

Figure 31 – Path Profile: Rocky Butte to Mt. Scott

1.10 Polivka Hill

1.10.1 Site Description

The proposed alternate site "Polivka" is located on SE Wally Rd., Gresham, OR. The proposed site location has an elevation of 985 feet (ASL). This is an existing communications facility with a 150' (AGL) tower. This City does not own this tower and needs to determine if there is sufficient space on the tower available for lease.

1.10.2 Path Profiles

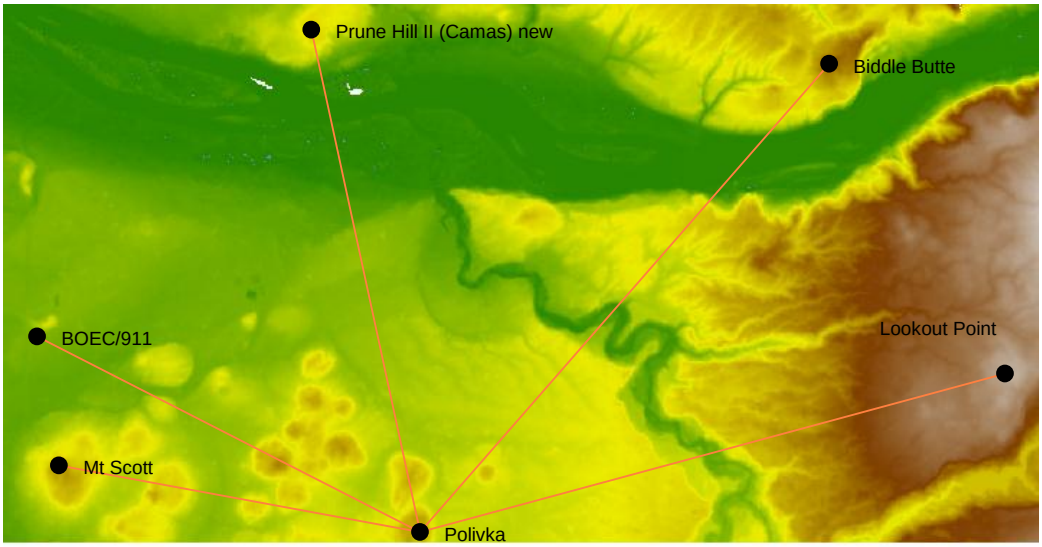

Figure 32 – Polivka Evaluated Microwave Paths

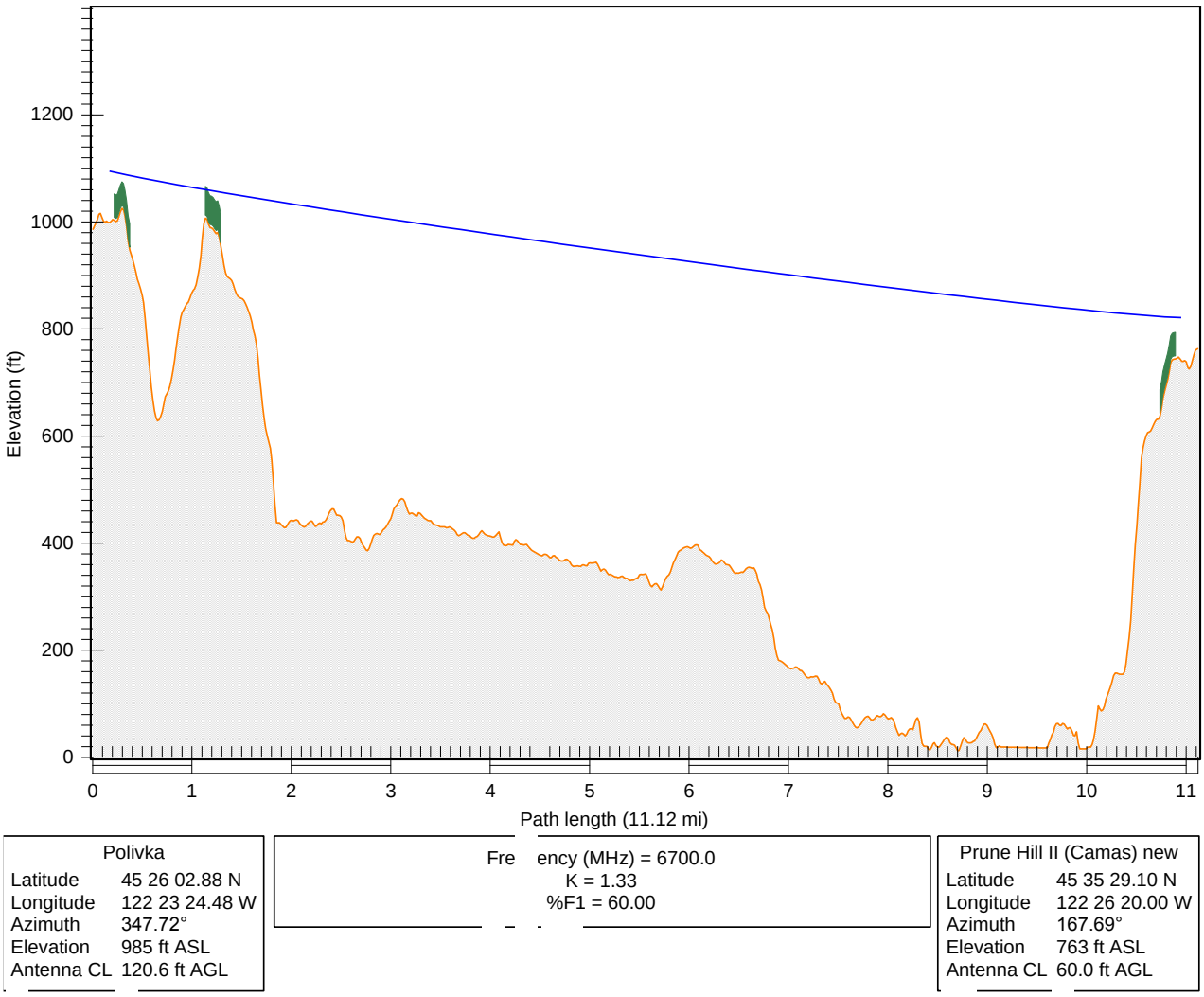

Figure 33 – Path Profile: Polivka Hill to Prune Hill

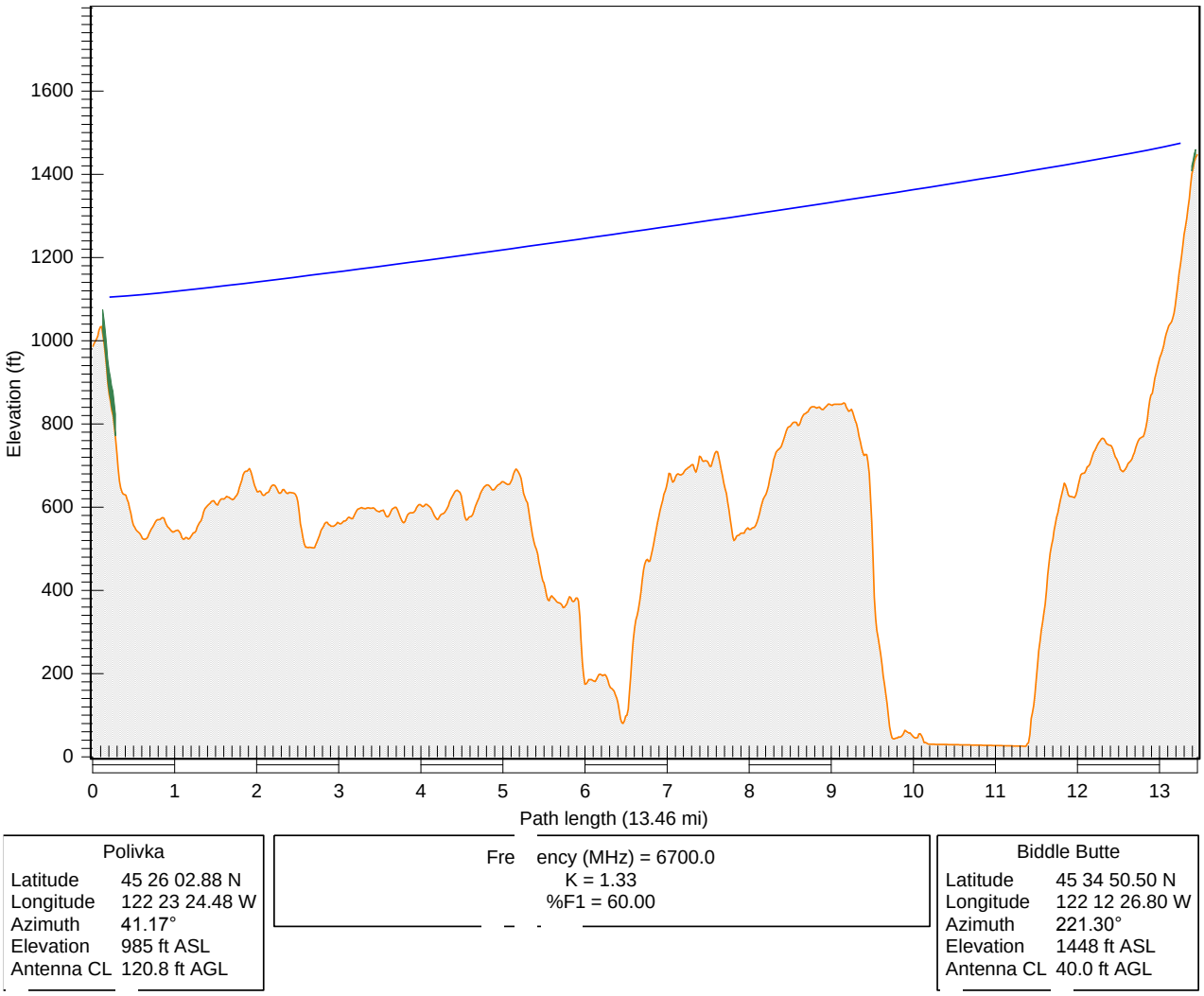

