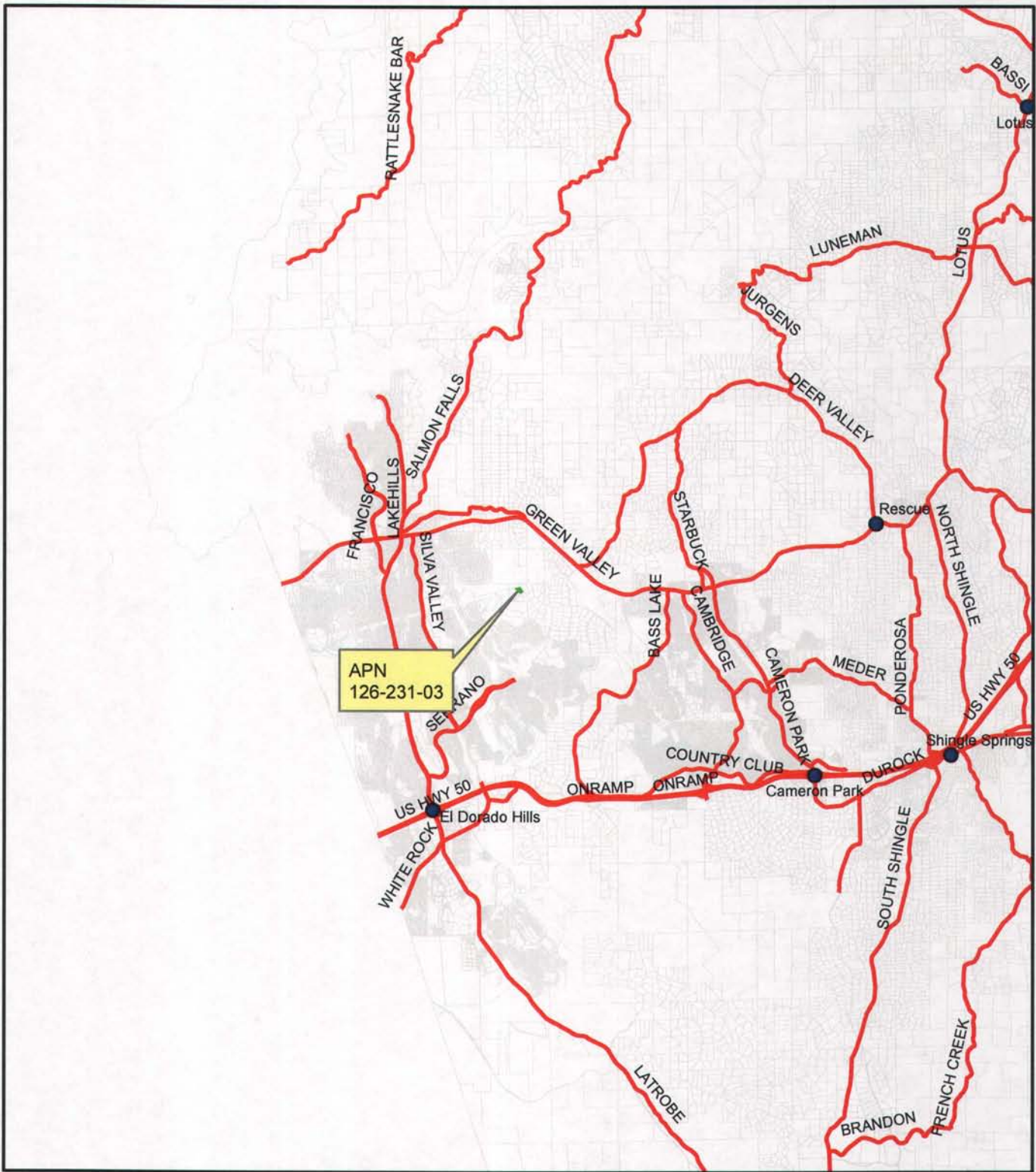


# Exhibit A: Location Map



- PLACENAMES
- major\_roads
- currprcl

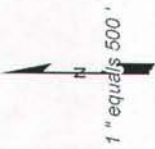


S13-0012/Green Springs Ranch Verizon  
Prepared By Aaron Mount

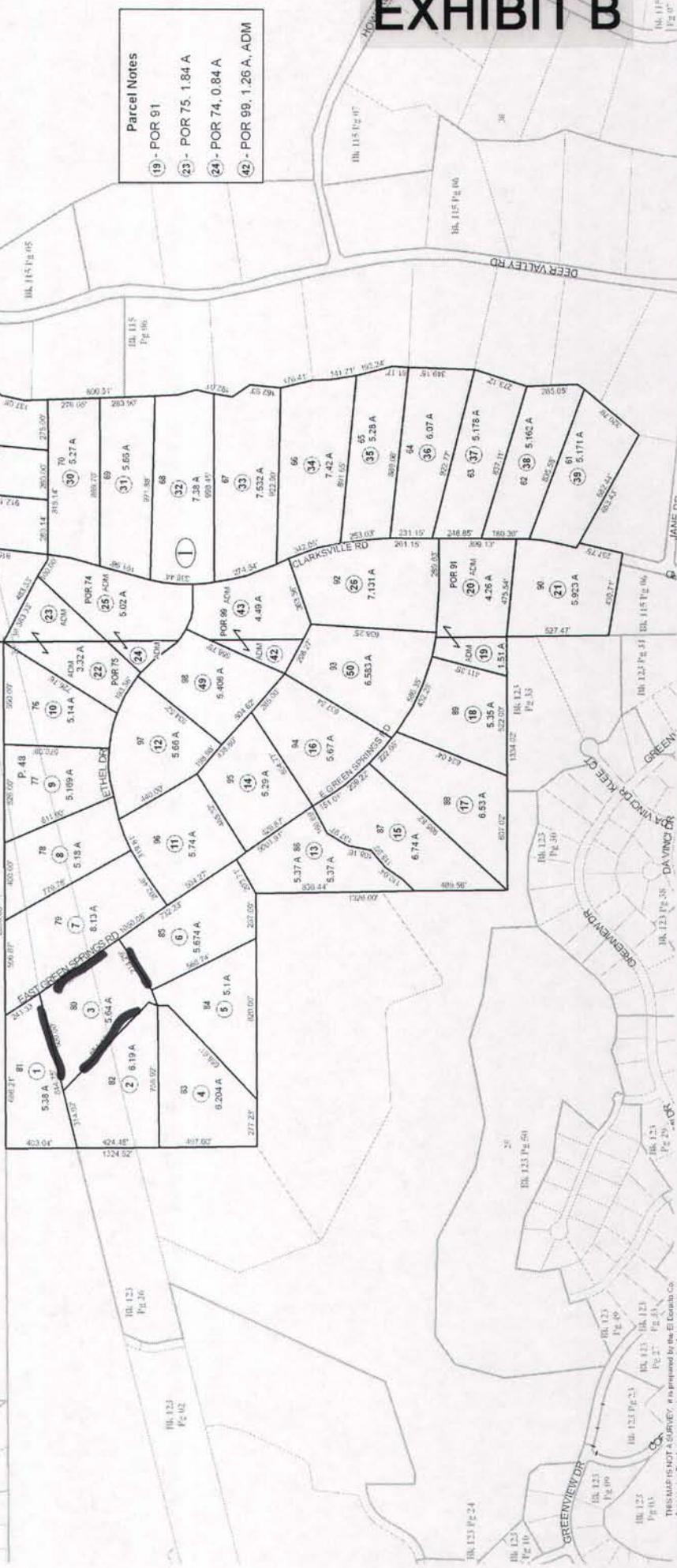
0 0.5 1 2 Miles



126:23



POR. SW 1/4 SEC. 19, W. 1/2 SEC. 30, T.10N., R.9E. &  
NE 1/4 SEC. 25, T.10N., R.8E., M.D.M.  
GREEN SPRINGS RANCH UNIT NO. 3  
F-97



