

# WIRELESS NETWORK CONSULTING

PHO\_WHITE-WING  
Capacity Cell Split

## RF DESIGN ANALYSIS





# Coverage vs Capacity

- † **Capacity is providing bandwidth or processing capacity to service the customers in the area.**
  - Areas where large numbers of users are in a specific geographic areas
  - Areas where users are demanding higher data rates for services
  - Areas with a large amount of indoor users
- † **Coverage is Providing Service where service does not exist, calls drop, or “no service”.**
  - Areas where sites are farther apart
  - Areas where terrain or buildings block signals
  - Areas where indoor service is low or nonexistent



# Objective of new site



## Capacity

- Provide additional bandwidth for customers in the area surrounding the proposed site
- Provide better throughput for indoor users in the area
- Offload surrounding sites in area.



## Coverage

- Provide additional in-vehicle coverage along E Lincoln Drive
- Provide additional indoor coverage in surrounding businesses and homes and indoor coverage at the hotel



## Why is this site important?

- 96% of Americans own a Cellular Phone
- 57% of American Homes rely exclusively on cellular phones
- 84% or more of 9-1-1 emergency calls are made from wireless devices



# Conditional Use Permit

## **Colocation on existing structures**

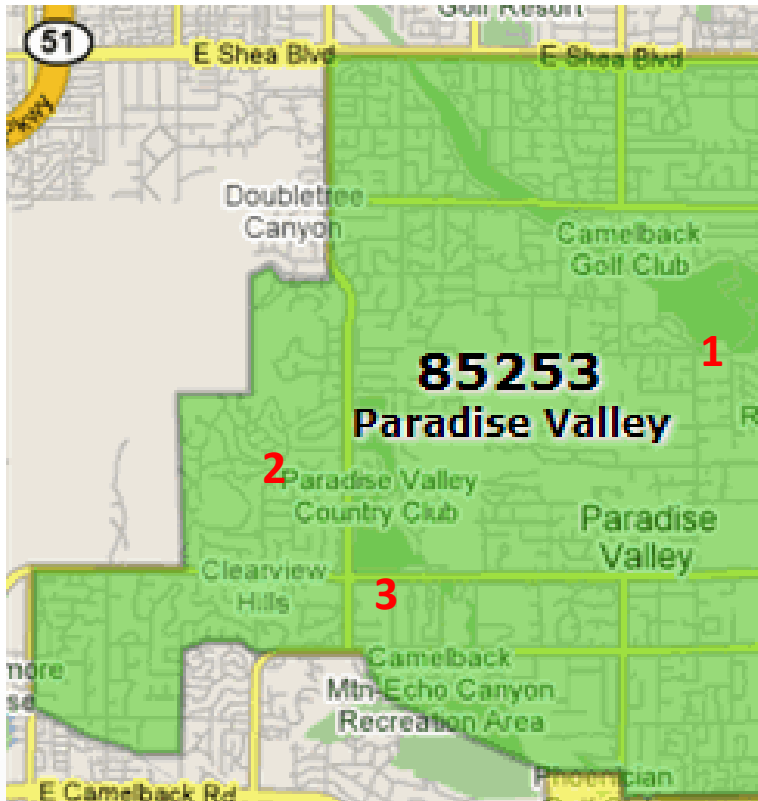
- Proposed will be located on an existing building
- Antennas will be concealed behind concealment
- Any wireless carrier can locate on the structure as long as they have a lease with the structure owner
- Provide additional in-vehicle coverage along E Lincoln Drive

## **Compliance with Federal Law**

- Proposed will follow all Federal laws relating to FCC/FAA requirements as well as NEPA & SHPO requirements and Tribal requirements



# Paradise Valley Verizon Sites



## Location #1

Antennas mounted on Camelback Golf Club

## Location #2

Cactus located at E Red Ledge Drive

## Location #3

Antennas located in stealth structure at Omni Scottsdale Resort & Spa at Montelucia



