

# Verizon Wireless Communications Facility

## Engineering Necessity Case – AG Valley Rd

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# Project Need Overview:

This primary objective for this project is to improve network coverage and capacity in residential area of south Arroyo Grande near Valley Rd. This project will fill in a coverage gap in the mid-bands where the bulk of network capacity resides. These mid-band frequencies do not provide coverage as far from sites as the lower frequency bands that establish coverage. The mid band frequencies make up 90% of the available capacity in SLO county. Detail is provided supporting these issues on slides 8-12.

Additional details and explanations follow in this presentation.



## Introduction:

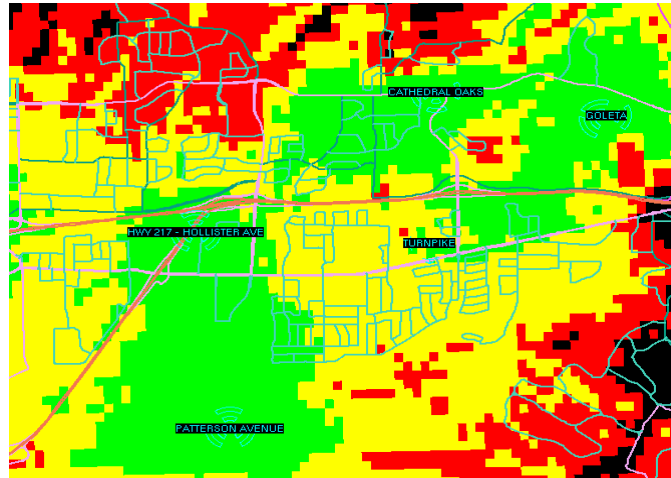
Coverage and/or capacity deficiencies are the two main drivers that prompt the need for a new *Wireless Communications Facility* (WCF). Most WCF provide a mixture of both capacity and coverage for the benefit of the end user.

**Coverage** describes the existence or lack of wireless service in an area. The request for improved service often comes from our customers or emergency services personnel that have no service or poor service. Coverage used to refer to the ability to make or place a call in vehicles, however, as usage patterns have shifted, coverage is now determined based on whether or not sufficient WCF exist to provide a reliable signal inside of buildings and residential areas, as well. Historically, when wireless was still in its infancy, coverage was the primary means to measure the effectiveness of the network in a given area.

**Capacity** is the metric used to determine if sufficient wireless resources exist and is now the primary means to measure how a community's wireless needs are being addressed. "Five bars" no longer means guaranteed coverage and capacity because each WCF has a limited amount of resources to handle voice calls, data connections and data volume. When these limits are reached and the WCF becomes overloaded (meaning there is more demand than signal to service it), the user experience quickly degrades preventing customers from making/receiving calls or getting applications to run. A WCF short on capacity could also make internet connections time out or delay information to emergency response personnel.



# Explanation of Wireless Coverage



**Coverage** is best shown via coverage maps. RF engineers use tools that take into account terrain, vegetation, building types, and WCF specifics to model the existing coverage and prediction what we expect to see with the addition of a proposed WCF.

Coverage also changes depending on which frequencies are used. Most phones today use 4G at low and mid band frequencies. Low frequencies can travel further distances than then the higher 1900 MHz, 2100 MHz, and 3500 MHz (Mid Band) frequencies now being employed due to increased capacity demands. Operating at higher frequencies makes it necessary for carriers to install substantially more wireless facilities to achieve the same coverage as one tower operating on the lower frequencies.



# Explanation of Wireless Capacity



**Capacity** is the amount of resources that a WCF has to service customer demand. Verizon utilizes sophisticated programs and customer feedback to monitor current usage trends and to forecast future needs. Because it takes an average of 2-3 years to complete a WCF, we have to start the process of adding a new WCF several years in advance of when the WCF will be needed.

**Location, Location, Location.** A good capacity WCF needs to be in the center of a user population which insures that traffic is evenly distributed around the WCF. A typical WCF is configured into three sectors (like a pie cut into three pieces), with each slice (sector) having 33% of the WCF resources. If one sector is under-utilized, it's resources cannot necessarily be diverted to another sector. Therefore, optimal performance is only obtained when all three sectors have an even traffic distribution.