**Parcel Notes**  
(19) - POR 91  
(23) - POR 75, 1.84 A  
(24) - POR 74, 0.84 A  
(42) - POR 99, 1.26 A, ADM

# EXHIBIT B

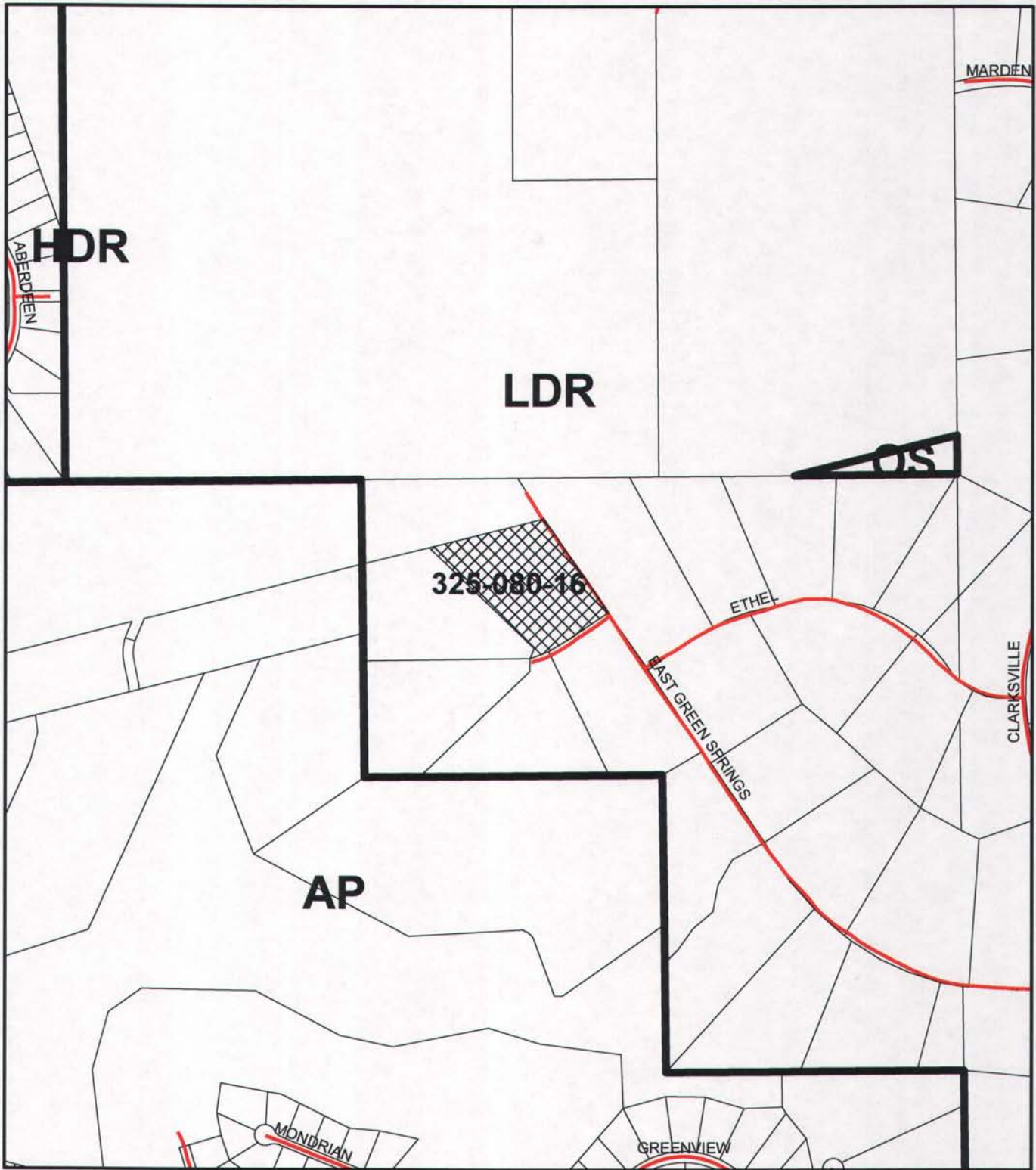
Assessor's Map Bk. 126, Pg. 23  
County of El Dorado, CA

Rev. Aug. 12, 2006

Acreages Are Estimates

THIS MAP IS NOT A SURVEY. It is prepared by the El Dorado County Assessor's Office for assessment purposes only. Area calculations are based on information and property lines shown on previous maps and are not guaranteed. Users should verify items with a licensed surveyor and property owner.