# Proposed Site

## † Existing Building

- 5402 E. Lincoln Drive Paradise Valley, AZ 85253
  - Latitude: 33.532999 N (NAD83)
  - Longitude: -111.964085 W (NAD83)
  - Ground Elevation: 1367.9' (NAVD88)
  - Verizon is tenant
- Antenna Centerline at 25'3" & 27'4" AGL



# Why here?

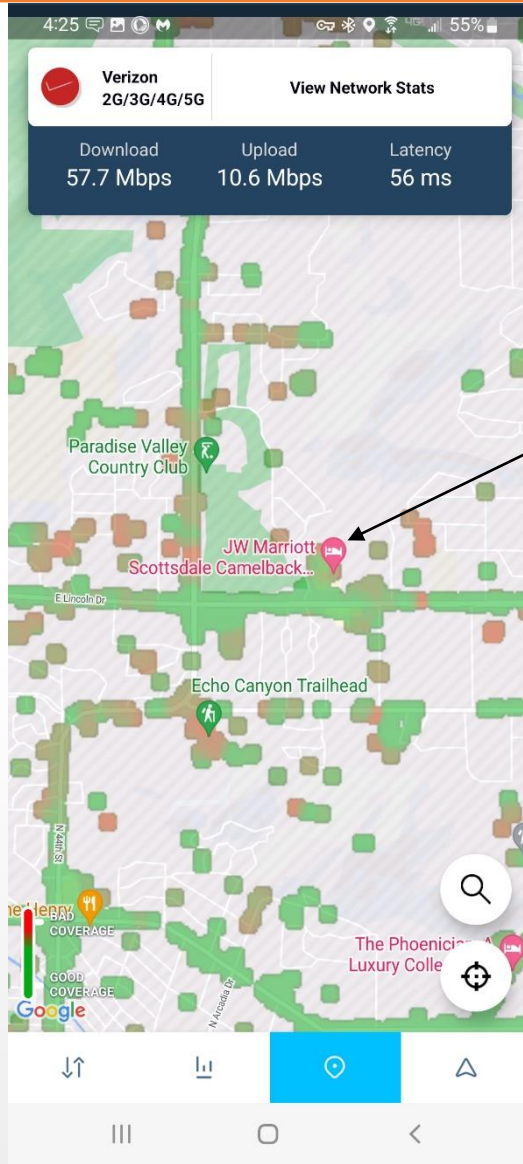
- † Large amount of users overloading surrounding sectors causing lower throughput for customers in the area
- † Additional coverage at hotel for Superbowl 2023
- † Low throughput for users in surrounding area
- † Some need for indoor service improvement to the North and South



This satellite map of Scottsdale, Arizona, provides a detailed view of the area around the Verizon Site. The site is located on E Lincoln Dr, near the intersection with N Tatum Blvd. Key landmarks include the Paradise Valley Country Club to the north, the Mountain Shadows Resort to the east, and the Scottsdale Camelback Inn. The map also shows several golf courses, including the Camelback Golf Club and the Mountain Shadows Golf Club. Major roads like E Lincoln Dr and E McDona'd Dr are clearly visible, along with the Google Earth logo in the bottom right corner.



# Open Signal Verizon Quality Map

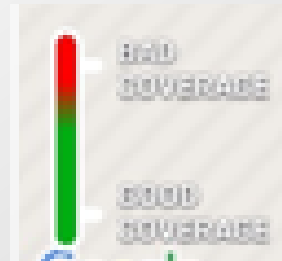


This map shows mobiles reporting quality of their connections to the network. This is crowdsource data from Verizon users made available by the OpenSignal App:

<https://www.opensignal.com/apps#section-os-app>




Green data points show good coverage and red data points show bad coverage and lack of data points show no coverage