# Explanation of Wireless Data Growth

## Wireless Data Growth

Each year Verizon sees large increases in how much data its customers need. As the resolution of the pictures we send increases, the quality of the video we watch improves, and the complexity of the applications grow, we commonly see tremendous growth year-over-year. From 3Q 2016 to 3Q 2017 the growth rate for wireless data was 65%.

Machine to Machine communications will also increase the data burden on wireless networks, as over the next five (5) years more and more services that improve our safety and make our lives easier will be available over the wireless infrastructure , such as:

- Cars that notify 911 when an airbag deploys.
- “Driverless” cars needing traffic data and maps to reach your destination as quickly as possible.
- Medical monitors that will alert us should a loved one neglect taking their prescription drugs.
- Home alarms that notify you when your child arrives home from school.
- Smart street lights that notify the city when they are not working.
- City garbage cans that let people know when they need to be emptied.
- Tracking watches will aid in finding lost Alzheimer patients.
- New applications are developed daily.



# Radio Emission Safety...

A common question received is “Are the radio emissions safe?”

Verizon goes to great effort to ensure that all of its projects meet the standards established by the FCC to ensure safety of the public and its employees. How this site measures in comparison with this standard is detailed in a report included with the zoning application for this site. The links below are to three reputable organizations that have performed extensive reviews of the science available on this subject and have good educational articles on the results of their research.

World Health Organization

<http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>

America Cancer Society

<http://www.cancer.org/cancer/cancercauses/othercarcinogens/athome/cellular-phone-towers>

FCC Radio Frequency Safety

<http://www.fcc.gov/general/radio-frequency-safety-0>

**Electromagnetic Hypersensitivity** – Evidence shows no link between exposure and symptoms.

World Health Organization finding based on the body on scientific evidence.

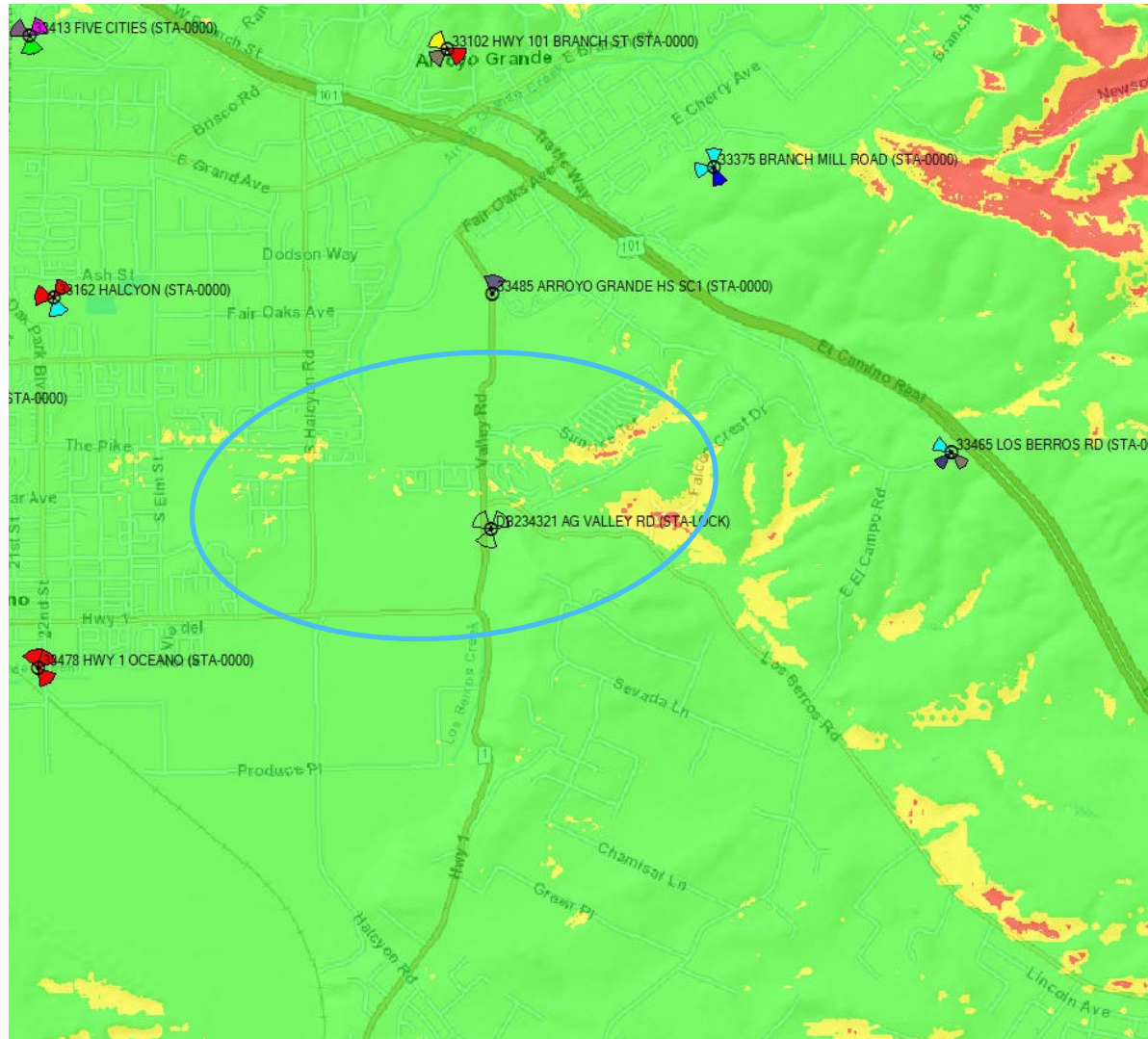
<http://www.who.int/peh-emf/publications/facts/fs296/en/>