# Exhibit C: General Plan Map



ludesign  
 gpsroads  
 currprcl

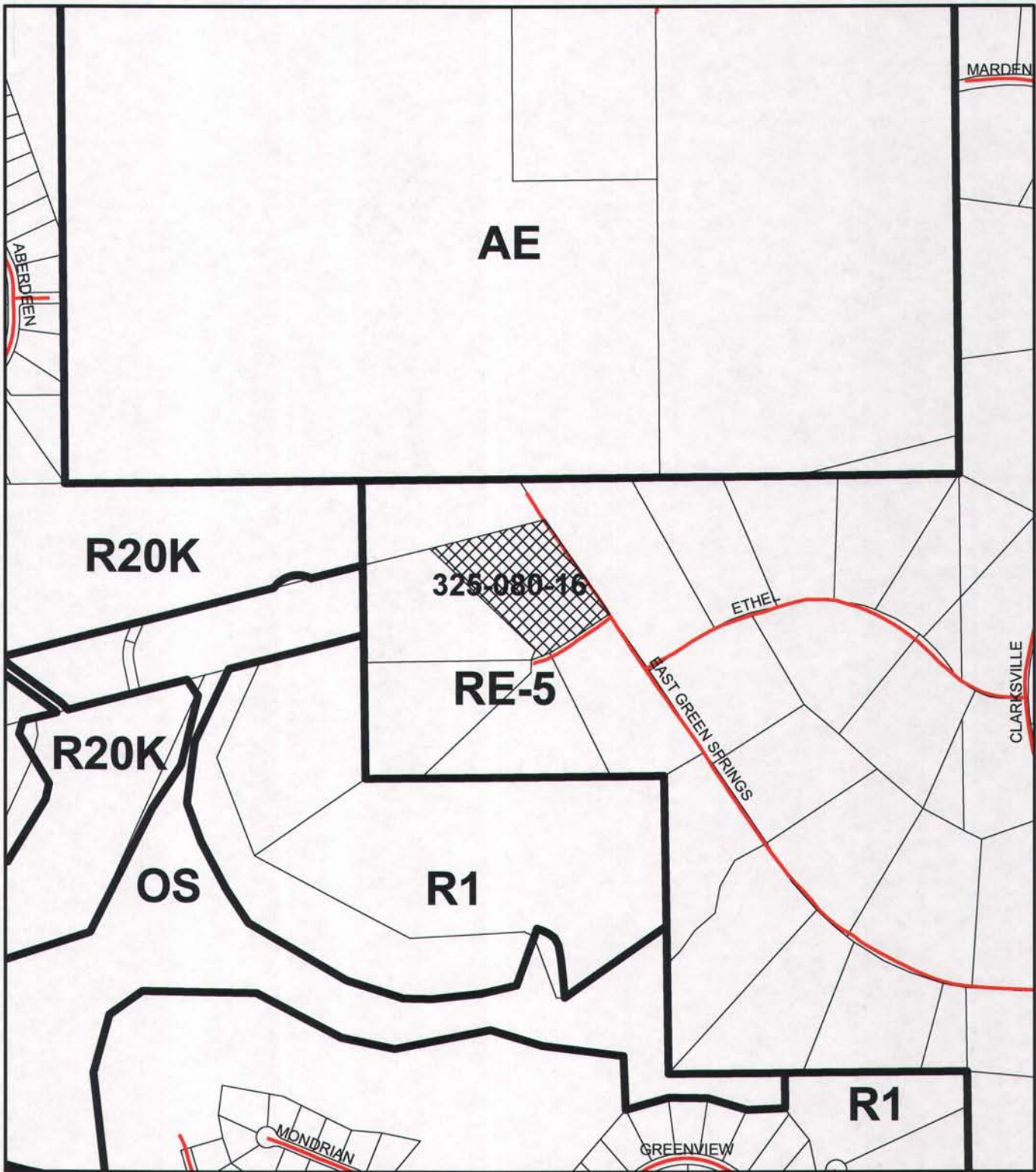





S13-0012/Green Springs Ranch Verizon  
Prepared By Aaron Mount

0 285 570 1,140 Feet



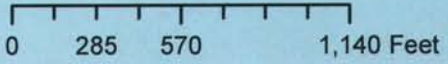
# Exhibit D: ZONE DISTRICT MAP



 zones  
 gpsroads  
 currprcl



S13-0012/Green Springs Ranch Verizon  
Prepared By Aaron Mount



0 285 570 1,140 Feet

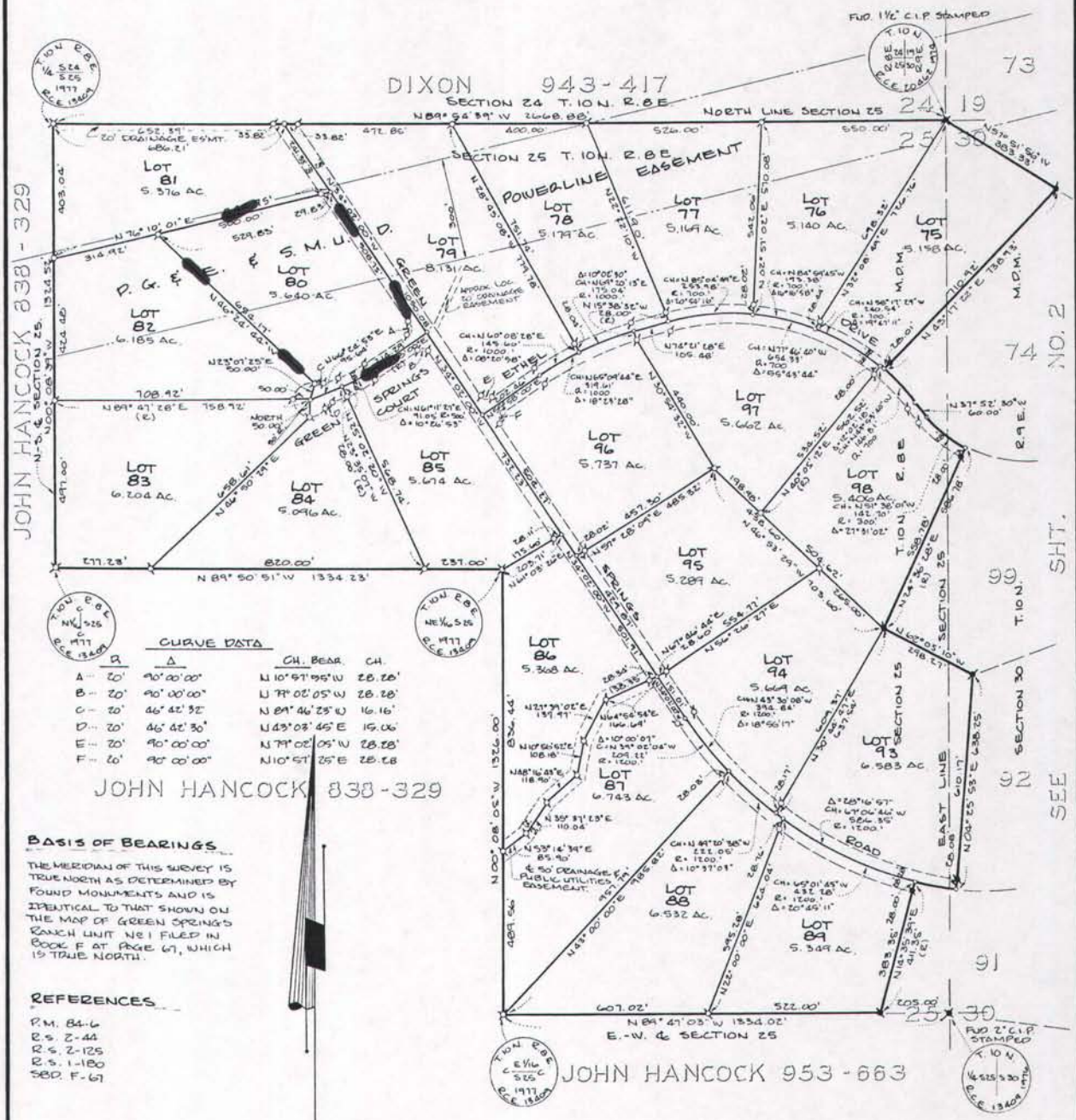


# EXHIBIT E

F-97B

F-97B

FLAT OF  
**THE GREEN SPRINGS RANCH UNIT NO 3**  
 A RURAL SUBDIVISION  
 POR'S. OF THE N.E. 1/4 OF SEC. 25, T.10N., R.2E., & N.W. 1/4  
 OF SECTION 30, T.10N., R.2E., M.D.M.  
 COUNTY OF EL DORADO STATE OF CALIFORNIA  
 FEBRUARY, 1979 MORGAN ENGINEERING CO. SCALE 1" = 200'  
 SHEET 5 OF 5



F-97B

F-97B



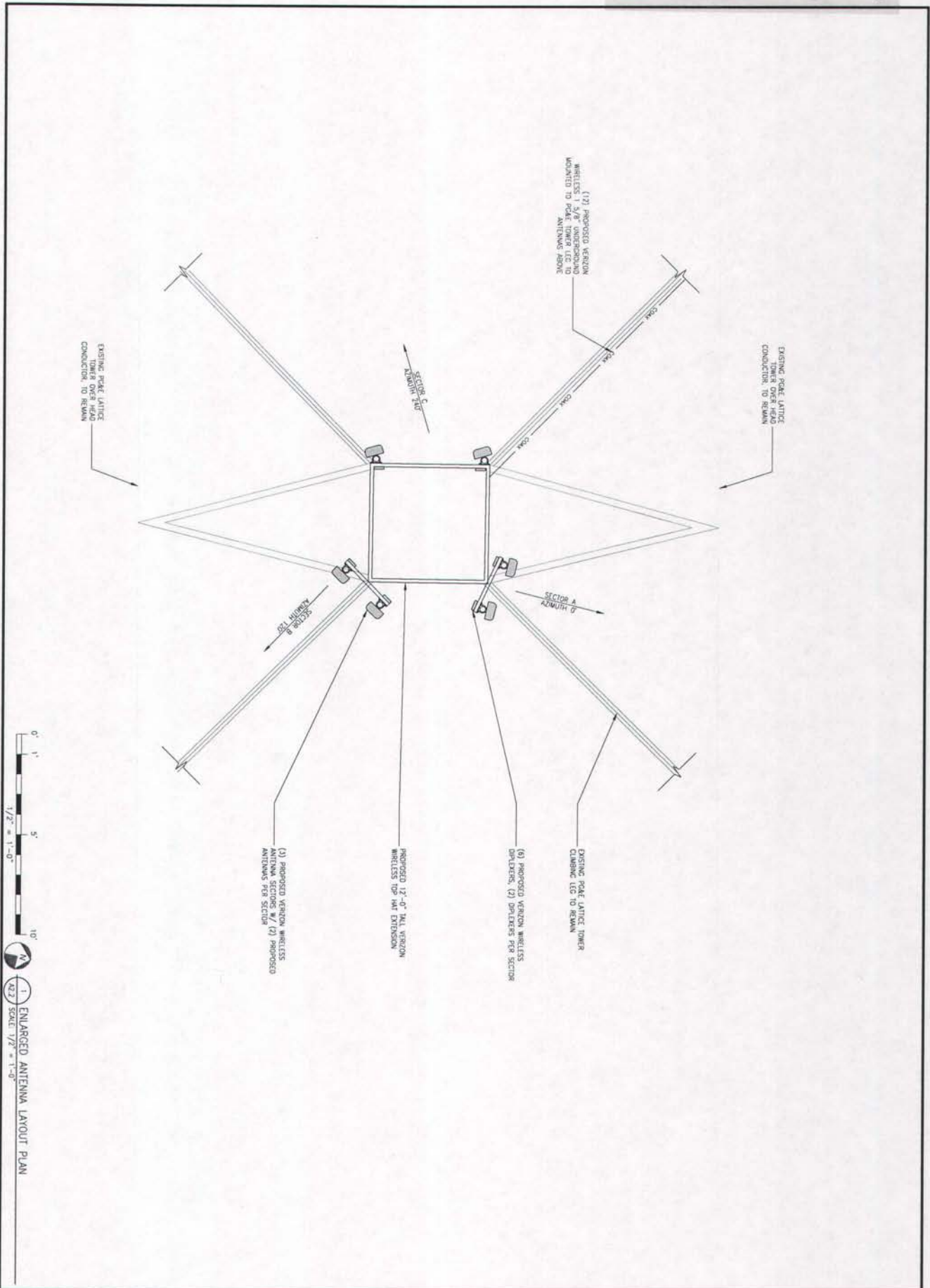












**A2.2** ENLARGED ANTENNA LAYOUT PLAN  
SCALE: 1/2" = 1'-0"

**A2.2**

DATE: 08/11/11  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 SCALE: AS SHOWN  
 SHEET NO.: A2.2