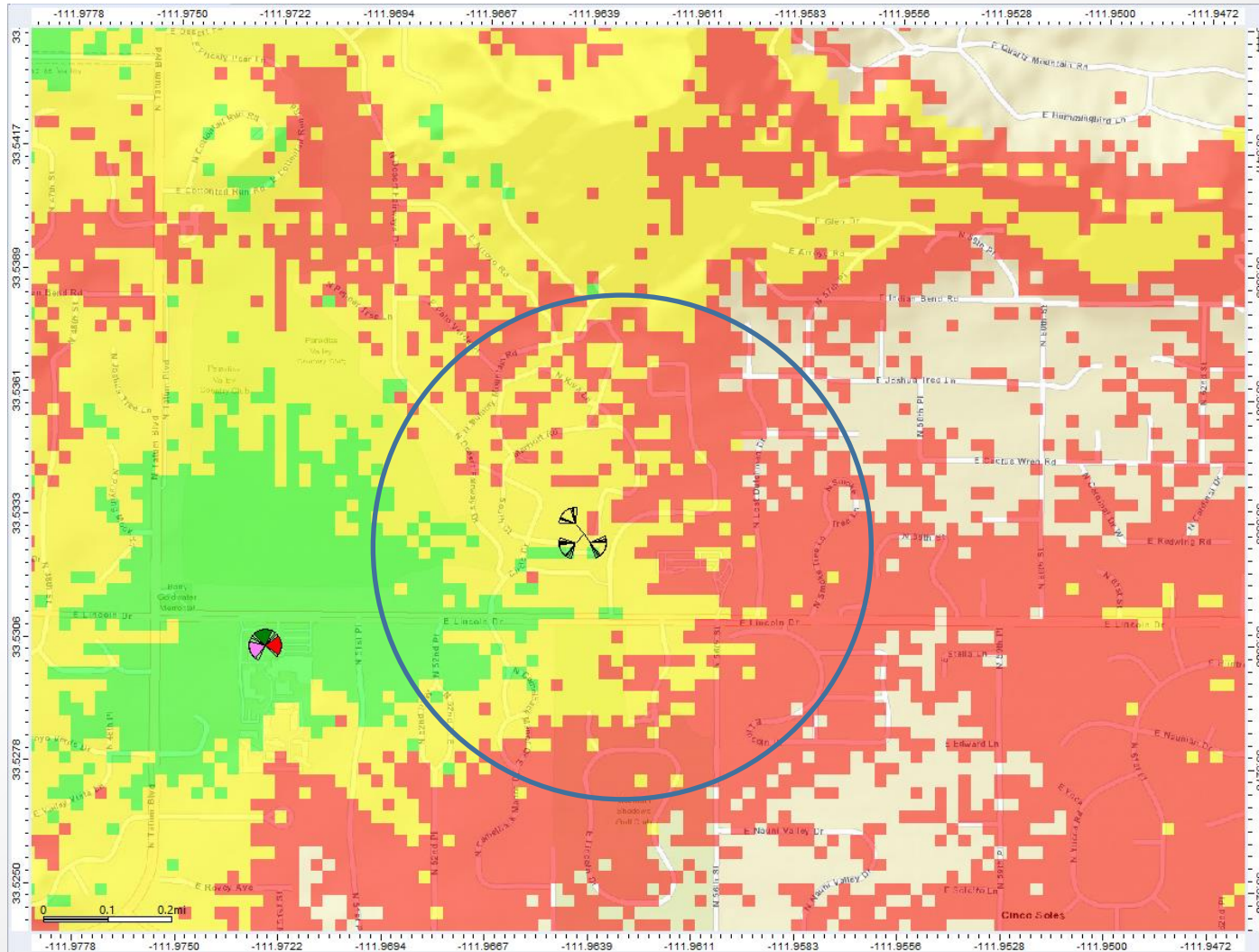
Notice the large amount of poor coverage points North of the Marriot, this is a capacity (throughput site)








