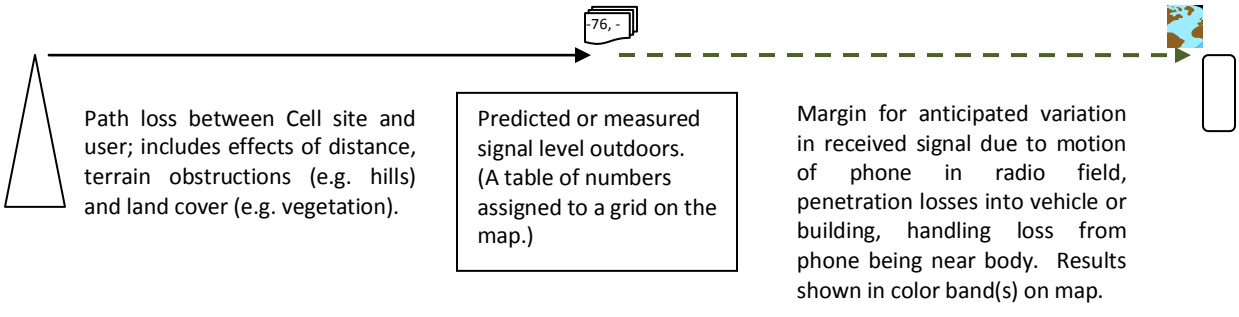
- An Isotrope drive-through of the road loop around the proposed site observed 4G signals on a handheld AT&T smartphone that were dominantly in the -70's dBm, diminishing to the -80's on Hosmer St and a portion of School St. 4G signals as low as -96 dBm were observed in a ¼ mile segment of Hosmer St. This loop exceeds AT&T's target for in-vehicle 4G service, and over a substantial extent of the loop, exceeds the AT&T target for in-building 4G service.
- The Isotrope informal drive-through employed in-vehicle user equipment (phone), which errs on the side of understating outdoor coverage; the drive-through was conducted in January, which errs on the side of overstating coverage due to the lack of foliage. To some degree, these offsets may roughly cancel out. The results are nevertheless instructive and corroborate the Isotrope computer modeling of the coverage available from all three AT&T radio bands.
- Isotrope modeling of AT&T cellular and 700 MHz coverage indicates AT&T has substantial penetration of the Acton area around the proposed site.
- A resident's video drive test documents the availability of AT&T service to a subscriber phone throughout a route in the subject area.

Appendix 1 – Discussion of Best Practices in Coverage and Drive Test Mapping

Radio communications coverage analysis of the sort employed in this proceeding customarily produces a computer estimated coverage map that has an underlying grid of signal strength values (in dBm in this case). Usually, the values represent the predicted signal strength by a specified receiving antenna at the user location (each point on the map). In plain terms, the computer model calculates the outdoor signal strength at each point on the map.

It is not practical to put a grid of measurement numbers on a map, so a grading scheme is employed to make a visual presentation. To turn the computer model into an illustration, a set of signal level thresholds is selected. Values between the thresholds are assigned colors.

To select the signal level thresholds, one starts with the minimum sensitivity of the cell phone. This is the lowest level at which the phone under perfect non-varying conditions is designed to work. However, conditions in the real world vary around the user. To address the variations in reception conditions, a set of customary margins is added to the minimum sensitivity level. Those margins typically include fading margins and things like body loss and building or car penetration losses. In short, the computer model produces numbers that represent outdoor signal levels, and the map takes the computer model and presents colors based on the numbers.



The drive testing in this case was performed with an antenna outside the vehicle, which is directly analogous to the computer calculations of outdoor signal strength. The only potential difference between the drive test data and the computer estimated grid of signal levels is the characteristics of the drive test receiving antenna connection. Sometimes adjustments are made to drive test data because the drive test apparatus antenna is different than the receive antenna modeled by the computer. Generally, adjustments are not made to drive test data for clutter loss or body loss. Body loss is accommodated in the selection of the signal level thresholds and has no bearing on the drive test data. Clutter loss is accommodated by the computer calculations in the coverage map, and in the drive test, the clutter loss is an inherent part of the path between the cell site and the test receiver, so no adjustments are required.