NO.	REVISION	DATE

**verizon WIRELESS**

GREEN SPRINGS RANCH  
 2367 EAST GREEN SPRINGS COURT  
 RESCUE, CA 95672

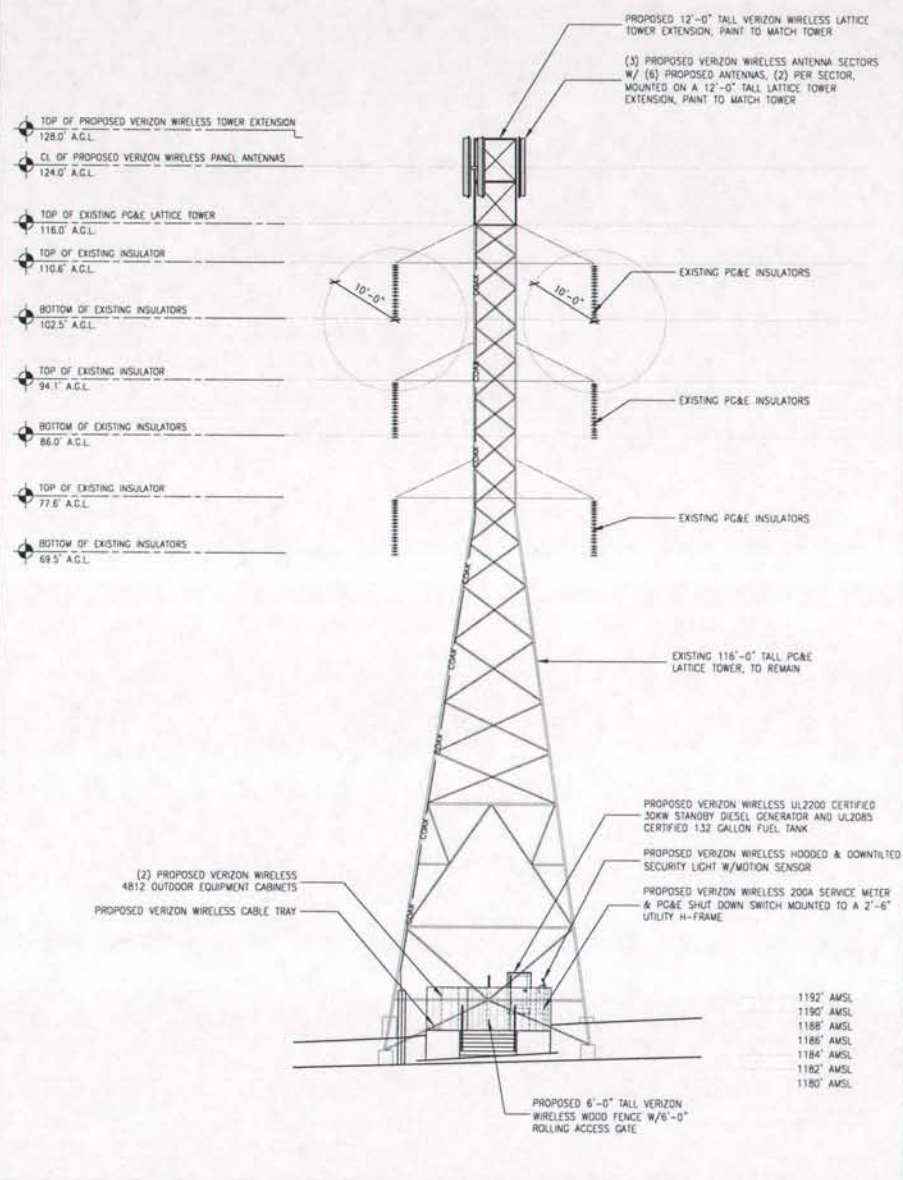
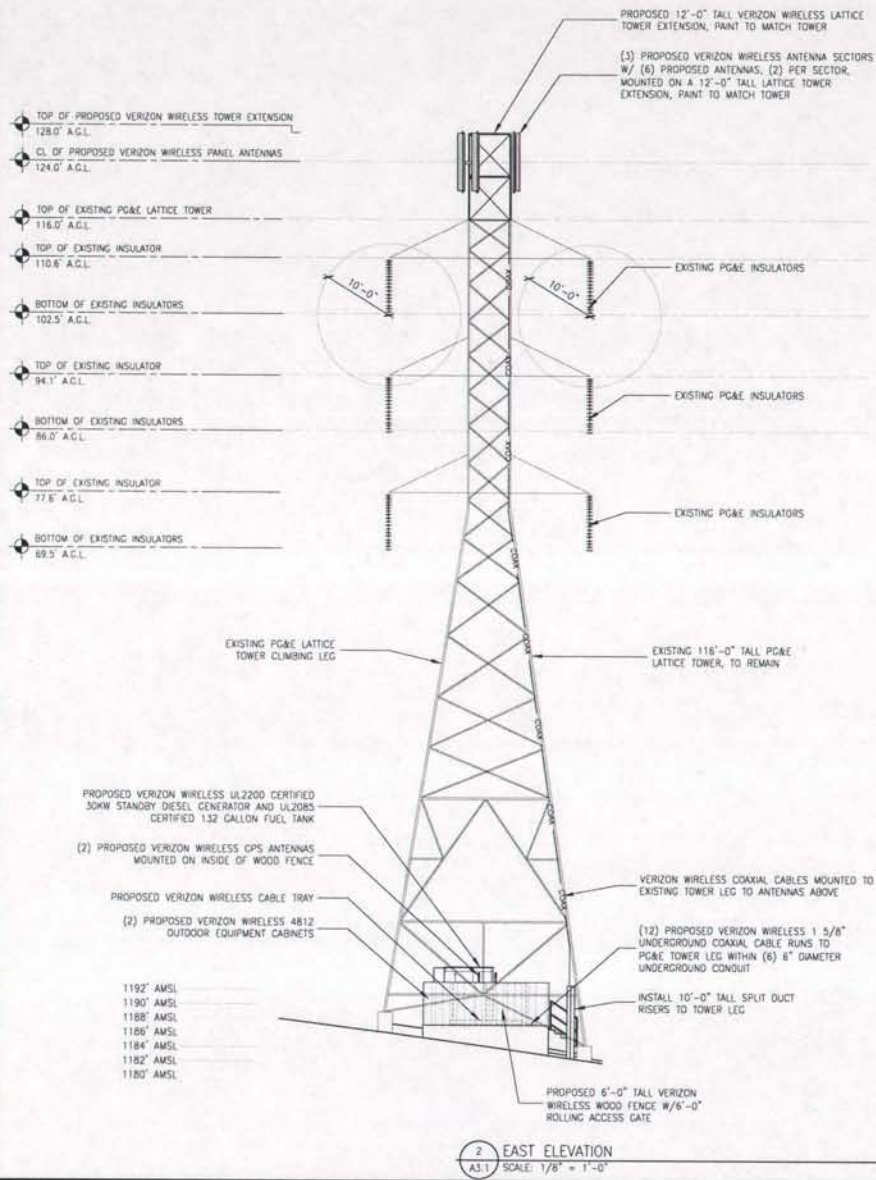
SHEET TITLE: ENLARGED ANTENNA PLAN

**MST ARCHITECTS**  
 881 Alhambra Blvd., Suite 2, Sacramento, CA 95811  
 PH: 916.661.4444 | FX: 916.661.4444  
 www.mst-architects.com

**COMPLETE**  
 Wireless Consulting, Inc.

THIS DRAWING AND ITS CONTENTS ARE HEREBY ON BEHALF OF MAST, ALL THE TERMS AND CONDITIONS OF THE CONTRACT, ALL RIGHTS ARE RESERVED FOR MAST. MAST AND ITS AFFILIATES OR ANY OF ITS AFFILIATES OR SUBSIDIARIES SHALL NOT BE LIABLE IN ANY MANNER OR FOR ANY REASON FOR ANY DAMAGE, LOSS, INJURY, OR DEATH, INCLUDING BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES, ARISING OUT OF OR IN CONNECTION WITH THE PERFORMANCE OF THIS CONTRACT.





GREEN SPRINGS RANCH  
 2367 EAST GREEN SPRINGS COURT  
 RESCUE, CA 95672

PROJECT ELEVATIONS

NO. REV.	DATE	BY	CHKD.

Revisions:

Job No. 182A79

**A3.1**



Photosimulation of view looking east from Appian Way, just north of Sangiovese Drive.