<http://www.ncbi.nlm.nih.gov/pubmed/15784787>

<http://www.ncbi.nlm.nih.gov/pubmed/25644455>



# Existing coverage without proposed site at 700 MHz:

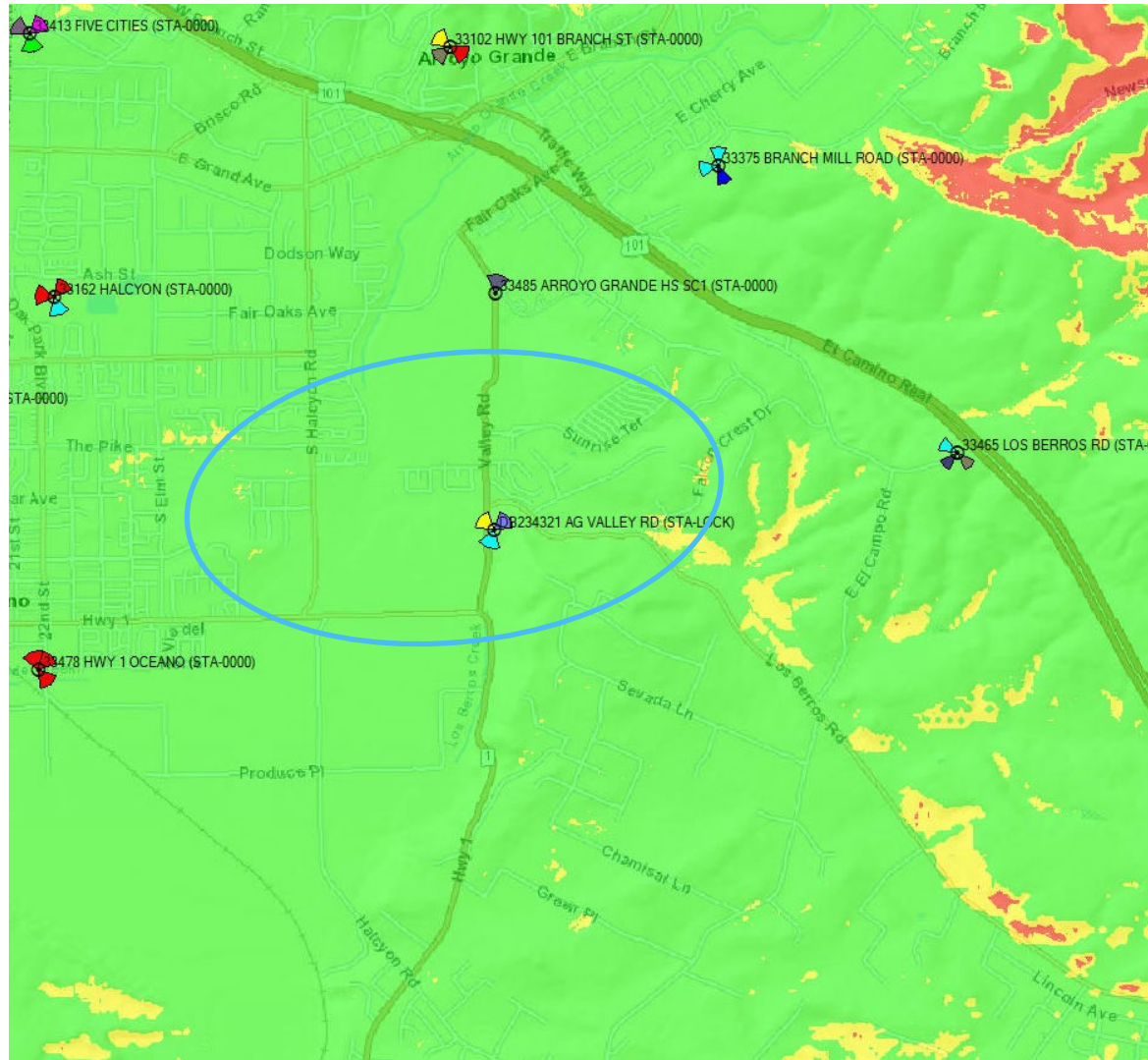