Figure 34 – Path Profile: Polivka Hill to Biddle Butte

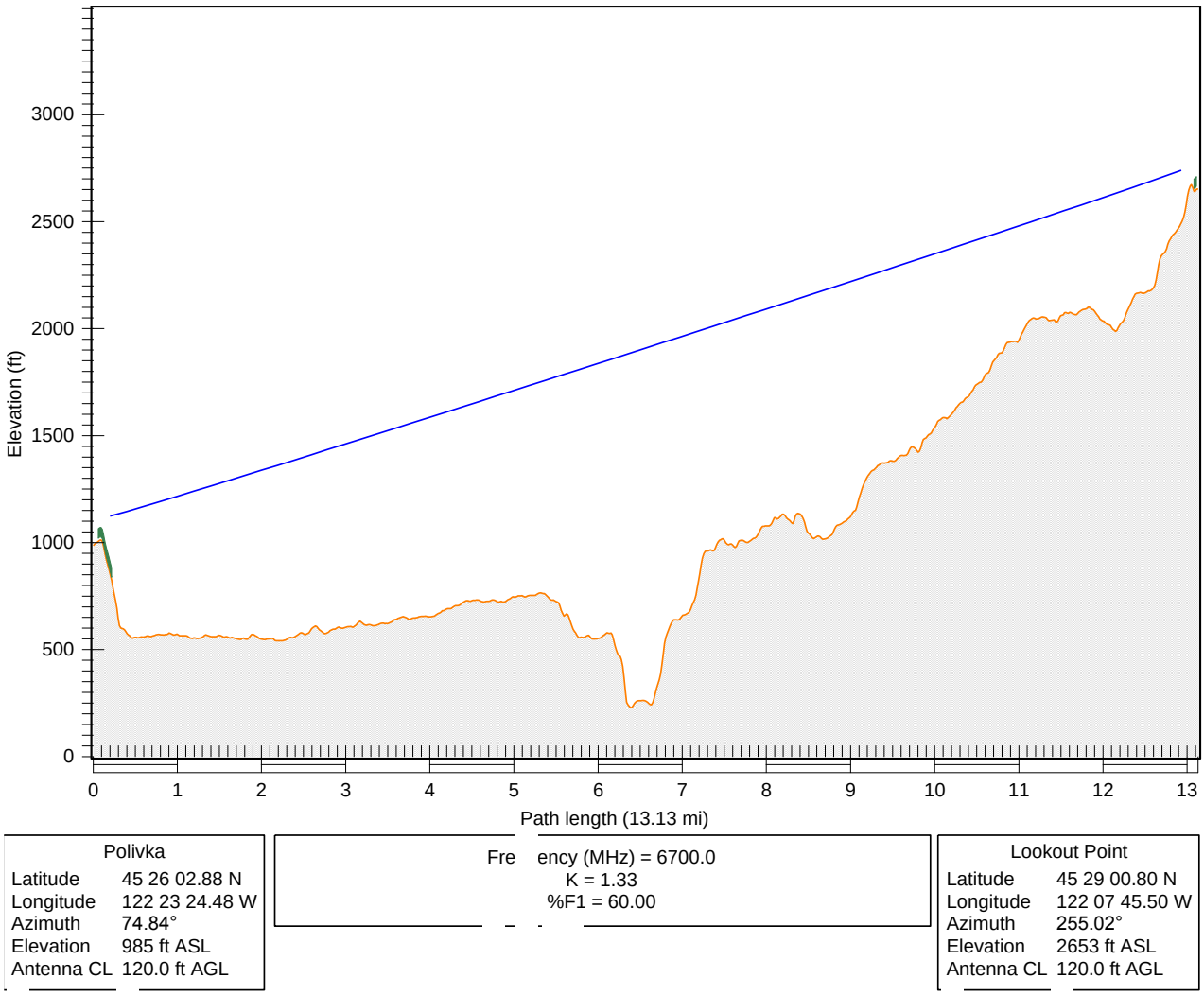

Figure 35 – Path Profile: Polivka Hill to Lookout Point

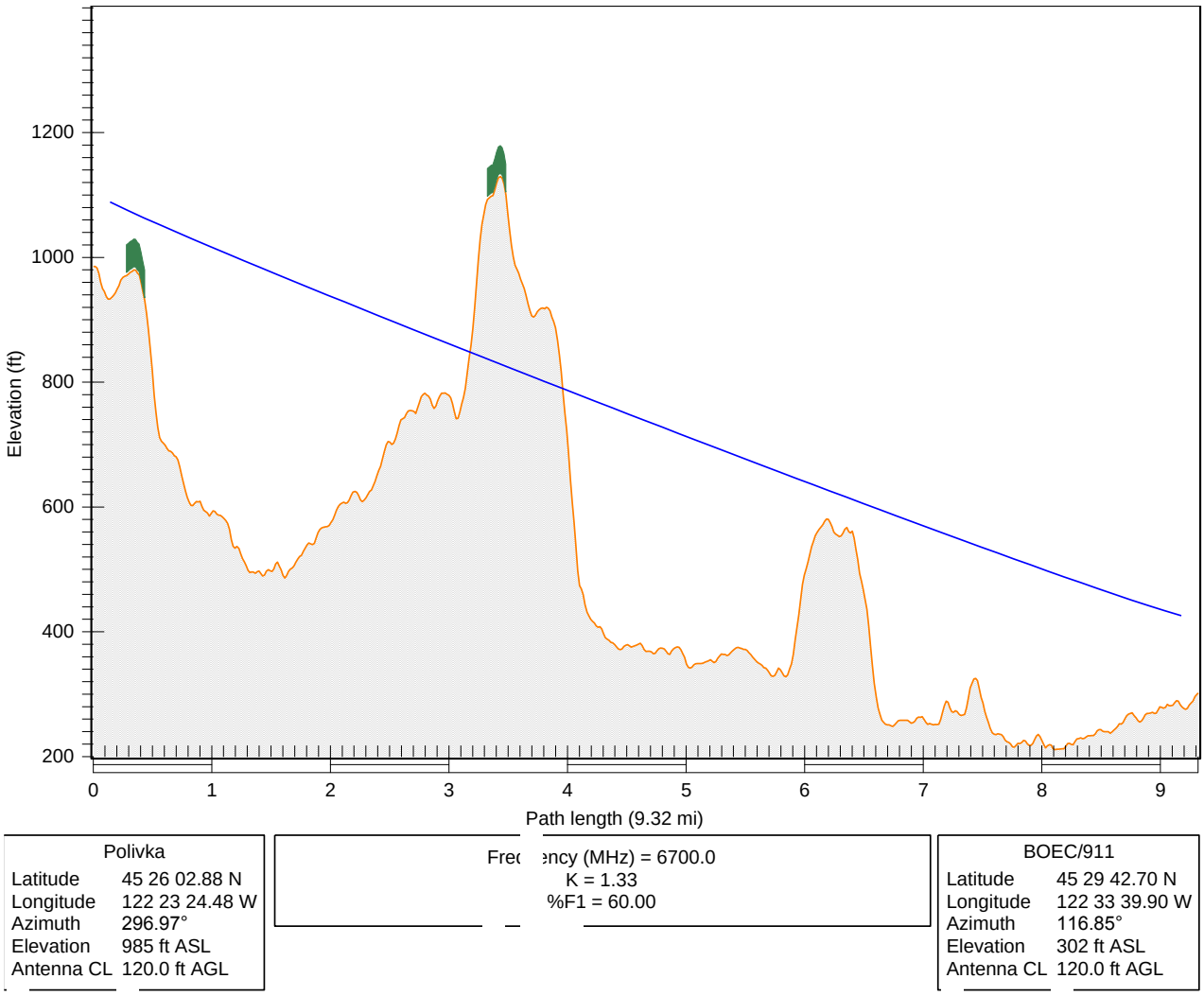

Figure 36 – Path Profile: Polivka Hill to BOEC/911

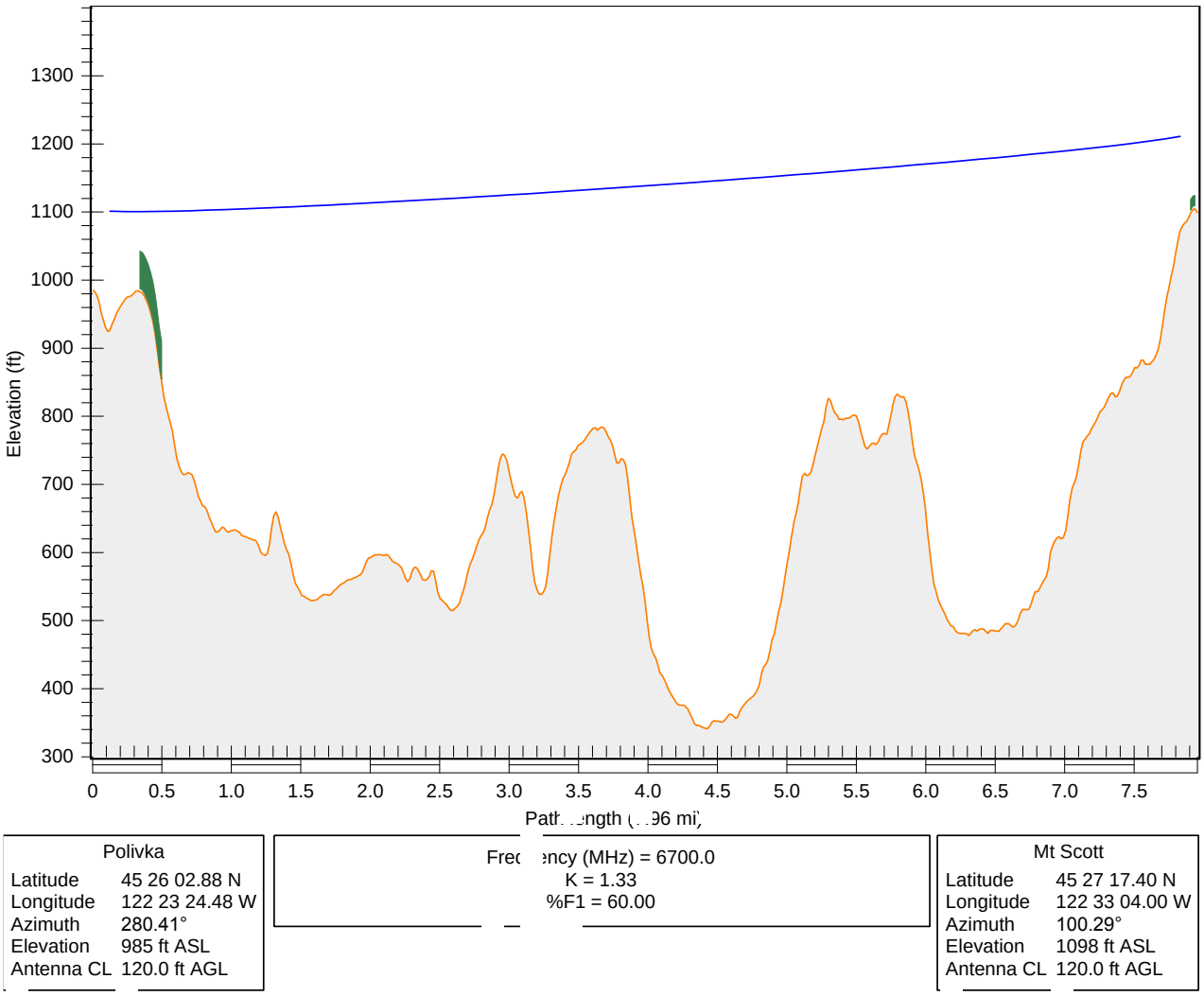

Figure 37 – Path Profile: Polivka Hill to Mt. Scott

1.11 Water Tank (SE of Walters Hill)

1.11.1 Site Description

The proposed alternate site “Water Talk” is located to the southeast of the current Walters Hill site. The site is a 40’ water tank north of Regner Rd. in Gresham, OR. The proposed site location has an elevation of 569 feet (ASL).