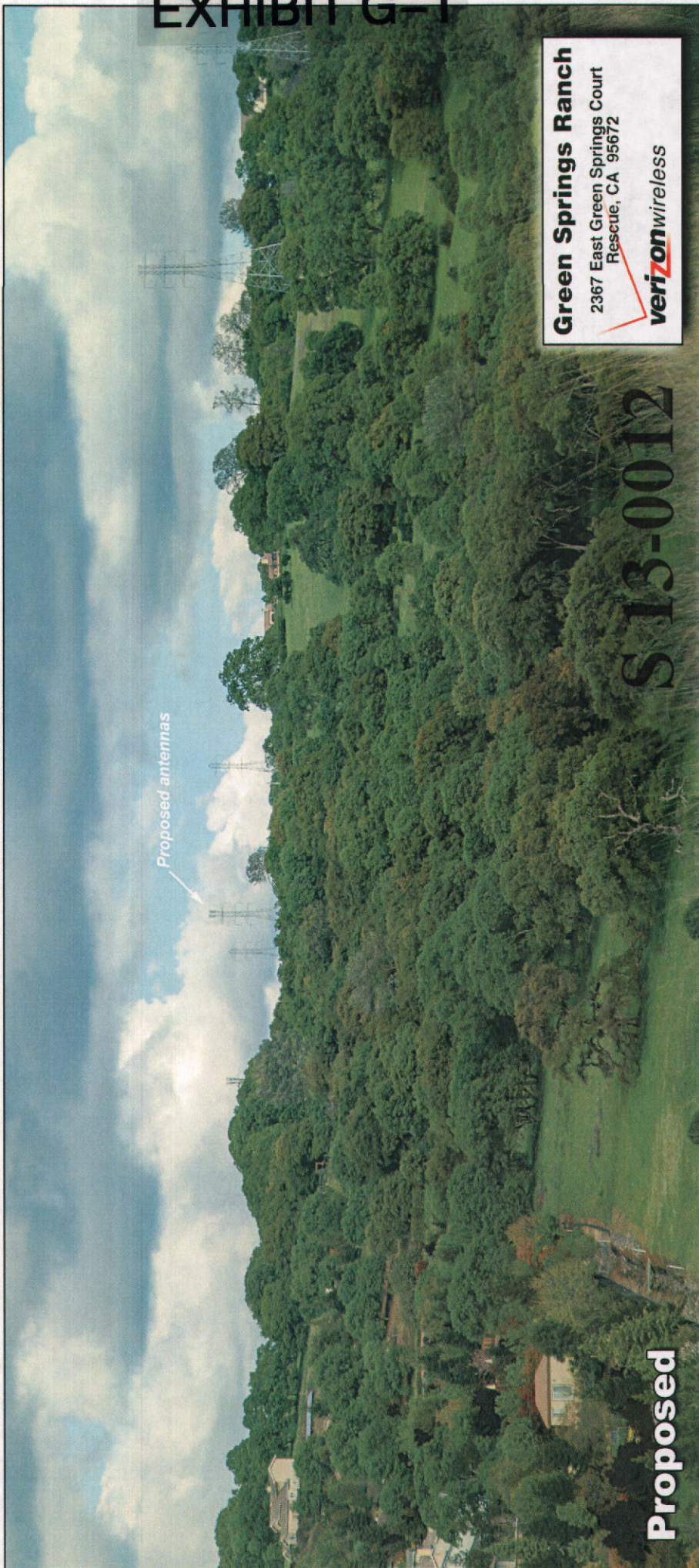
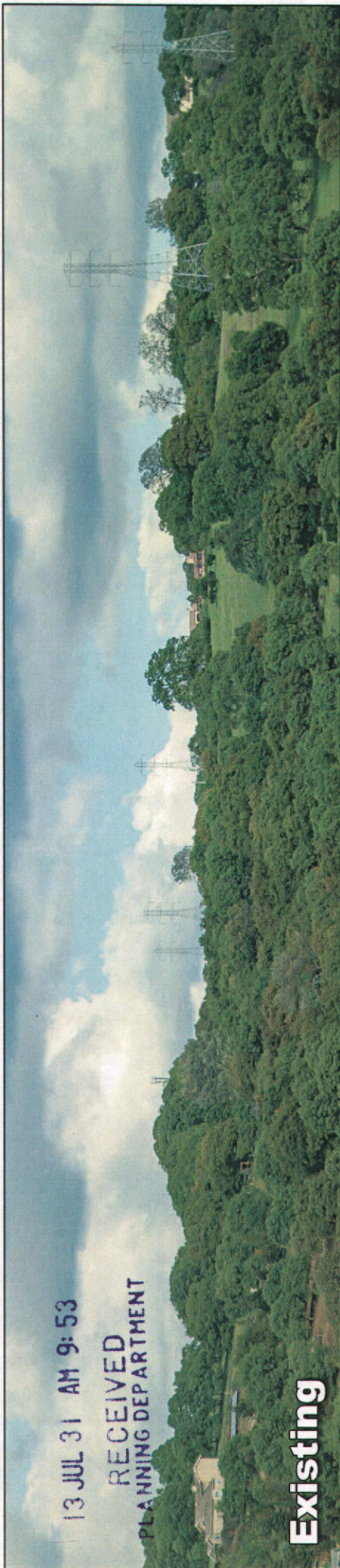
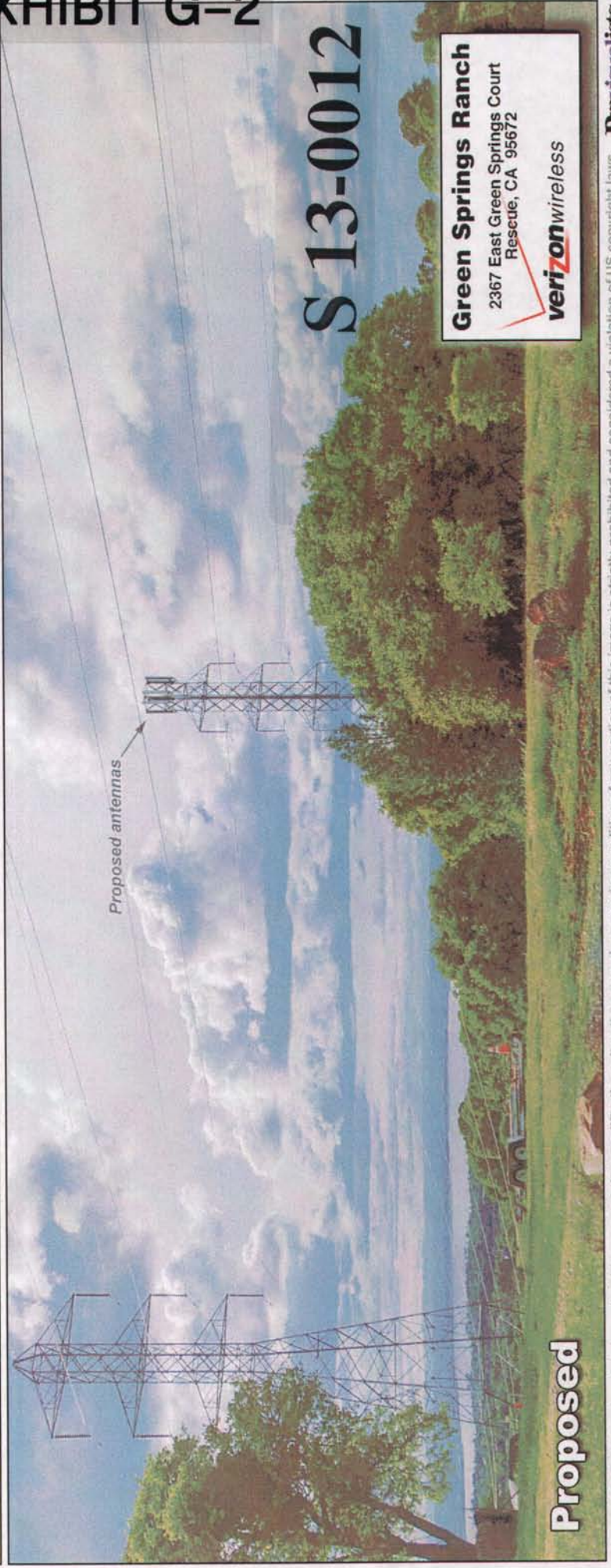
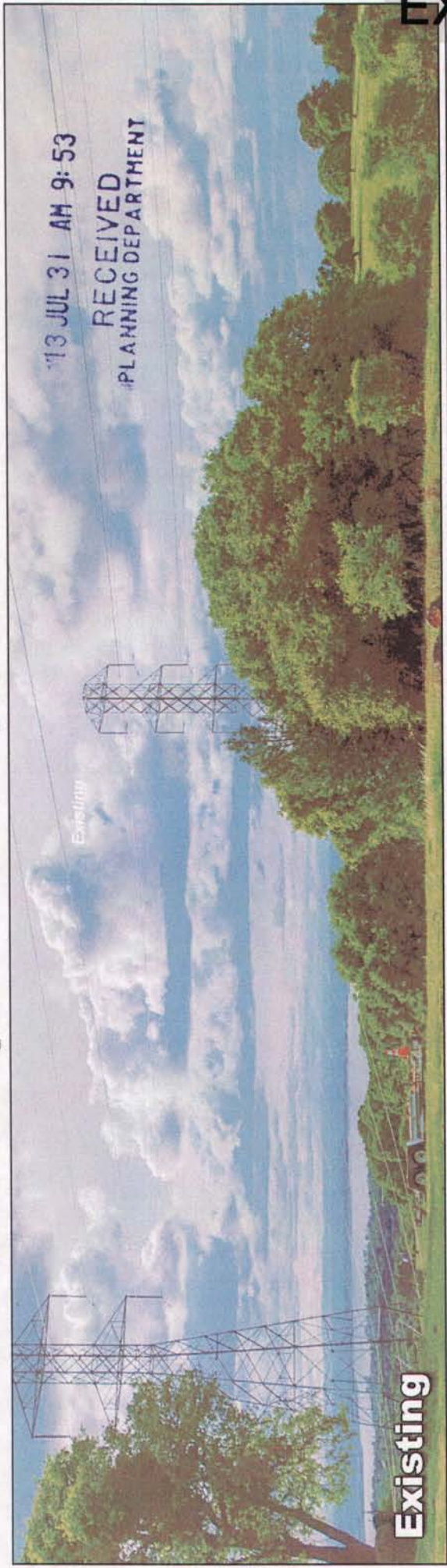