**Green** = Good In-Building, **Yellow** = Good In-Vehicle, **Red** = Good on-Street.





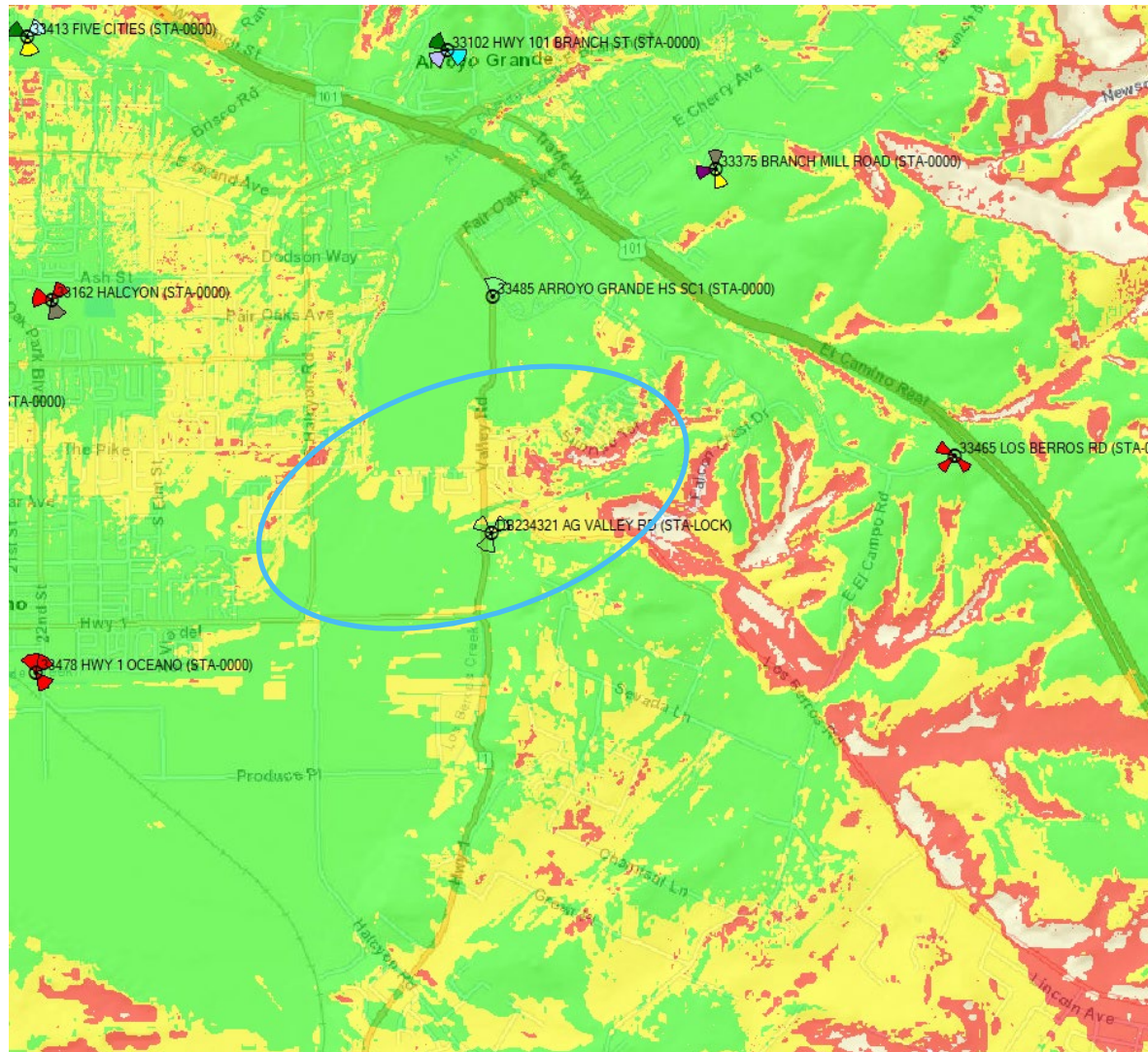
# Future coverage with proposed site at 700 MHz