1.11.2 Path Profiles

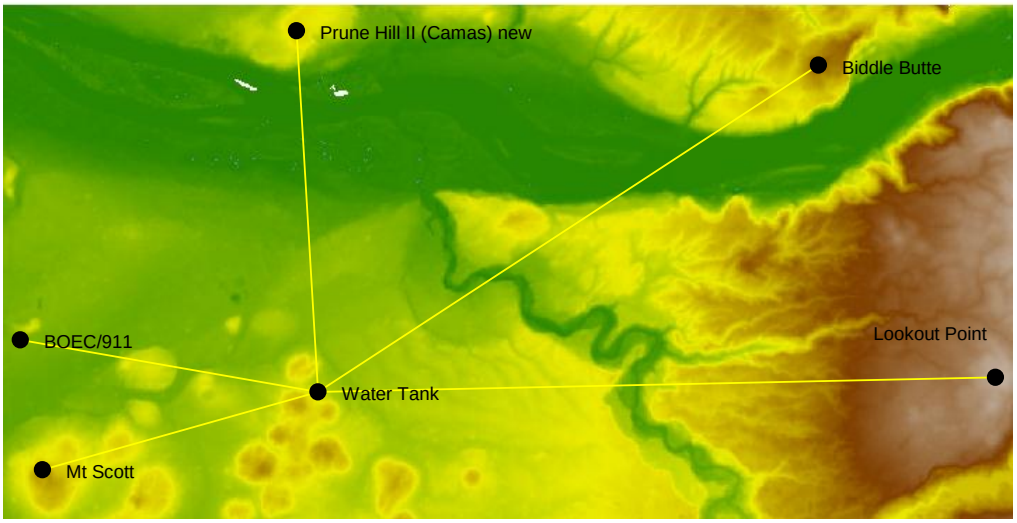

Figure 38 – Water Tank Evaluated Microwave Paths

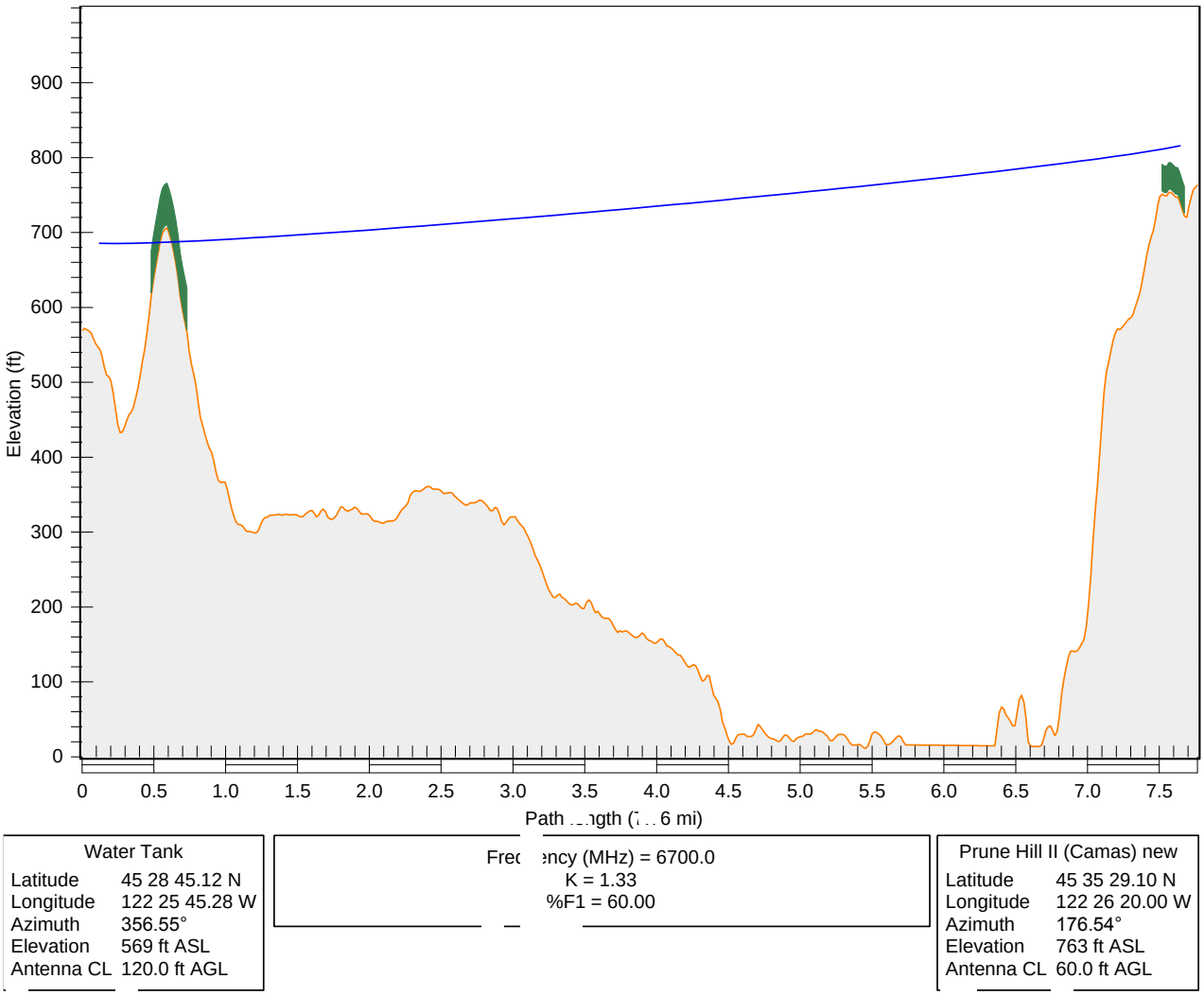

Figure 39 – Path Profile: Water Tank to Prune Hill

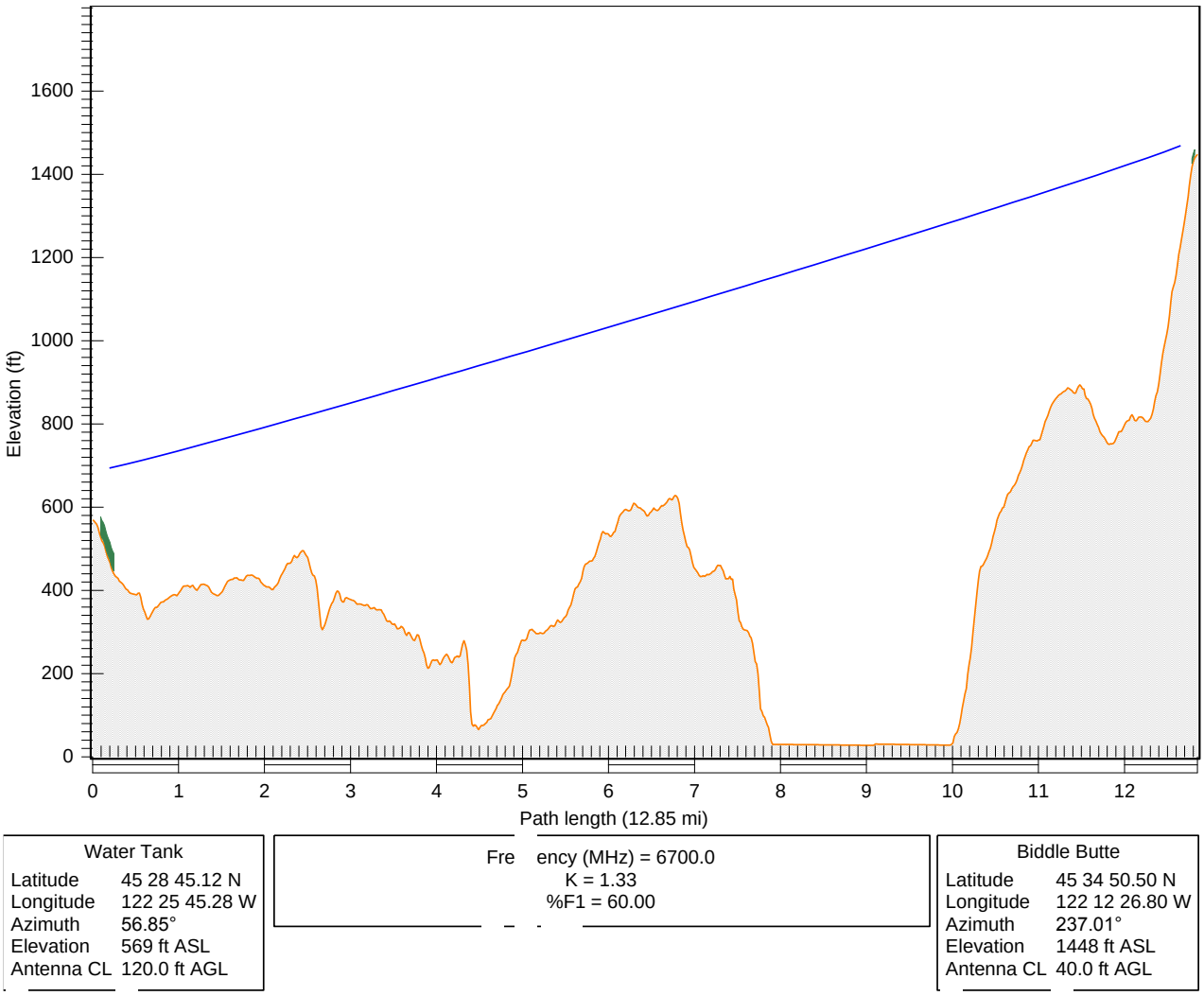

Figure 40 – Path Profile: Water Tank to Biddle Butte

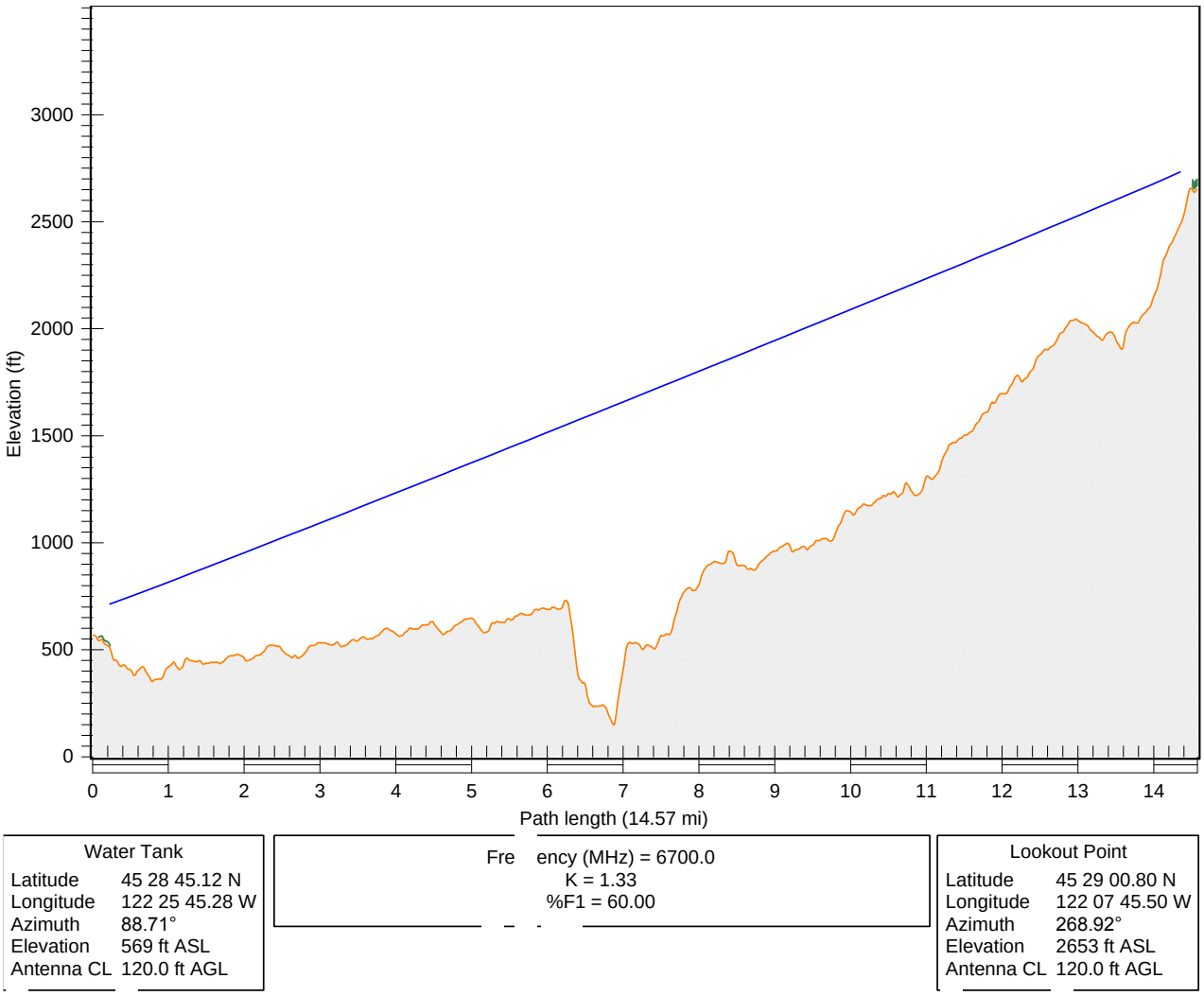

Figure 41 – Path Profile: Water Tank to Lookout Point

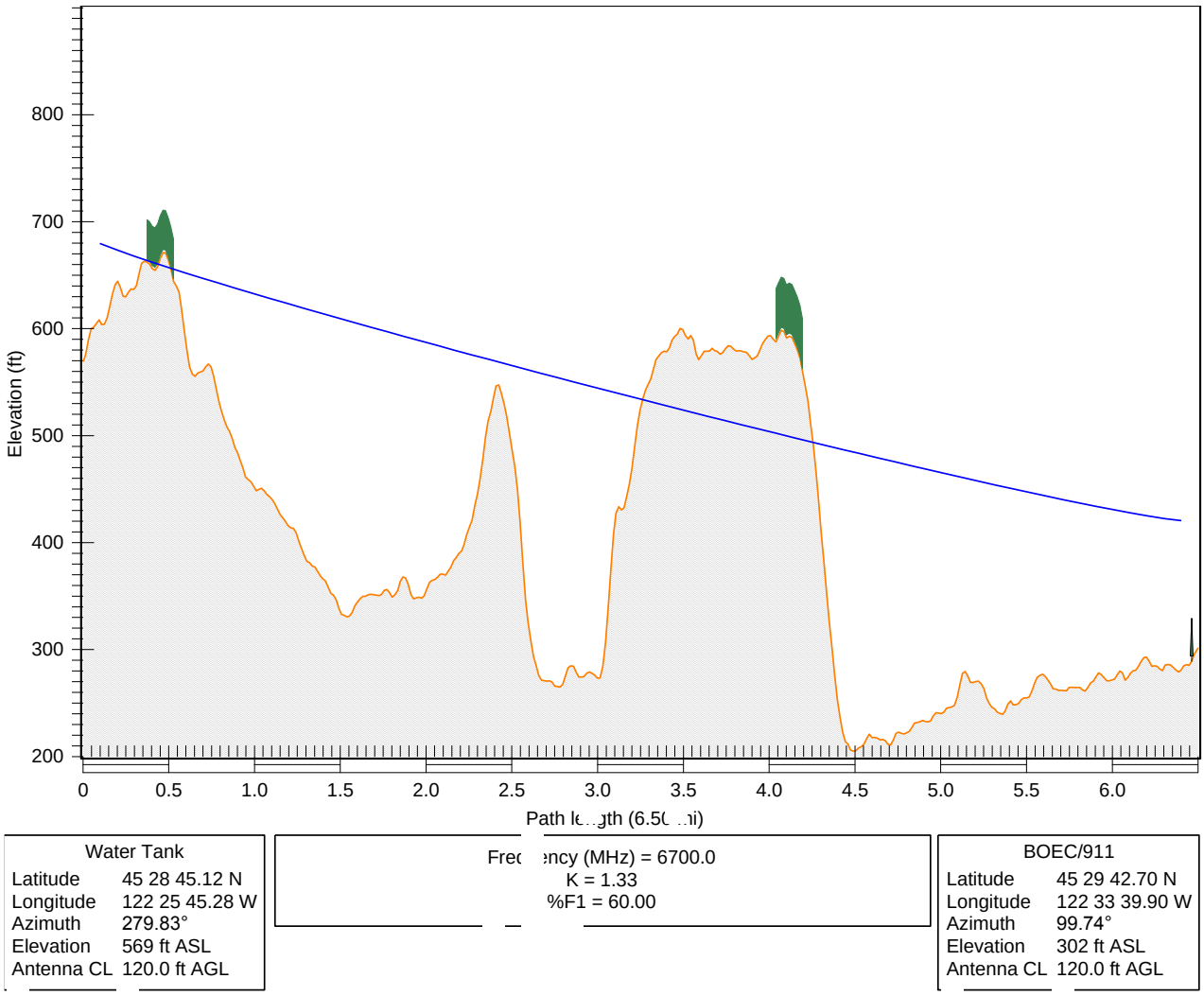

Figure 42 – Path Profile: Water Tank to BOEC/911

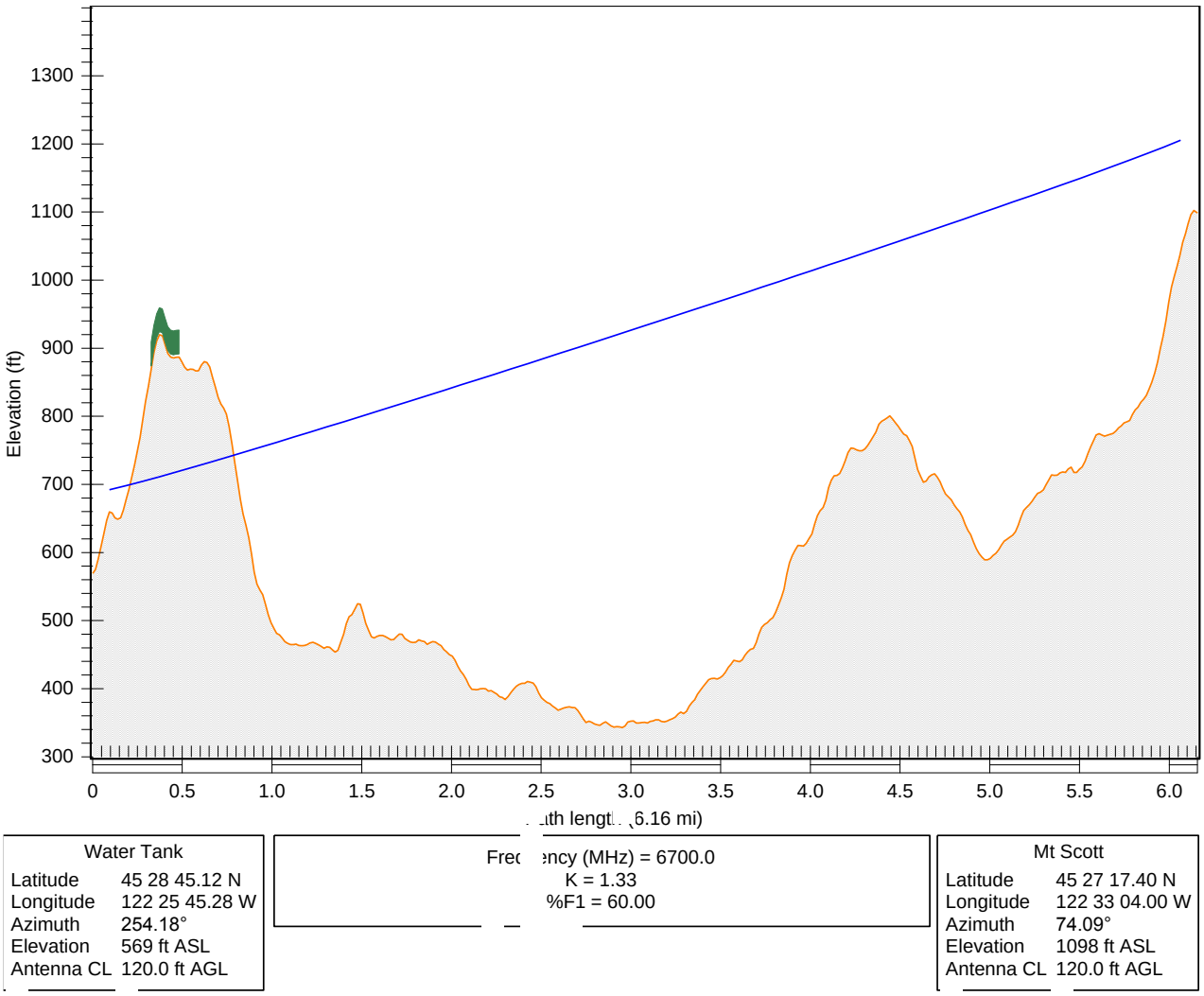

Figure 43 – Path Profile: Water Tank to Mt. Scott

1.12 Additional Site Considerations

1.12.1 Mt. Scott

The City indicated that the Tri-County Metropolitan Transportation District of Oregon, also known as TriMet, advises that given the current antenna loading, it is unlikely that the Mt. Scott tower would pass a structural analysis for the addition of microwave antennas. Based on information provided by the City of Portland, this tower currently supports multiple agencies. Until a full structural analysis is completed, it is unknown if structural enhancements, which can be very costly, are possible with the existing tower. Due to the number of agencies using this location, construction of a new tower and migrating users would likely cause significant interruptions to their communications or simply be economically unfeasible.

There is a high probability that choosing to connect an alternate site for Walters Hill into the microwave network through Mt. Scott will introduce significant increased costs and delays to the project.

1.12.2 Biddle Butte

Based on input from the City of Portland, the Biddle Butte site has a 40-foot self-supporting tower that is heavily loaded with limited, if any, space for additional antennas. For the City to use this location would likely entail the construction of a new tower. Due to the visibility from this site into the Columbia Gorge Scenic Area, it is very possible that constructing a tower tall enough to be beneficial to the project will involve considerable upfront time and expense to secure the necessary approvals.

2. Coverage Prediction Studies for Walters Hill Alternate Sites

This section contains the results of the coverage prediction studies conducted by ***FE*** for each Walters Hill alternate site configuration.