EXHIBIT G-1



Photosimulation of view looking northwest from E Green Springs Road just north of E Green Springs Court.



13 JUL 31 AM 9:53  
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EXHIBIT G-2

S 13-0012

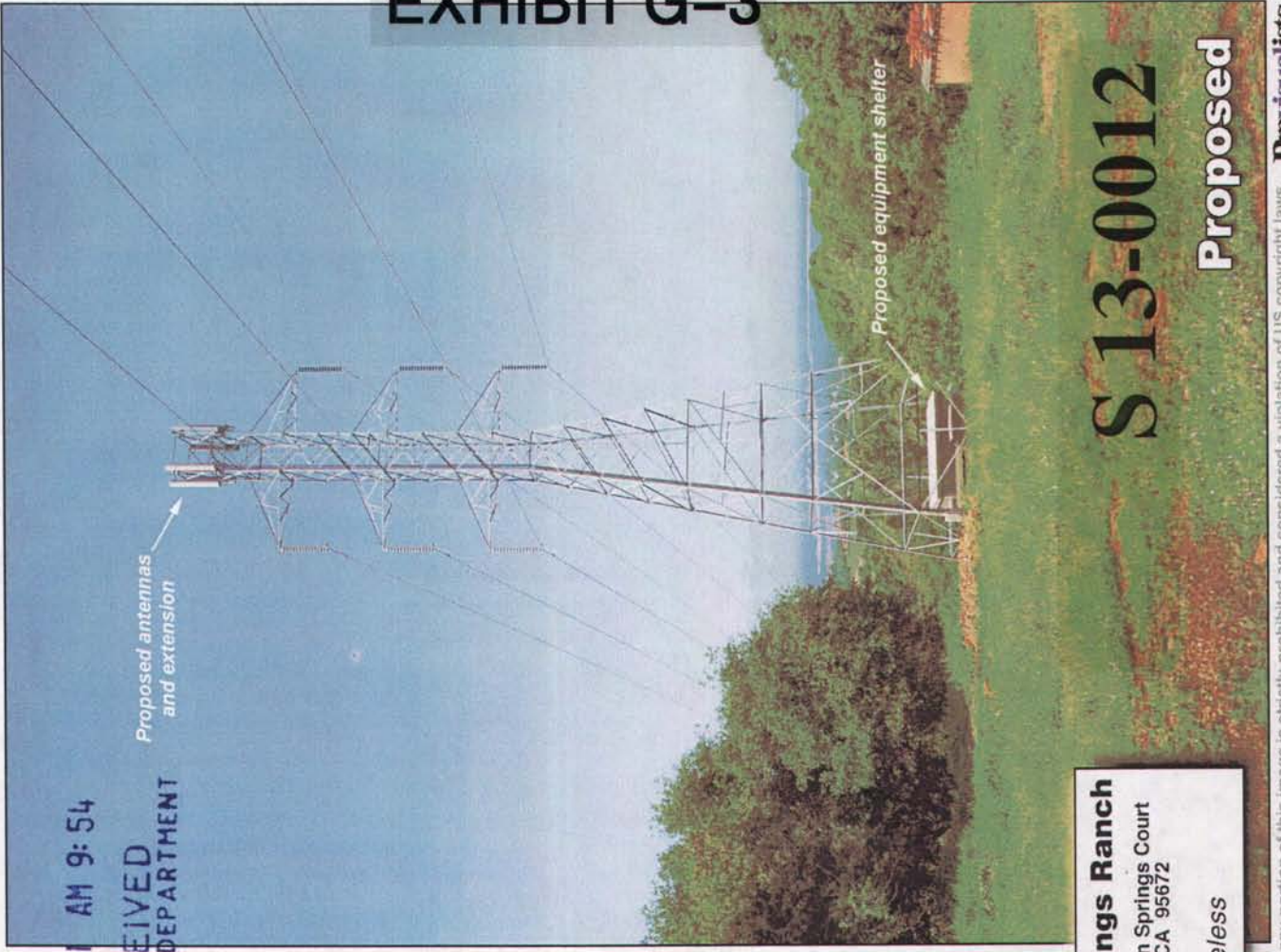
**Green Springs Ranch**  
 2367 East Green Springs Court  
 Rescote, CA 95672



Photosimulation of view looking west from the nearest point along East Green Springs Road.



**Existing**



**Green Springs Ranch**  
 2367 East Green Springs Court  
 Rescued, CA 95672

**S 13-0012**

**Proposed**

**EXHIBIT G-3**



**PROJECT SUPPORT STATEMENT**

13 JUL 31 AM 9:40

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PLANNING DEPARTMENT**VERIZON WIRELESS SITE: "GREEN SPRINGS RANCH"****2367 EAST GREEN SPRINGS COURT, RESCUE, CA 95672 (APN: 126-231-03-100)****INTRODUCTION**

Verizon Wireless (VZW) is seeking to improve cellular communication service in the this area of El Dorado County. More specifically, Verizon Wireless would like to increase cellular coverage and capacity by adding a new facility near the end of Green Springs Court. Currently, this portion of the Verizon network is suffering from a lack of cellular capacity and poor coverage due to an insufficient amount of telecommunications facilities and the ever increasing volume of service in this area. To address this issue, Verizon Wireless is proposing a new wireless communications facility at 2367 East Green Springs Count, Rescue, CA 95672, consisting of the following improvements:

- A 25' x 25' compound, enclosed by a 6' tall wood fence, and a 12' wide access gate.
- A 11'-6" x 16'-10.5" equipment shelter
- A UL2200 certified 30 KW standby diesel generator with a UL142 certified 132 gallon fuel tank on a concrete slab.
- Underground power and telco
- 3 VZW antenna sectors with 2 proposed antennas per sector placed atop an existing 116' tall PG&E lattice tower with proposed 12' top hat extension.