**Green** = Good In-Building, **Yellow** = Good In-Vehicle, **Red** = Good on-Street.



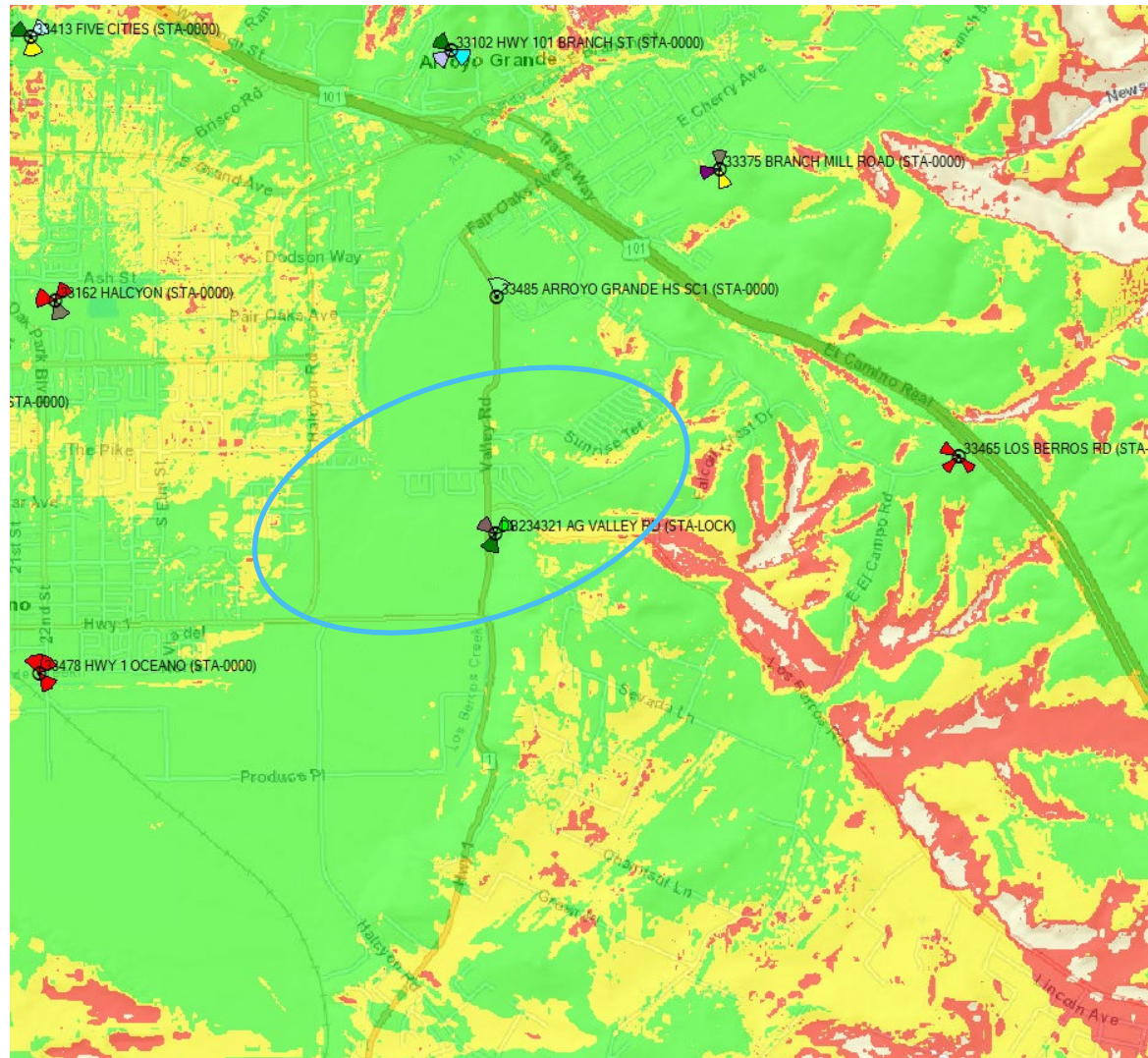
# Existing coverage without proposed site at 2100 MHz:



**Green** = Good In-Building, **Yellow** = Good In-Vehicle, **Red** = Good on-Street.



# Future coverage with proposed site at 2100 MHz



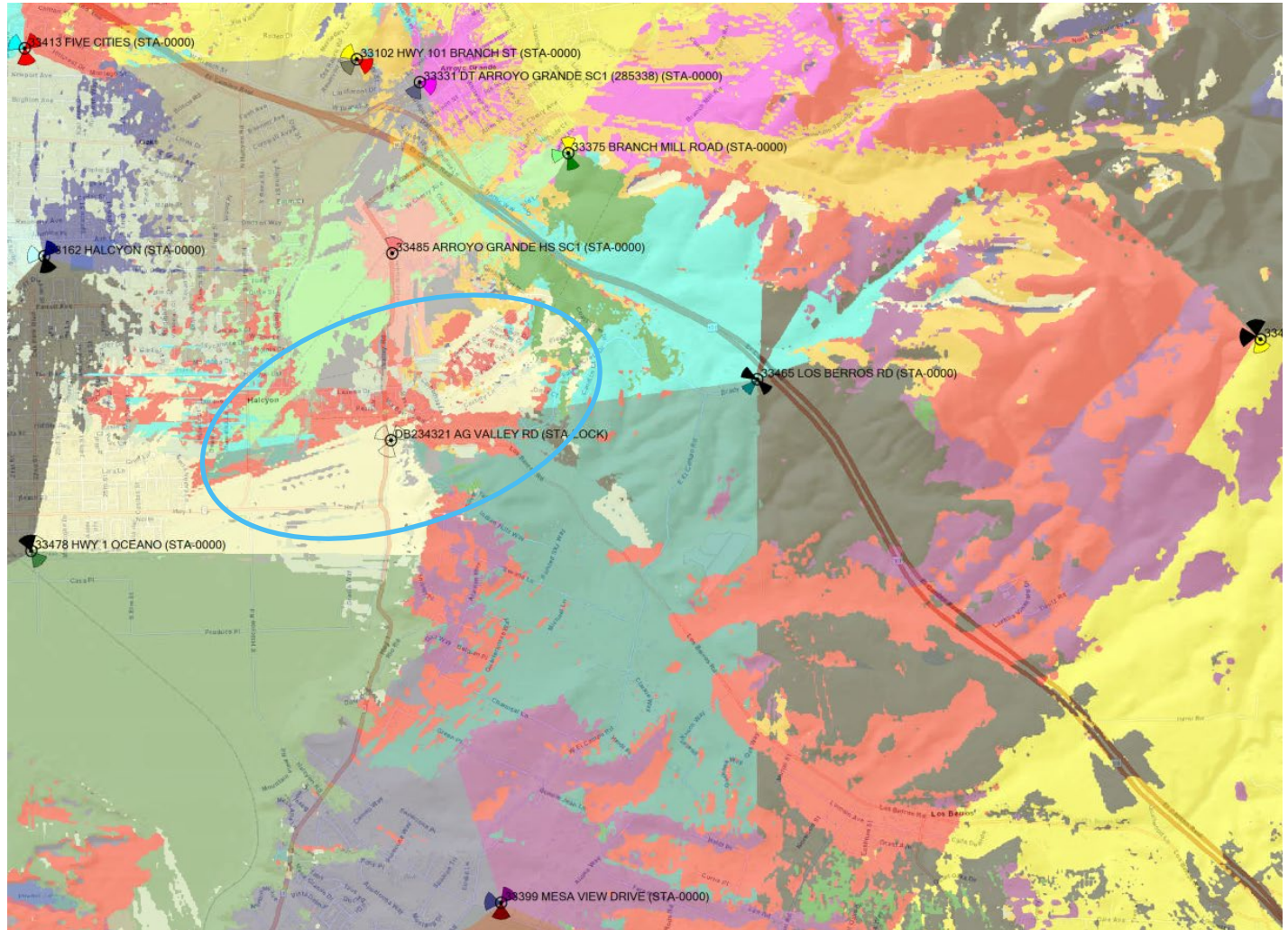
**Green** = Good In-Building, **Yellow** = Good In-Vehicle, **Red** = Good on-Street.