The technical parameters for each radio cover study conducted are as follows:

- System technology: Phase 1 P25 FDMA
- Frequency band: 700/800 MHz
- Latitude DD-MM-SS.SS (WGS84): 45-31-03.13
- Longitude DD-MM-SS.SS (WGS84): -122-23-39.35
- Transmit antenna Model: SC479-HF1LDF(D00-E5765) omnidirectional
- Transmit antenna centerline height: 140 ft.
- Transmit antenna gain: 9 dBd
- Base station model: GTR 8000
- Transmit Power Out of station: 100 Watts
- Combined line/insertion/jumper loss: 6 dB
- Effective Radiated Power (ERP): 199.17 Watts
- Receive antenna Model: SC479-HF1LDF(D00-E5765) omnidirectional
- Receive antenna centerline height: 140 ft.
- Receive antenna gain: 9 dBd
- Base station receive sensitivity: -123 dBm
- Net system gain from tower top amplifiers/receiver multicouplers: 4 dB

2.1 Baseline Coverage - Walters Hill

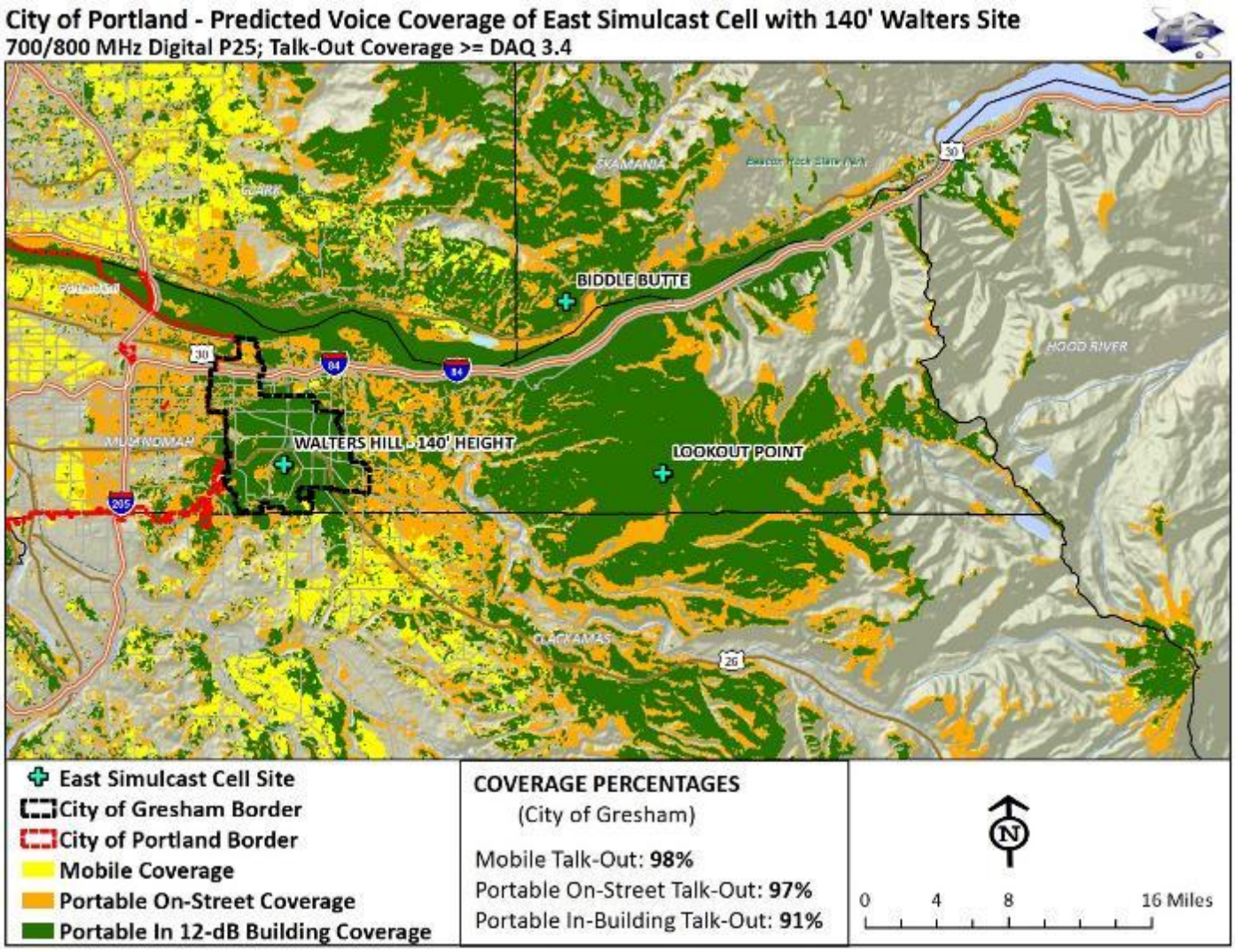

Figure 41 – Baseline Talk-Out Coverage: East Simulcast Cell with Walters Hill at 140'

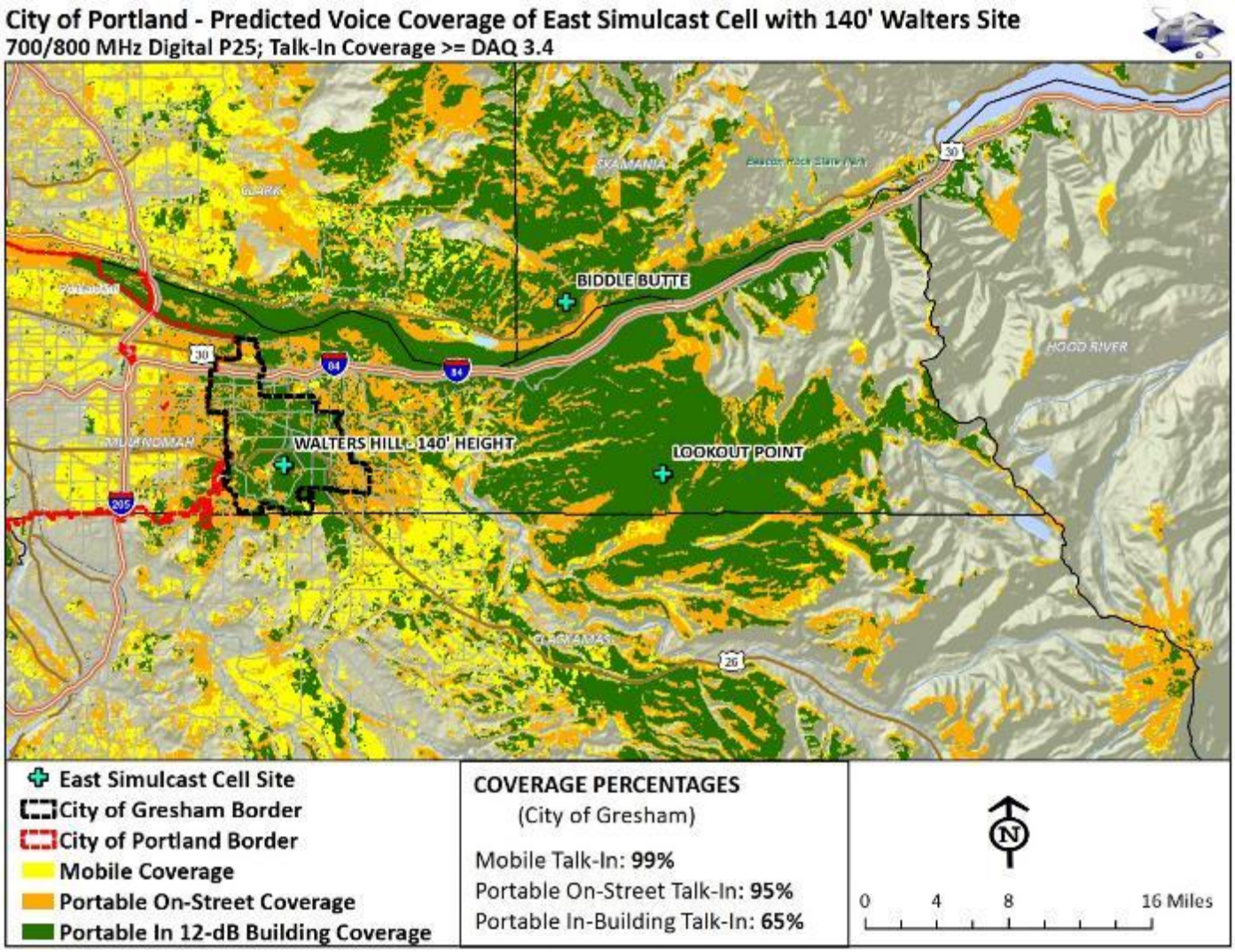

Figure 42 – Baseline Talk-In Coverage: East Simulcast Cell with Walters Hill at 140'

2.2 Powell Butte plus Walter Hill

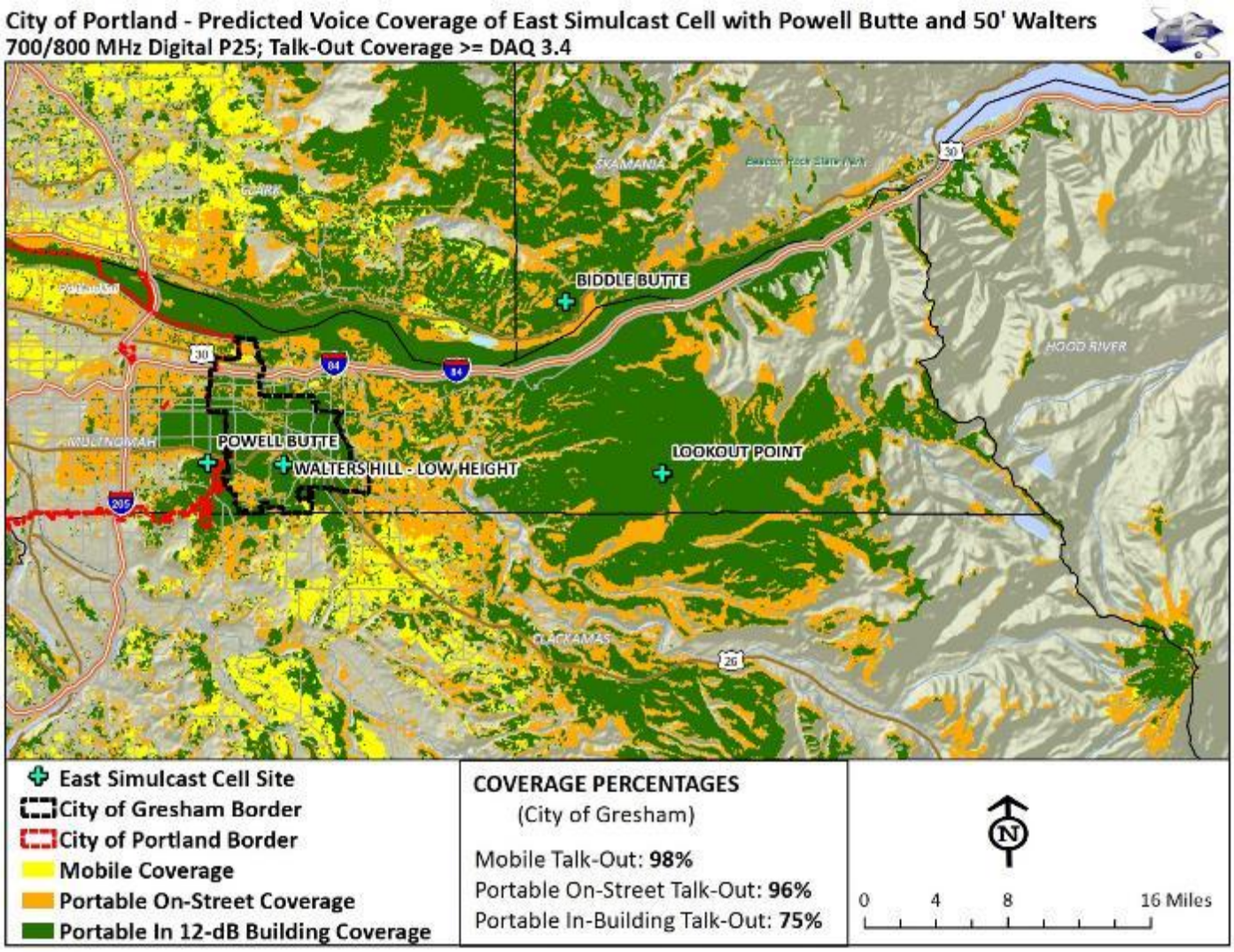

Figure 43 – Talk-Out Coverage: East Simulcast Cell with Powell Butte Site at 140' and Walters Hill at 50'