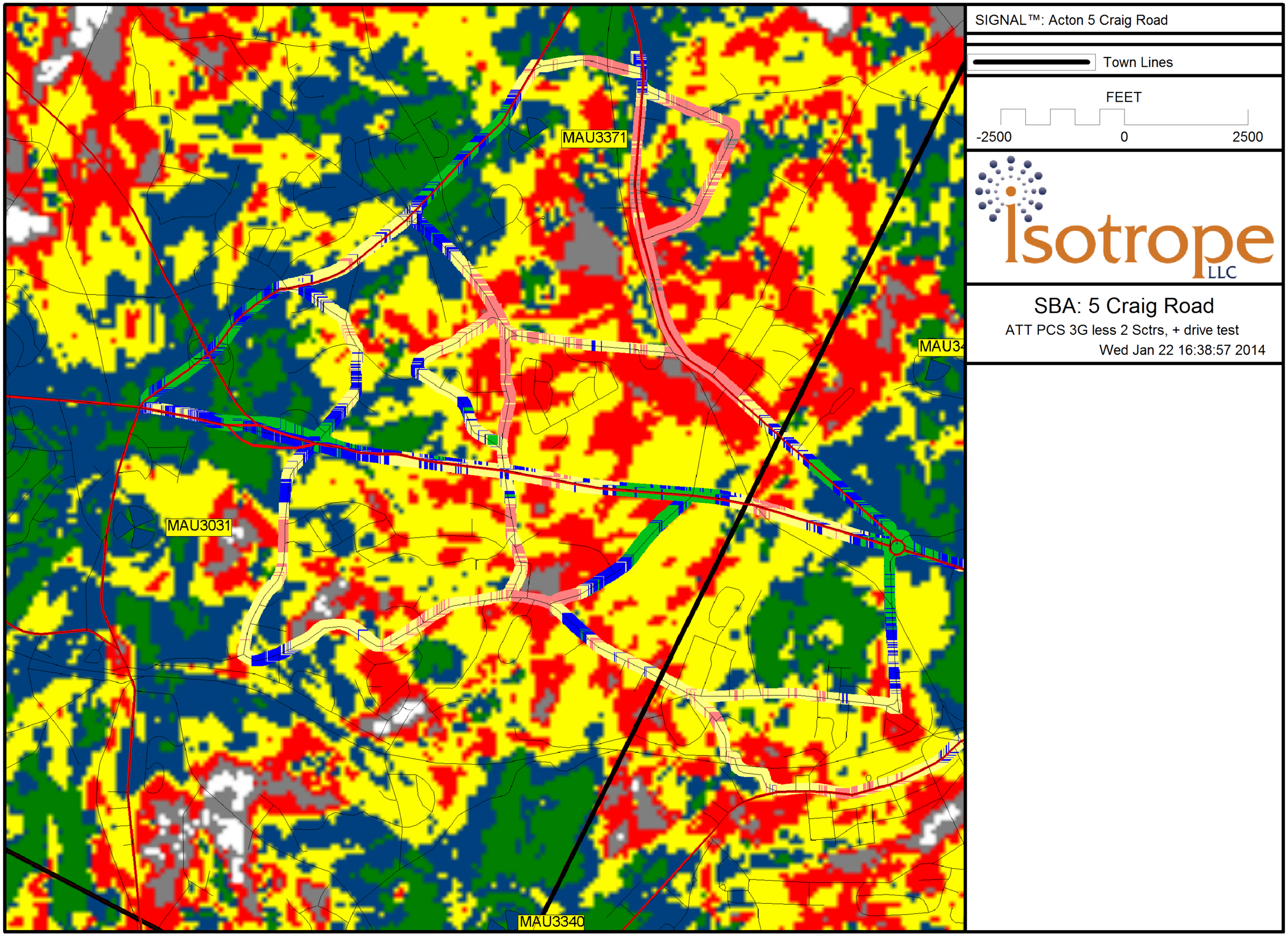
In the present case, the drive test antenna and cable produce a result similar to the model antenna the computer is simulating, so no adjustment is necessary.

Upon receipt of the drive test data, Isotrope determined that AT&T indeed added a penalty to the drive test data shown on the AT&T-submitted drive test map. This causes the drive test map to under-report the existing 3G PCS coverage. Looking at the test configuration, there is no significant difference between the test setup and the modeling of the receive antenna in the computer model. The application of the 6 dB penalty was unnecessary.

Appendix 2 – AT&T Drive Test

The following page contains an Isotrope existing coverage (AT&T PCS) map with two sectors turned off, to best replicate our findings on the results of the AT&T drive test. The AT&T drive test is overlaid on the computer model to illustrate the degree of agreement between the two data sets. There is statistical variation in each, so an exact match between them is not expected. Not all the statistical variation is due to computer model error. When a drive test is repeated, the results will also vary in a statistically describable fashion compared with a previous drive test. The drive test data is not perfect and the computer model is not the only source of uncertainty.

As the eye can readily discern, the drive test data and the Isotrope computer model are a close fit. The ups and downs of the predicted signal levels correspond well with those of the drive test. There will always be places where the colors do not match, but it is reassuring that the Isotrope map captures the locations of transitions from blue to yellow and yellow to red in the same general locations as the drive test over much of the map. A statistical comparison was performed that indicated strong agreement between the drive test data and the coverage map with two sectors disabled.