# RSRP - Current Coverage

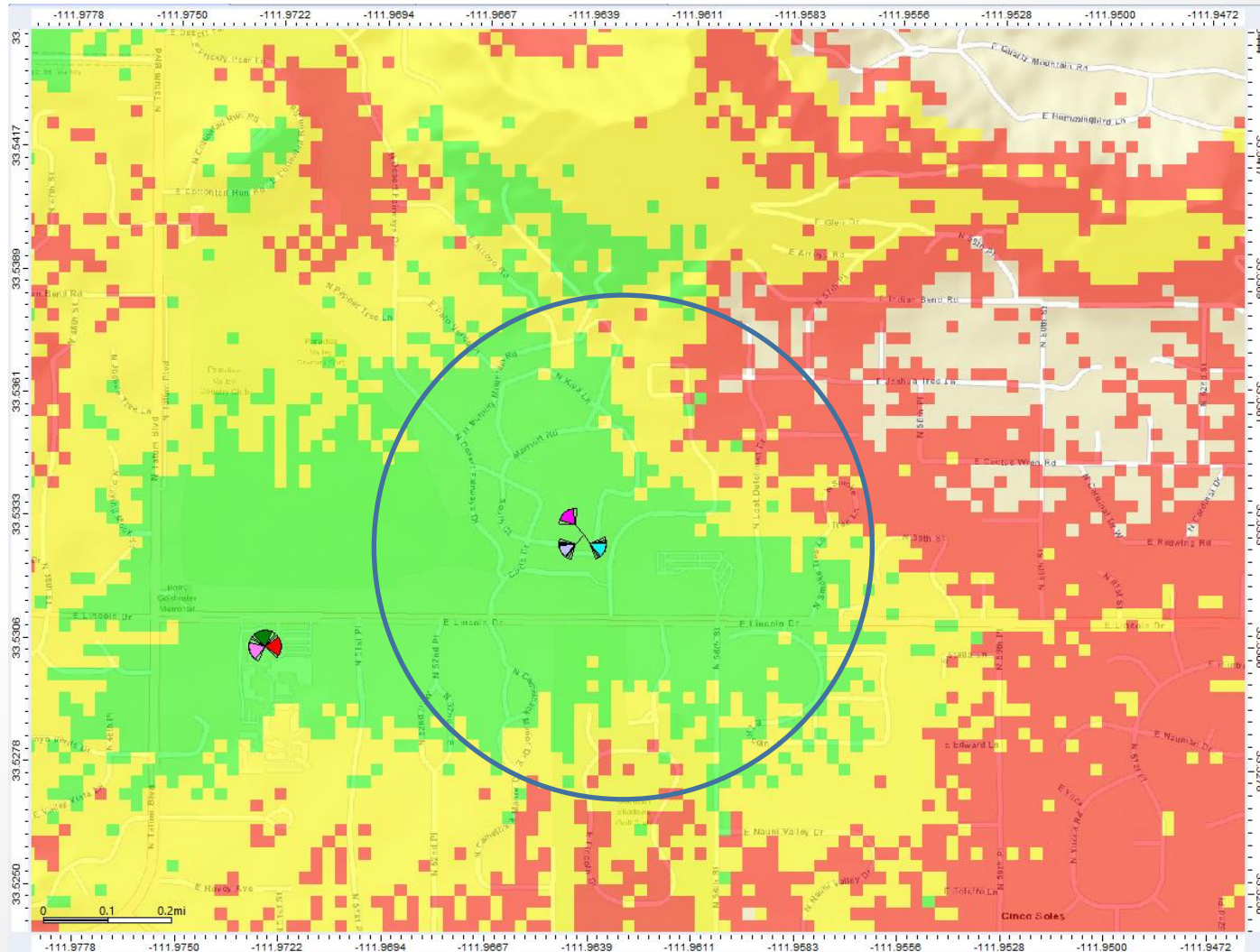
LEGEND	
	In-Building
	In-Vehicle
	On-Street