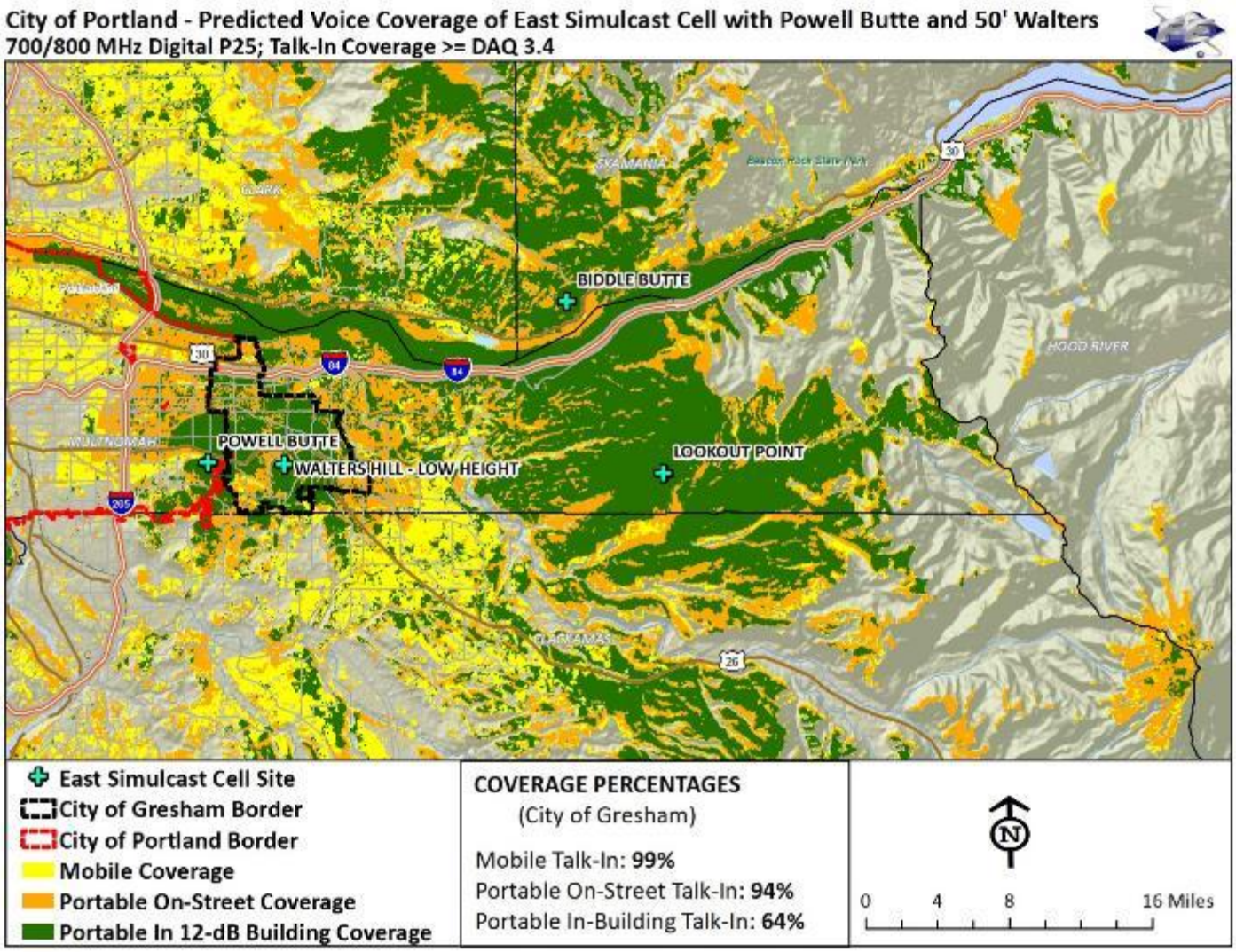

Figure 44 – Talk-In Coverage: East Simulcast Cell with Powell Butte Site and Walters Hill at 50'

2.3 Powell Butte

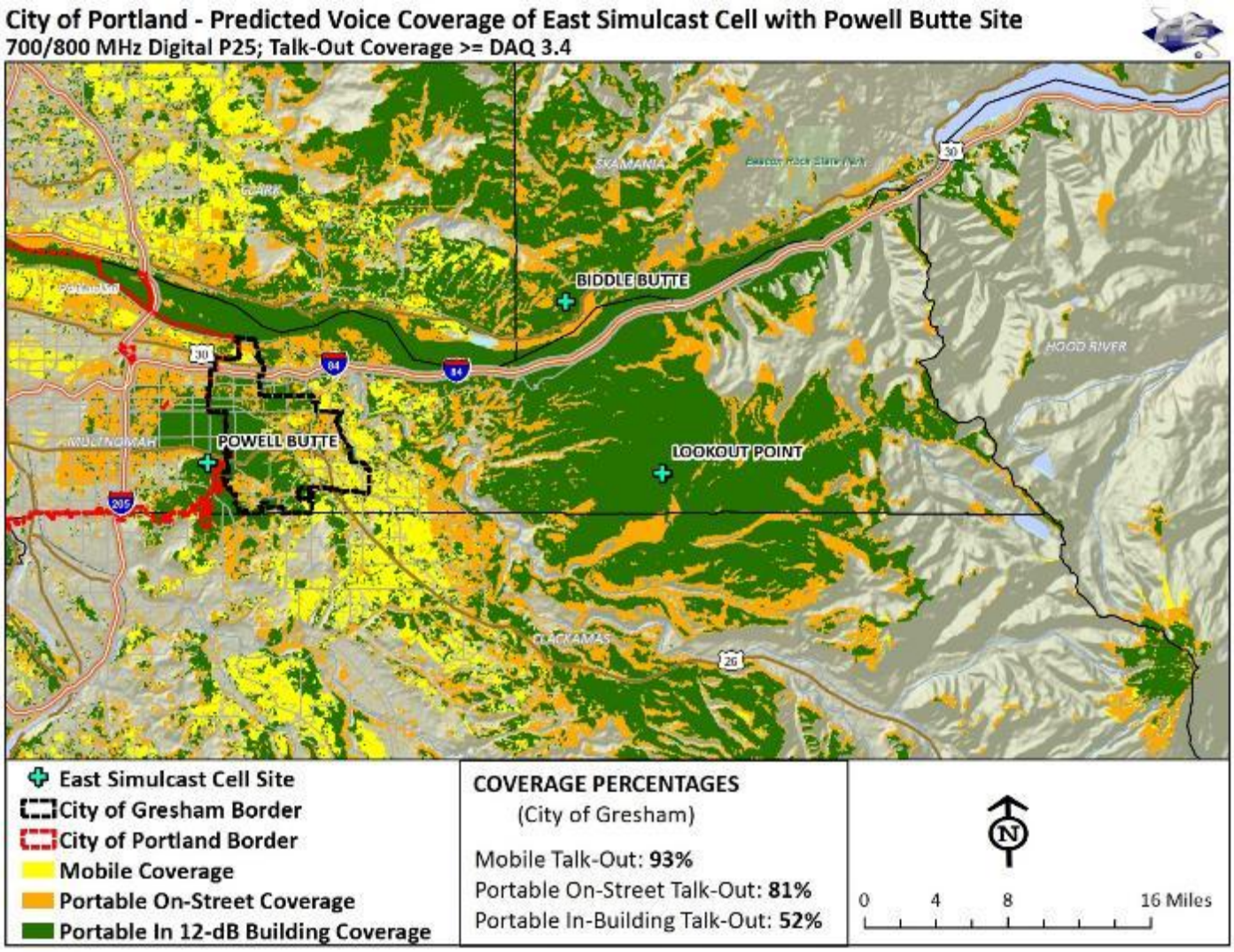

Figure 45 – Talk-Out Coverage: East Simulcast Cell with Powell Butte Site at 140'

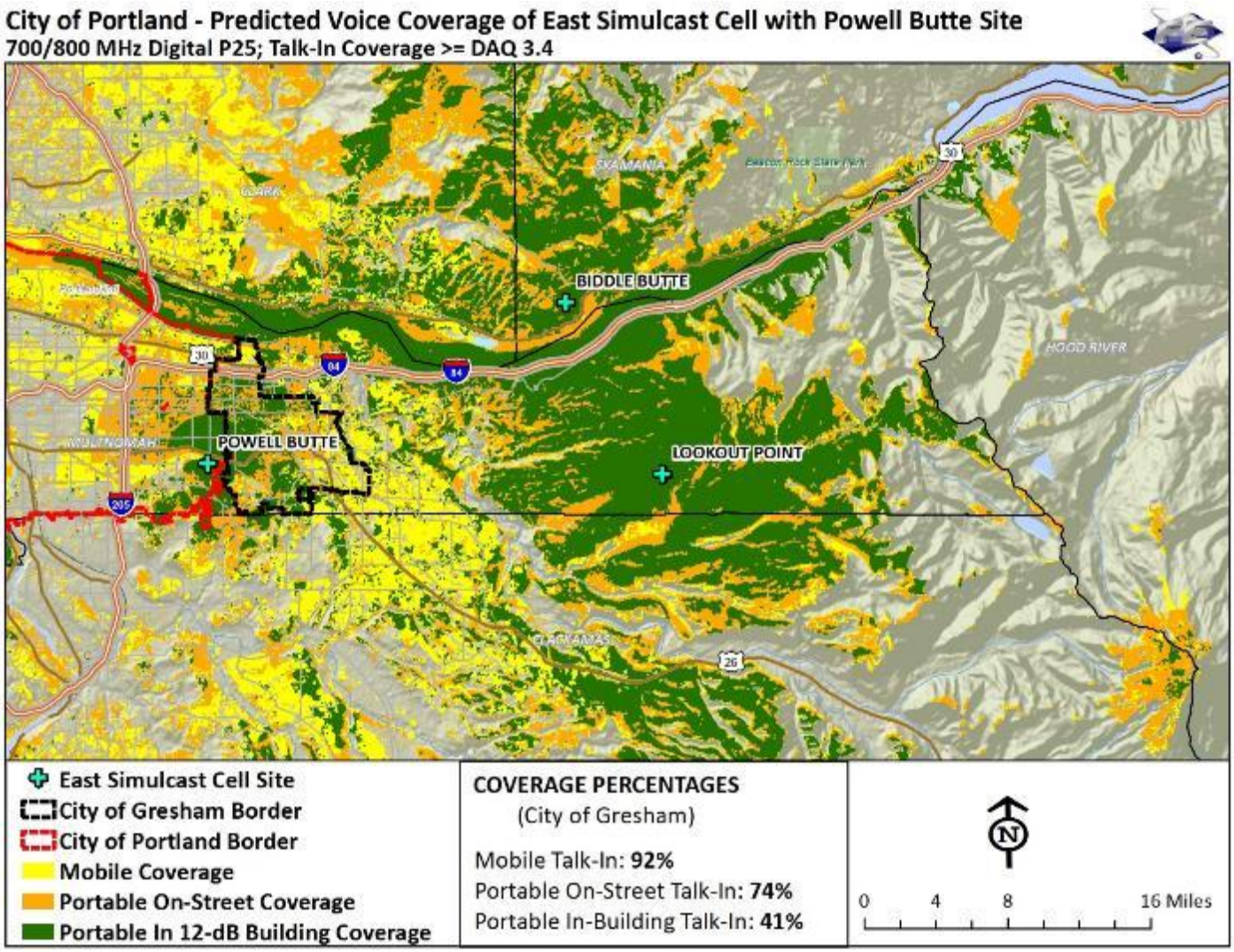

Figure 46 – Talk-In Coverage: East Simulcast Cell with Powell Butte Site at 140'