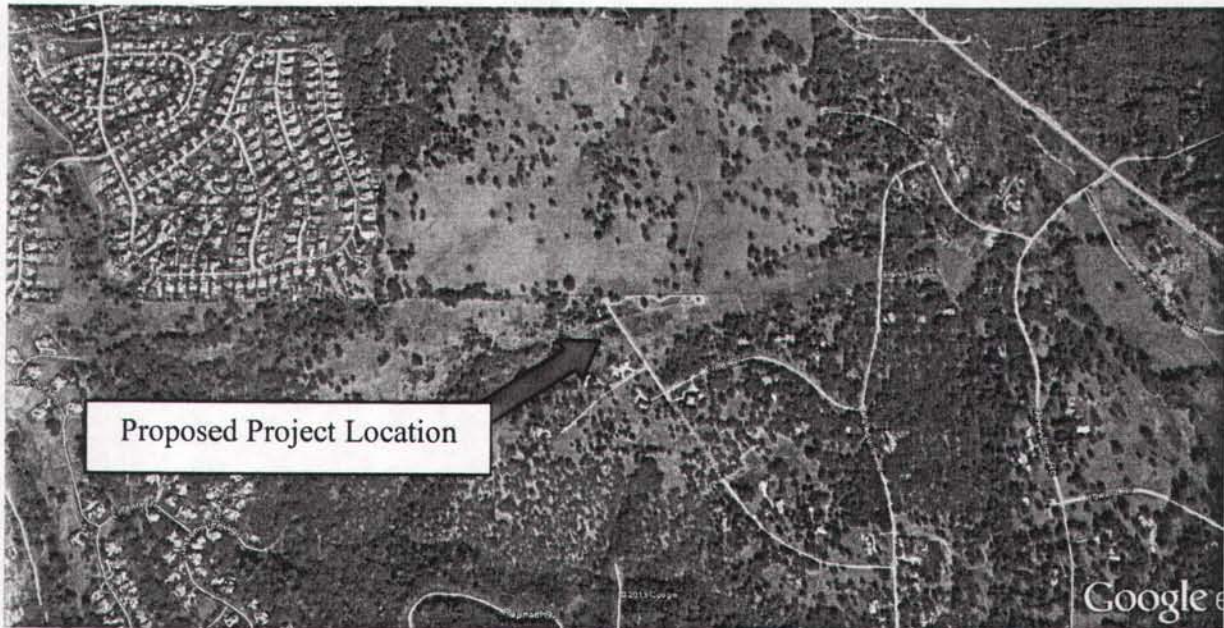
Verizon Wireless maintains a strong customer base in El Dorado County and strives to increase and improve coverage and capacity for both current and potential customers. Additionally, this network development will increase public safety within this area of the County and bring wireless service to areas that currently suffer from poor service.

This unmanned facility will provide service to area travelers, residents and businesses 24 hours a day, 7 days a week. This site will also serve as a backup to the existing landline service in the area and will provide improved mobile communications, which are essential to modern day commerce and recreation.

**PROJECT LOCATION****S 13-0012**



This project is located at 2367 East Green Springs Court, Rescue, CA 95672, at the western edge of a 5.64 acre parcel zoned Estate Residential (RE-5) in a rural area.



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## COMPLIANCE WITH COUNTY WIRELESS DEVELOPMENT STANDARDS

This project has been carefully designed to comply with all applicable standards set forth in the County's Zoning Code, Chapter 17.14 (Communication Facilities, Wireless) with regard to project location, development standards, visual impacts, radio frequency requirements, and submittal requirements. The following summarizes the list of Required Submittal Information for Wireless Communications Facilities:

*1) Manufacturers specifications or noise studies for any proposed generator and/or air conditioning units.*

See Noise Study (attached).

*2) Copy of Hazardous Material Questionnaire. Indicate power source for the facility.*

See Hazardous Materials Questionnaire. Power source for the proposed facility is shown on the attached Site Plan. Emergency power source is identified in text below.

*3) Provide EME/RF Report for proposed wireless facility demonstrating compliance with FCC standards for emissions and exposure levels.*

See Radio Frequency Emissions Study (attached). Verizon Wireless will comply with all FCC rules governing construction requirements, technical standards, interference protection, power



and height limitations and radio frequency standards. In addition, VZW will comply with all FAA rules on site location and operation.

*4) Provide information describing the fire suppression system proposed for the wireless facility shelter/enclosure.*

The proposed facility will be equipped with a fire alarm that is connected to a nation-wide alerting system. The equipment shelter will contain a fire extinguisher.

*5) Provide information that shows and lists the alternative site locations that have been reviewed pursuant to Zoning Ordinance Chapter 14.14.200 (B) (1).*

See Alternatives Sites section (below).

*6) Provide information identifying the school district and any HOA established by CC&R's.*

The proposed facility is located within the El Dorado Union High School District. The proposed facility located within the Green Spring Ranch HOA, or governed by any CC&R's

*7) Provide information describing the co-location capability of the proposed tower.*

The proposed facility has been designed to accommodate future co-location by other carriers, as preferred by the County. Towers designed for co-location must take into account the necessary centerline heights for future carriers to offer the desired coverage within their network. The approximate highest available centerline available at this facility will be roughly 56' and should allow for other carriers to provide adequate service. Space for other carriers ground equipment would need to be negotiated with the property owner.

*8) Provide seven (7) color copies of Visual Simulations.*

See attached Photosimulation.

*9) Indicate a fire district approved turn around at the project site.*

A fire district approved turn around is shown on the Site Plan (attached).

*10) Indicate the facility setbacks to property lines and or road easements. Describe and justify any setback waivers.*

All setbacks are shown on the Survey and Site Plan (attached). No setback waivers are requested.

*11) Indicate if the facility will be underground or above ground and if the utilities will be underground or above ground. Indicate the distance and cubic yards of material removed and replaced of utility trenching.*



See Site Plan and Preliminary Grading Plan (attached).

*12) Indicate any lighting to be used and if any timers or motion detector controlled lights will be utilized and type of light shielding.*

No lighting proposed.

*13) Provide information on paint and colors proposed to be used on the facility and support structure.*

See Site Plan and Elevations (attached). The antennas will be located on an existing grey steel transmission tower. The lease area fencing will be of wood and will use its natural color.

*14) Provide information on the type of camouflage techniques to be used on the facility and support structure. Show how you will address the elimination of all reflective surfaces.*

The antennas will be positioned as to not extend above the existing tower and will match in color, limiting their visibility. The Equipment shelter will be surrounded by 6' wooden fencing that follows the footprint of the tower, reducing visibility of the shelter and associated equipment.

*15) Identify and list all tree and plant species type and size that will be removed and replaced for the new facility, if applicable.*

See Site Plan and Tree Survey (attached).

*16) Provide a landscaping plan and temporary irrigation system for the facility of vegetation to be used to screen the facility.*

Proposed facility will be sufficiently screened by fencing and no other landscaping is proposed or necessary for screening of this facility.

*17) Provide a title report or deed identifying legal access.*

See Preliminary Title Report and Grant Deed (attached).

---

## ALTERNATIVE SITES

The candidate review process for this site began in September 2010. In identifying the least intrusive site location and design, VZW begins its process by identifying a search area (called a "search ring") and a required centerline height. The search ring represents the area within which a facility can be located to produce the desired coverage objective. The centerline height represents the required height of the antennas to produce the desired coverage objective. Once a search ring and centerline height have been established, VZW looks to local codes and



general plans to identify the values significant to the local community for the siting/locating of wireless facilities. Chapter 17.14.200 (B) (1) of the El Dorado County Zoning Code was used to guide the candidate review process for this facility.

In addition to the above mentioned location and height attributes, each proposed site must meet certain minimum requirements, such as the following:

- a willing landlord
- feasible construction
- road access
- available telephone and electrical utilities
- satisfaction of coverage objectives
- compliance with local zoning requirements

During the candidate review process, VZW first looked for collocation opportunities within the Search Ring. This particular Search Ring does not have any existing wireless communication towers that would provide any co-location opportunities. Next VZW looked for feasible facade mount and roof mount opportunities. Since, no feasible co-location, facade mount, or roof mount opportunities exist within this search ring, VZW determined that a new facility, with co-location potential, was the next best option.

The following is a list of the specific opportunities that were considered prior to identification of the subject property as the preferred location:

1. **2311 Ethel Drive, Rescue, Ca 95672**  
**APN: 126-231-08-10**  
Unable to reach amenable terms regarding lease agreement.
2. **2240 Deer Valley Road, Rescue, Ca 95672**  
**APN: 102-220-07-10**  
Unable to reach amenable terms regarding lease agreement.
3. **2425 Clarksville Road, Rescue, Ca 95672**  
**APN: 126-231-46-10**  
Unable to reach amenable terms regarding lease agreement.
4. **2400 Green Valley Road, Rescue, CA 95672**  
**APN: 115-410-05-10**  
Unable to reach amenable terms regarding lease agreement.

The identified project location and design of the proposed facility represents a thorough and responsible investigation of the alternative sites and co-location possibilities performed over the



last 2.5 years. Of the potentially viable candidates, VZW has determined that the proposed site is the best available location for a wireless telecommunications facility, from the perspective of producing the desired coverage objective, while having the least possible impact on both the surrounding area and overall County. This site/design represents the least intrusive means to provide the needed coverage.

---

### **SAFETY BENEFITS / EMERGENCY OPERATIONS**

Mobile phone use has become an extremely important system for public safety. Along roads and highways without public call boxes, mobile phones are often the only means for emergency roadside communication. Motorists with disabled vehicles (or worse) can use their phone to call in and request appropriate assistance. With good cellular coverage along important roadways, emergency response is just a phone call away. Furthermore, as a back up system to traditional landline phone service, mobile phones have proven to be extremely important during natural disasters and other catastrophes.