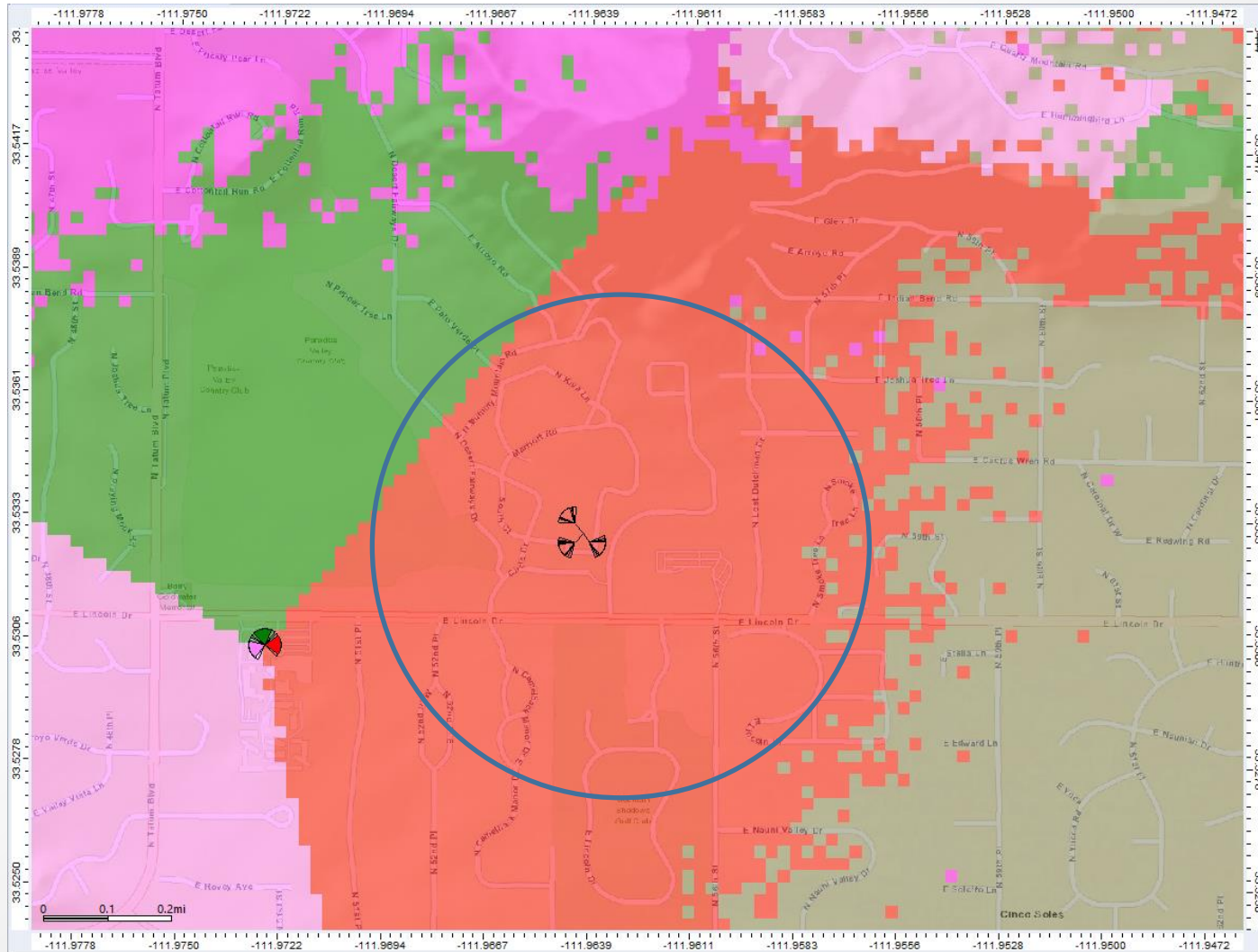
# RSRP – Proposed Coverage

LEGEND	
	In-Building
	In-Vehicle
	On-Street



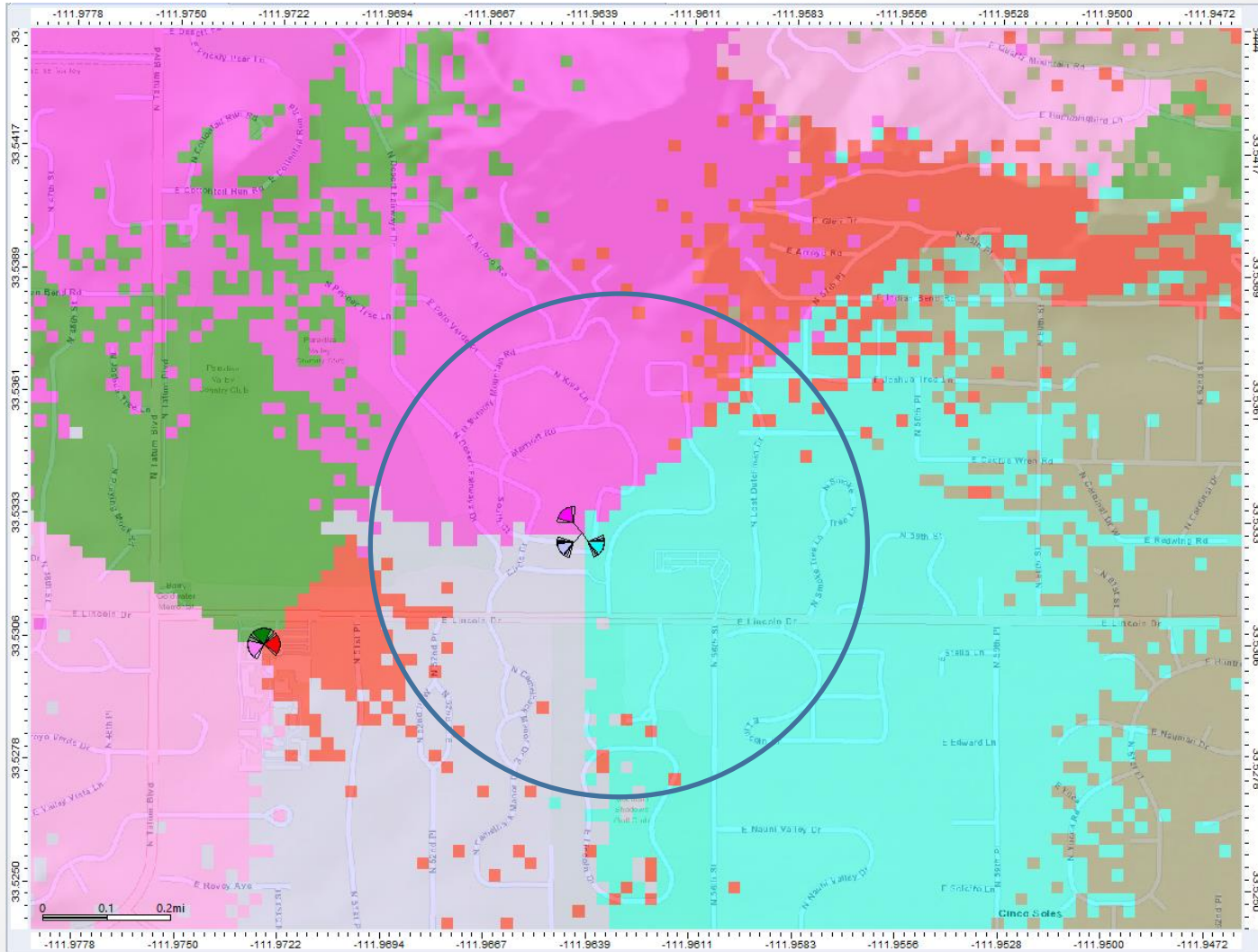


# Best Server - Current (-120dbm)





# Best Server – with new site (-120dbm)





# Ionizing vs Non-Ionizing

† There are two (2) types of Energy/Radio Waves

- **Ionizing**

- These are waves that can effect human DNA
- Examples are:
  - Gamma rays
  - X-Rays
- This is one of the reasons the nurse steps out of the room and you wear a lead overcoat when you get X-Rays at the dentist.

- **Non- Ionizing**

- These are waves do not effect human DNA
- Examples are:
  - Car Radios
  - Television
  - Wi-Fi Access points and routers
  - Bluetooth headsets
  - Cellphones and Smartphones
  - Lightbulbs
  - Wireless Baby Monitors
  - TV remotes
- Absorption of waves is proximity based, the closer you are to the antenna the more non-ionizing energy is absorbed. You will absorb 50% of the FCC's General Public limit with your smartphone next to your ear versus less than 10% of the FCC's General Public limit from the antennas when you are standing 20' away from the proposed tower.
- The further you walk away from the tower it decreases even more.