2.4 Regner Road

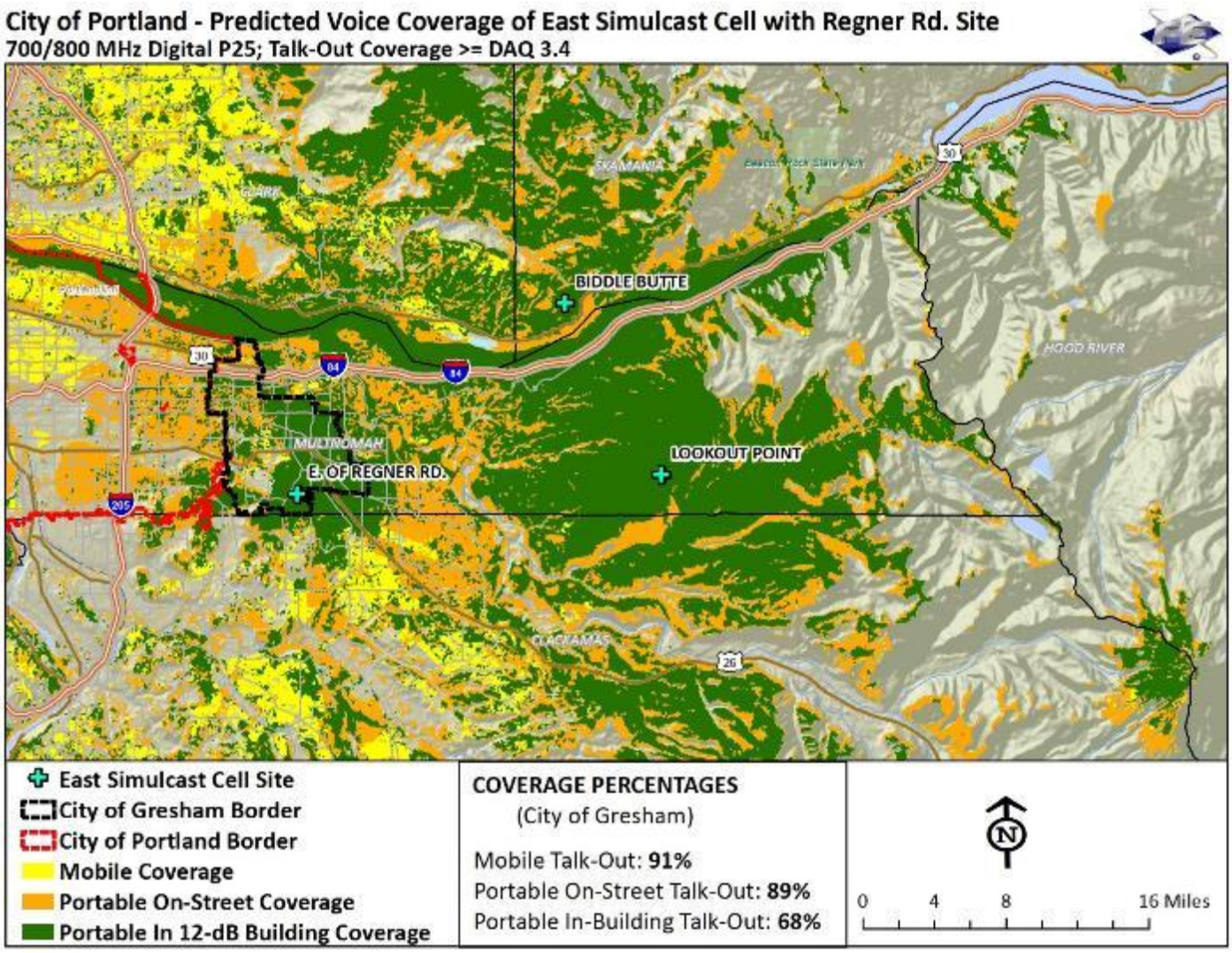

Figure 47 – Talk-Out Coverage: East Simulcast Cell with Regner Rd. Site

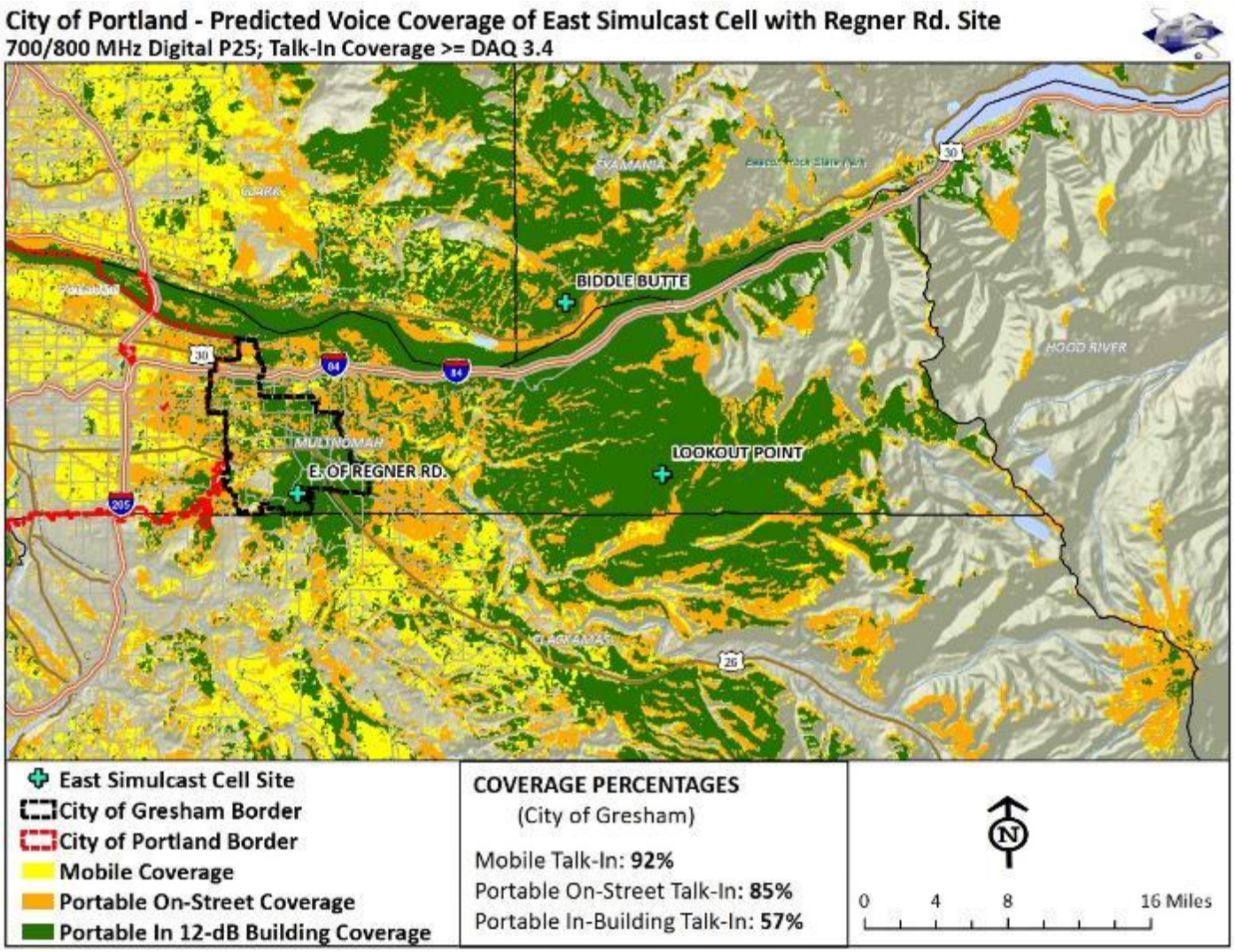

Figure 48 – Talk-In Coverage: East Simulcast Cell with Regner Rd. Site

2.5 Multnomah County Maintenance Yard

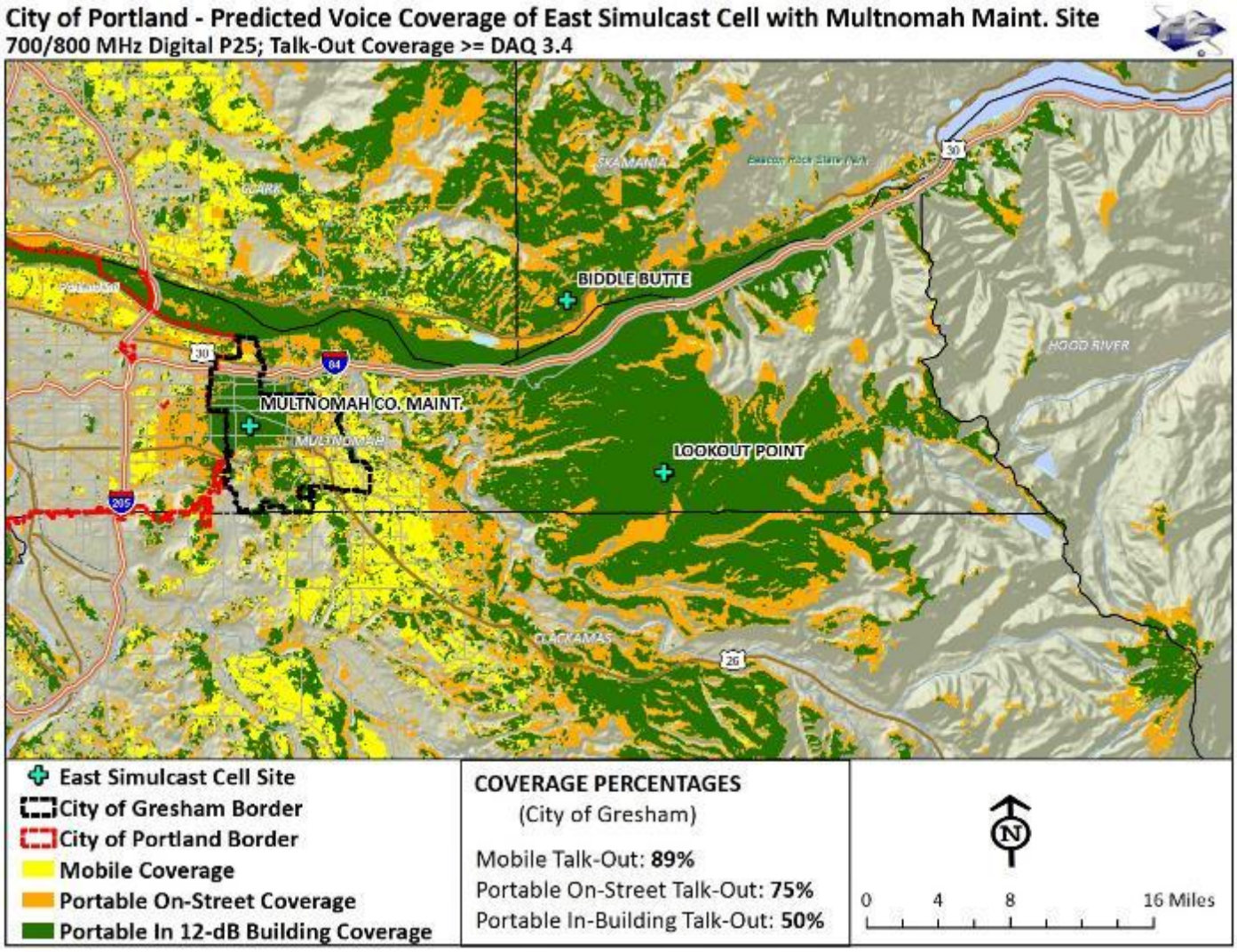

Figure 49 – Talk-Out Coverage: East Simulcast Cell with Multnomah County Maint. at 140'