# Existing coverage showing area:

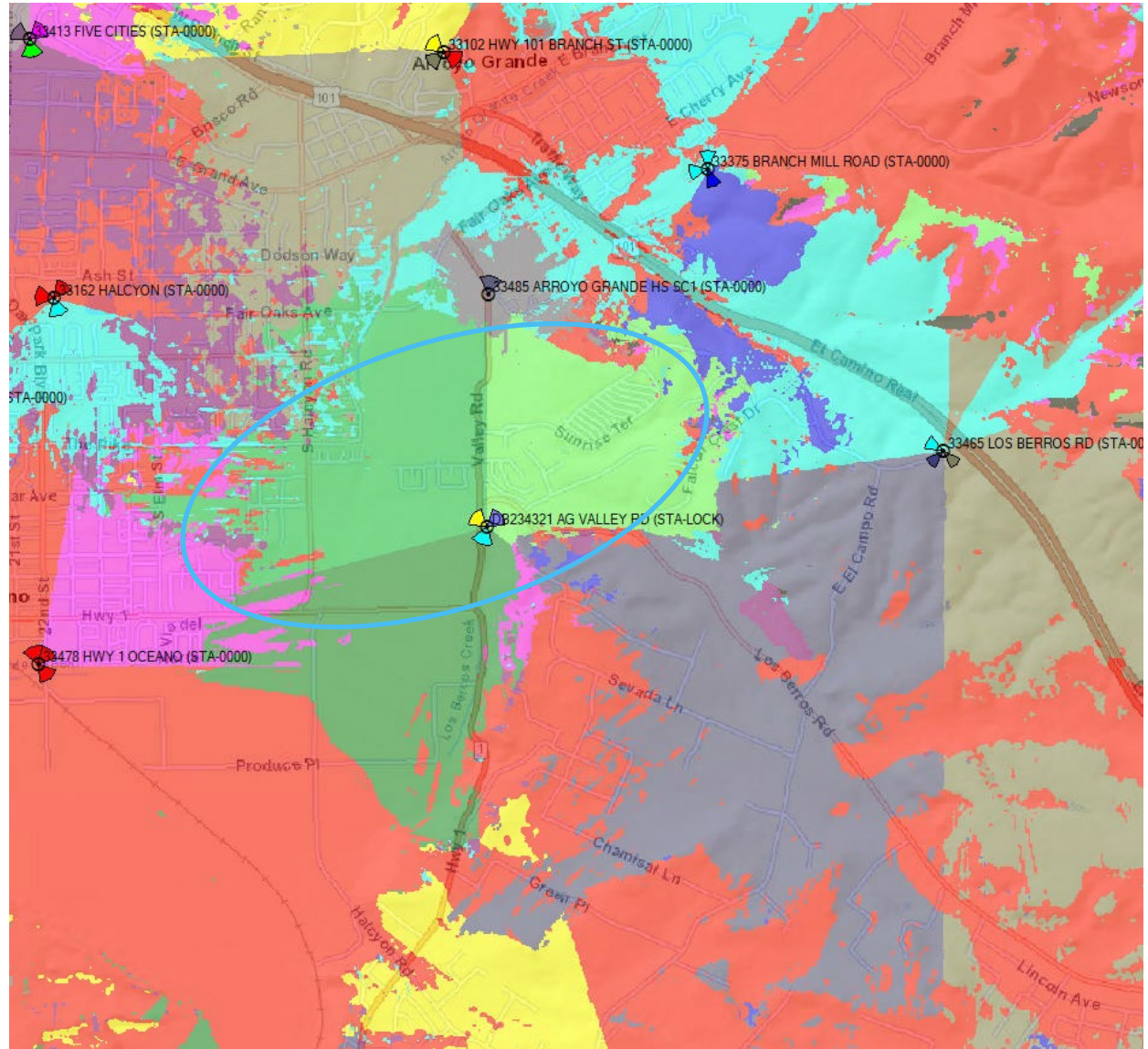
The red in the area of the new site is coverage from the Overloaded hilltop Arroyo Grande site.

The new site will reduce the load on that site.



# Future coverage showing area served by the new site:

Green is the coverage from the proposed site



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