# General Public & Occupational limits

† The FCC isolated two (2) groups relative to access around wireless antennas

† The first group is called Occupational

- This refers to areas where workers would be allowed (general public cannot access) but the workers would not have knowledge about antennas (An example would be an Air Conditioner Repair Technician). Barriers or signage may be needed to alert the worker when close to the antennas.
  - Examples are:
    - Rooftop access behind a locked door
    - Compound access behind a locked gate
- The FCC determined the safe value and then lowered by a factor of 10 and that is the value the wireless carriers use in the studies
- The exposure levels are averaged over 6 minutes

† The second group is called General Public

- Uncontrolled access (General Public)
  - This group is for areas with general public access, the public would not have a knowledge of an antenna being close to them
  - Examples are:
    - Sidewalks
    - Parks
    - Public accessed buildings
- The FCC determined the safe value and then lowered by a factor of 50 and that is the value the wireless carriers use in the studies
- The exposure levels are averaged over 30 minutes

† Compare the value for a tower which is 10mW to the power of a smartphone which is 200mW of power.

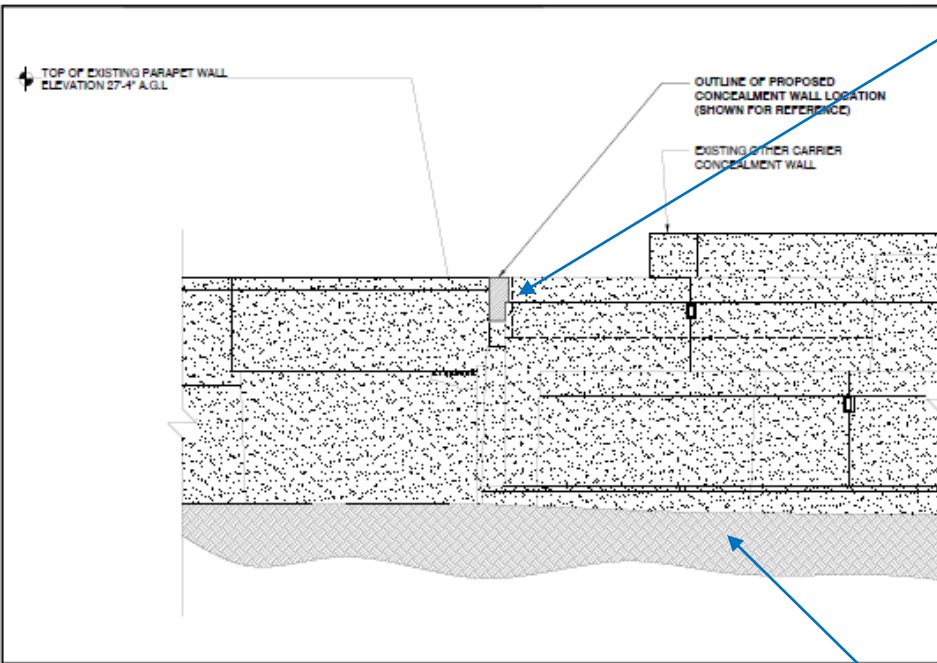


# Power Levels below a tower

Main beam of the antenna

- Power levels on the ground around the tower are much less than what is at the antennas
- Power on the ground adjacent to the tower is 1/1000 of the power compared to what is at the antenna