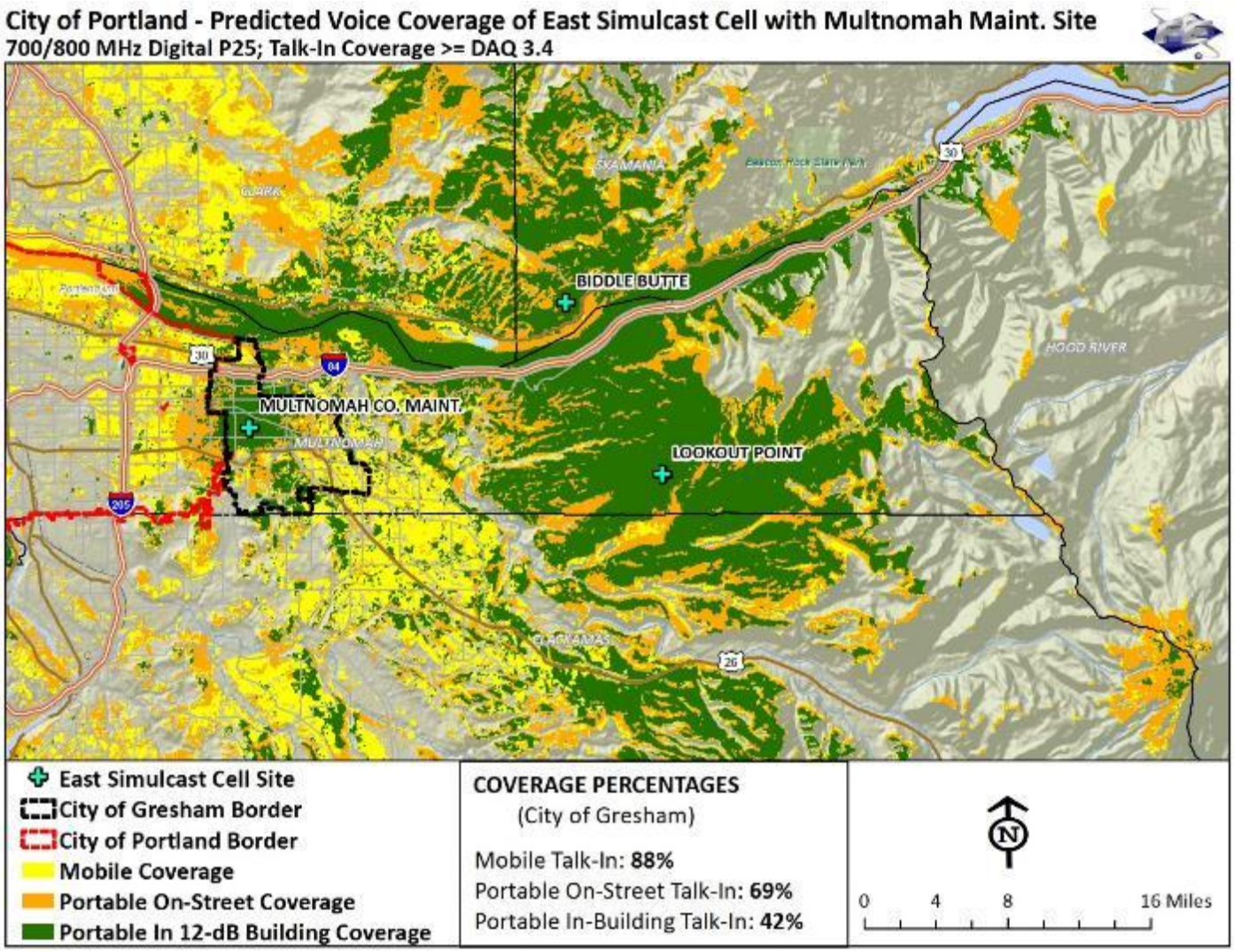

Figure 50 – Talk-In Coverage: East Simulcast Cell with Multnomah County Maint. at 140'

2.6 Mt. Hood Community College

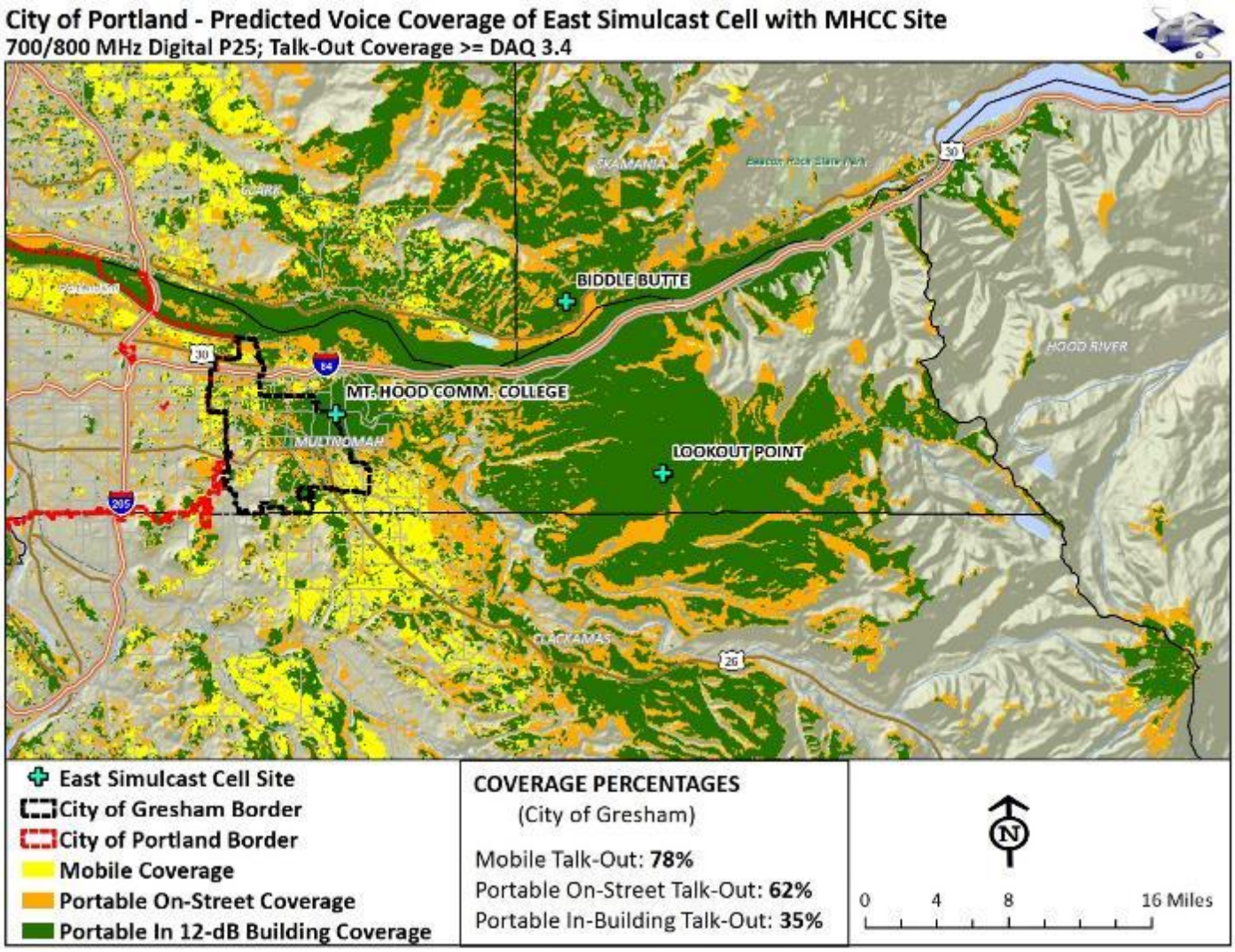

Figure 51 – Talk-Out Coverage: East Simulcast Cell with Mt. Hood CC Site at 140'

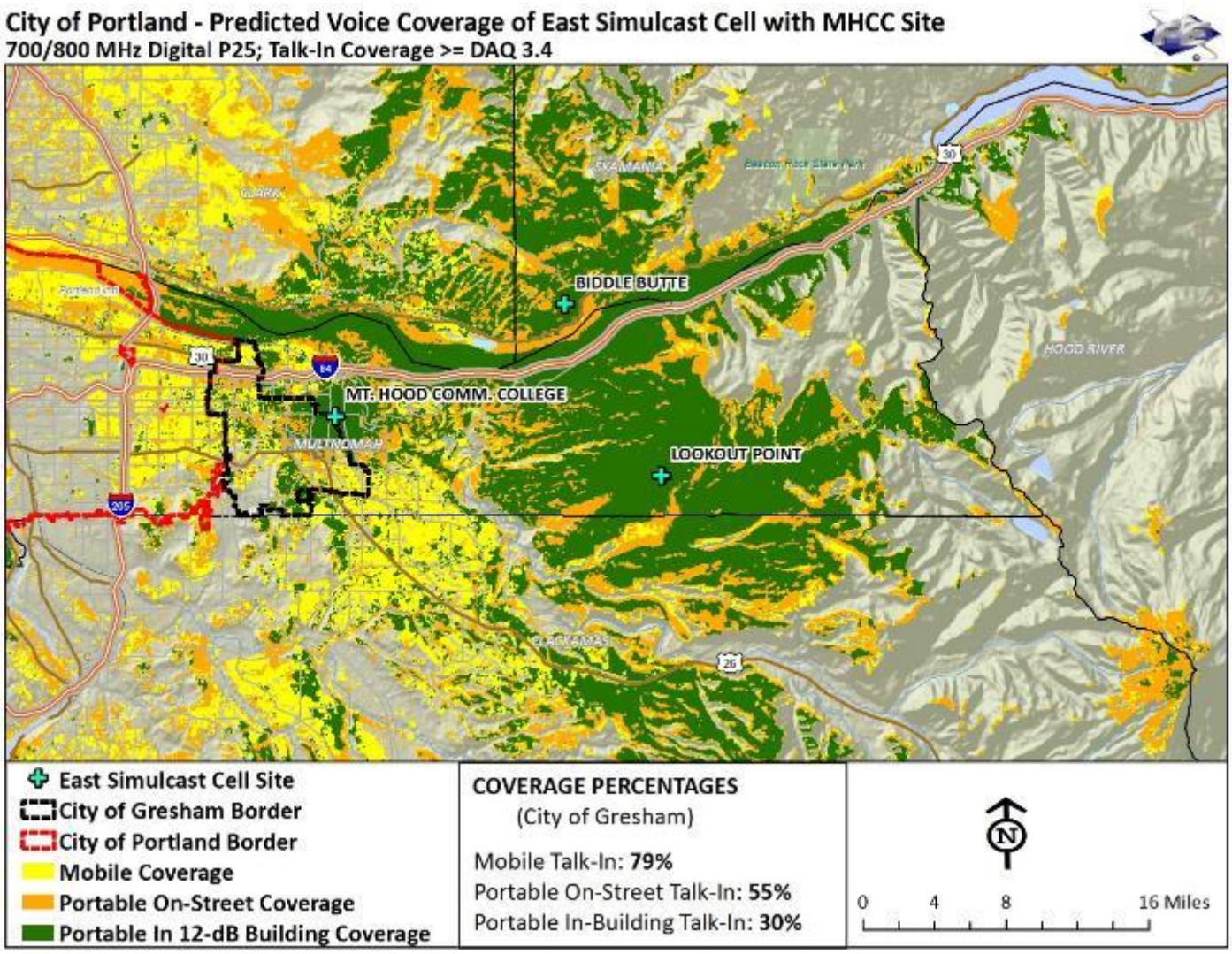

Figure 52 – Talk-In Coverage: East Simulcast Cell with Mt. Hood CC Site