SIGNAL™: Acton 5 Craig Road

Town Lines

FEET

-2500 0 2500

Isotrope LLC

SBA: 5 Craig Road

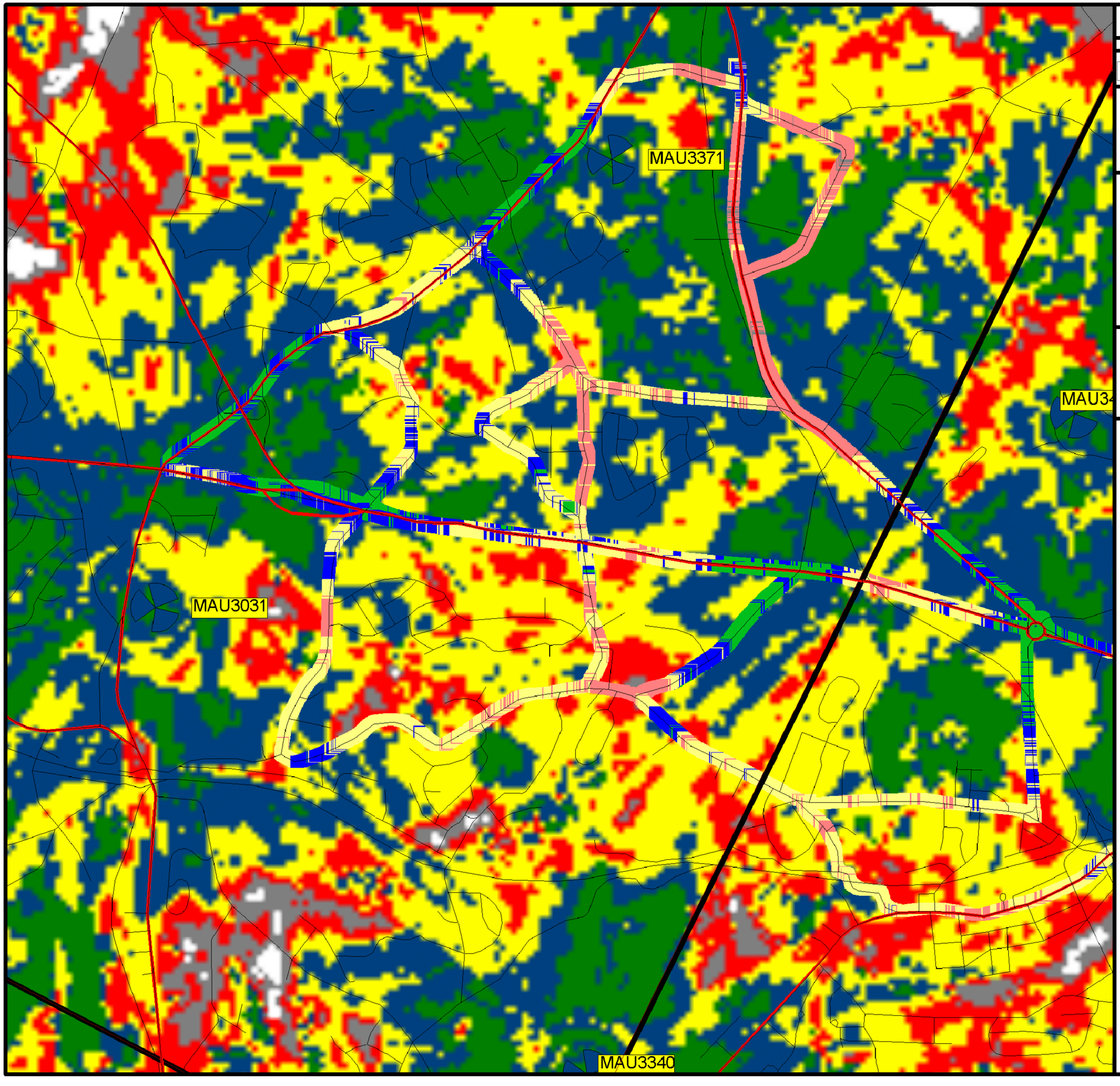
ATT PCS 3G less 2 Sctrs, + drive test

Wed Jan 22 16:38:57 2014

Appendix 3 – AT&T 3G PCS Coverage

The following coverage map utilizes the computer model that was corroborated by the drive test data, to which the missing sectors have been added. Now the results do not match the drive test data well in the area between Annursnac Hill and Post Office Square. It is this discrepancy that originally raised our concerns about the drive test. Note the long run of pink drive test data up Great Hill Road. With the two sectors activated, the predicted signal is substantially more robust than the drive test indicated.

This representation of PCS 3G coverage indicates there is more and better coverage from the existing AT&T PCS network than indicated by the maps submitted by the applicant.



SIGNAL™: Acton 5 Craig Road

Town Lines

FEET

-2500 0 2500

Isotrope LLC

SBA: 5 Craig Road

ATT Existing PCS 3G + drive test

Wed Jan 22 16:42:41 2014

Appendix 4 – Existing 3G PCS plus Proposed

The following two maps show the existing PCS coverage with the proposed facility added. The first is at the proposed 100 feet, while the second is at an alternative 80 feet. There is not much difference visually, and the population counts (presented in the narrative above) provide one quantitative view of the difference for the Board's consideration.