1/1000 of the power  
on the ground  
around the site

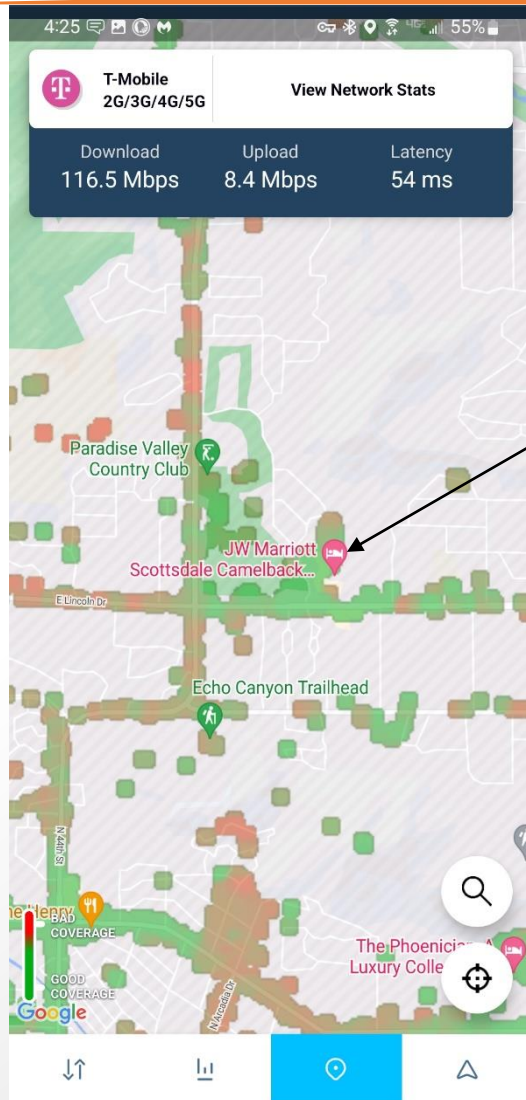




# **APPENDIX**



# Open Signal T-Mobile Quality Map

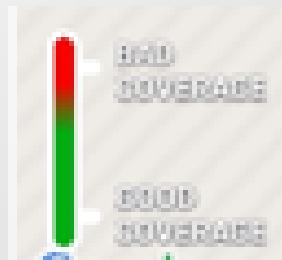


This map show mobiles reporting quality of their connections to the network. This is crowdsource data from T-Mobile users made available by the OpenSignal App:

<https://www.opensignal.com/apps#section-os-app>

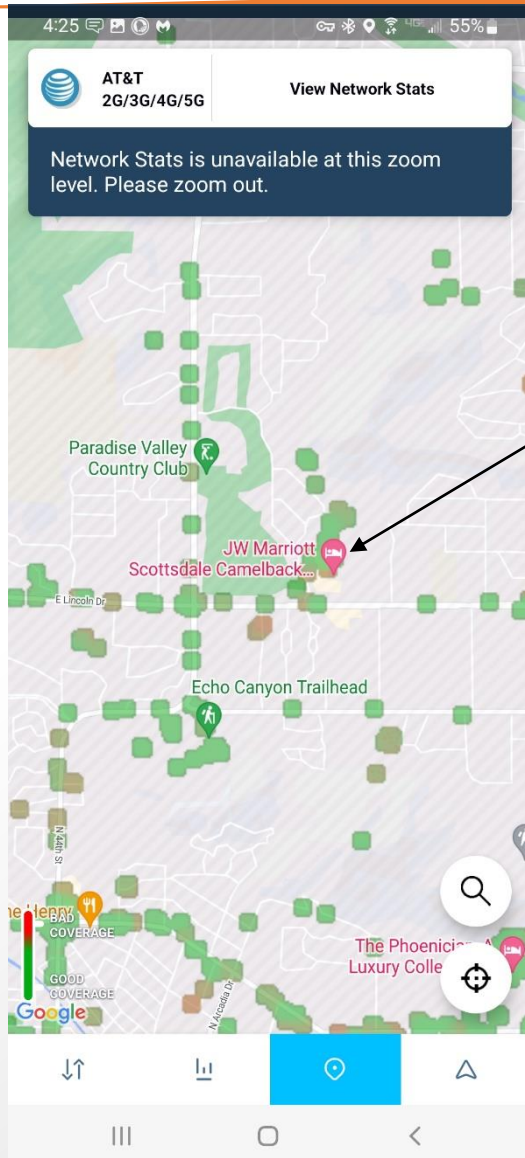
Green data points show good coverage and Red data points show bad coverage and lack of data points show no coverage

T-Mobile has some bad coverage points in the area to the North, West and South





# Open Signal AT&T Quality Map



This map shows mobiles reporting quality of their connections to the network. This is crowdsource data from AT&T users made available by the OpenSignal App:

<https://www.opensignal.com/apps#section-os-app>

Green data points show good coverage and Red data points show bad coverage and lack of data points show no coverage

Notice some bad coverage points on the map