Verizon Wireless has taken the responsibility for back-up service very seriously. As such, VZW ensures that all of its wireless communications facilities include a minimum 8-hour back-up battery system that will operate in the event of an emergency and/or power outage. VZW also incurs the increased expense to install standby generators to recharge the back-up battery system in the event of a prolonged power outage. This will ensure constant and quality communication for the surrounding community, regardless of any disaster or catastrophe. The proposed generator will be fully contained within the equipment shelter. The generator will be operated for routine maintenance approximately 15 minutes per week. In the event of an extended power outage, the generator will turn on for approximately 30 minutes every 8 hours to recharge the batteries and maintain seamless wireless communication for the service area.

---

### **CONVENIENCE BENEFITS OF IMPROVED WIRELESS SERVICE**

Modern day life has become increasingly dependent on instant communications. Whether it is a parent calling their child, spouse calling a spouse, or general contractor ordering materials to the jobsite, wireless phone service is no longer just a convenience. It has become a way of life and a way of business.

---

### **FUTURE COLLOCATION OPPORTUNITIES:**

The proposed facility has been designed to accommodate future co-location by other carriers, as preferred by the County. Towers designed for co-location must take into account the necessary centerline heights for future carriers to offer the desired coverage within their network. The approximate highest available centerline available at this facility will be roughly 65' and should



adequately provide service for future carriers. Space for other carriers ground equipment would have to be negotiated with the property owner.

---

**LIGHTING:**

Unless tower lighting is required by the FAA the proposed facility will not include lighting of any kind.

---

**NOISE:**

The standby generator will be operated for approximately 15 minutes per week for maintenance purposes, and during power outages and disasters.

During construction of the facility, which typically lasts around two months, acceptable noise levels will not be exceeded.

---

**HAZARDOUS MATERIALS:**

A Hazardous Material Business Plan will also be submitted upon project completion, and stored on site after construction

---

**MAINTENANCE AND STANDY GENERATOR TESTING**

Verizon Wireless installs a standby generator and batteries at all of its cell sites. The generator and batteries serve a vital role in Verizon Wireless' emergency and disaster preparedness plan. In the event of a power outage, Verizon Wireless' communications equipment will first transition over to the back-up batteries. The batteries can run the site for a roughly 8 hours, depending upon the demand placed upon the equipment. Should the power outage extend beyond the capacity of the batteries, the back-up generator will automatically start and continue to run the site, while recharging the batteries. This two state back-up plan is an extremely important component of every Verizon Wireless communications site. As one of the nation's largest wireless companies, Verizon Wireless is the mobile phone service of choice to many Federal, State, and Local public safety agencies. While many public safety agencies employ their own two-way radio systems for intra-agency communications, Verizon Wireless phones are often the link to other agencies and the outside world. Back-up batteries and generators allow Verizon Wireless' communications sites to continue providing valuable communications services in the event of a power outage, natural disaster or other emergency.

A standby generator will be installed at the site to ensure quality and consistent coverage in the event of a power outage or disaster. This generator will be run for approximately 15 minutes per week for maintenance purposes, and during power outages and disasters.



A technician will visit the site approximately twice a month to check the facility and perform any necessary maintenance.

---

### **COMPLIANCE WITH FCC STANDARDS**

Verizon Wireless will comply with all FCC rules governing construction requirements, technical standards, interference protection, power and height limitations and radio frequency standards. In addition, VZW will comply with all FAA rules on site location and operation.

This project will not interfere with any TV, radio, telephone, satellite, or any other signals. Any interference would be against the Federal Law and would be a violation Verizon Wireless' FCC License.

---

### **CONSTRUCTION SCHEDULE**

The construction of the facility will be in compliance with all local rules and regulations. The typical duration is two months. The crew size will range from two to ten individuals.

---

### **OPERATIONS**

Once the construction of the proposed wireless facility is complete and the telephone switching equipment is running, visitation to the site by a service technician for routine maintenance typically occurs on an average of once per month. The proposed site will be entirely self-monitored and connected directly to a central office where sophisticated computers alert personnel to any equipment malfunction. Because the wireless facility will be unmanned, there will be no regular hours of operation and no impacts to existing local traffic patterns. No water or sanitation services will be required.

---

### **NOTICE OF ACTIONS AFFECTING THIS DEVELOPMENT PERMIT**

In accordance with California Government Code Section 65945(a), Verizon Wireless requests notice of any proposal to adopt or amend the: general plan, specific plan, zoning ordinance, ordinance(s) affecting building or grading permits that would in any manner affect this development permit. Any such notice may be sent to 2009 V Street, Sacramento, CA 95818.

---



**Verizon Wireless • Proposed Base Station (Site No. 252121 "Green Springs Ranch")  
2367 East Green Springs Court • Rescue, California**

**Statement of Hammett & Edison, Inc., Consulting Engineers**

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of Verizon Wireless, a personal wireless telecommunications carrier, to evaluate the base station (Site No. 252121 "Green Springs Ranch") proposed to be located at 2367 East Green Springs Court in Rescue, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields.

**Executive Summary**

Verizon proposes to install directional panel antennas on the tall PG&E lattice tower sited near the residence located at 2367 East Green Springs Court in Rescue. The proposed operation will comply with the FCC guidelines limiting public exposure to RF energy.

**Prevailing Exposure Standards**

The U.S. Congress requires that the Federal Communications Commission ("FCC") evaluate its actions for possible significant impact on the environment. A summary of the FCC's exposure limits is shown in Figure 1. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. The most restrictive FCC limit for exposures of unlimited duration to radio frequency energy for several personal wireless services are as follows:

Wireless Service	Frequency Band	Occupational Limit	Public Limit
MicroWave (Point-to-Point)	5,000–80,000 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
BRS (Broadband Radio)	2,600	5.00	1.00
AWS (Advanced Wireless)	2,100	5.00	1.00
PCS (Personal Communication)	1,950	5.00	1.00
Cellular	870	2.90	0.58
SMR (Specialized Mobile Radio)	855	2.85	0.57
700 MHz	700	2.40	0.48
[most restrictive frequency range]	30–300	1.00	0.20

Power line frequencies (60 Hz) are well below the applicable range of these standards, and there is considered to be no compounding effect from simultaneous exposure to power line and radio frequency fields.

**General Facility Requirements**

Base stations typically consist of two distinct parts: the electronic transceivers (also called "radios" or "channels") that are connected to the traditional wired telephone lines, and the passive antennas that send the wireless signals created by the radios out to be received by individual subscriber units. The



**Verizon Wireless • Proposed Base Station (Site No. 252121 "Green Springs Ranch")  
2367 East Green Springs Court • Rescue, California**

transceivers are often located at ground level and are connected to the antennas by coaxial cables. A small antenna for reception of GPS signals is also required, mounted with a clear view of the sky. Because of the short wavelength of the frequencies assigned by the FCC for wireless services, the antennas require line-of-sight paths for their signals to propagate well and so are installed at some height above ground. The antennas are designed to concentrate their energy toward the horizon, with very little energy wasted toward the sky or the ground. This means that it is generally not possible for exposure conditions to approach the maximum permissible exposure limits without being physically very near the antennas.

**Computer Modeling Method**

The FCC provides direction for determining compliance in its Office of Engineering and Technology Bulletin No. 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation," dated August 1997. Figure 2 attached describes the calculation methodologies, reflecting the facts that a directional antenna's radiation pattern is not fully formed at locations very close by (the "near-field" effect) and that at greater distances the power level from an energy source decreases with the square of the distance from it (the "inverse square law"). The conservative nature of this method for evaluating exposure conditions has been verified by numerous field tests.

**Site and Facility Description**

Based upon information provided by Verizon, including zoning drawings by MST Architects, Inc., dated April 3, 2013, it is proposed to install six directional panel antennas – assumed for the purposes of this study to be three Amphenol Model BXA-70063-8CF and three Andrew Model HBX-6516DS-VTM – on a 12-foot extension on top of the existing 116-foot PG&E lattice tower sited to the north of the residence located at 2367 East Green Springs Court in Rescue. The antennas would be mounted with up to 8° downtilt\* at an effective height of about 124 feet above ground and would be oriented in pairs (one of each type) at about 120° spacing, to provide service in all directions. The maximum effective radiated power in any direction is assumed for the purposes of this study to be 5,720 watts, representing simultaneous operation at 1,200 watts for AWS, 1,120 watts for PCS, 2,600 watts for cellular, and 800 watts for 700 MHz service. There are reported no other wireless telecommunications base stations at the site or nearby.

**Study Results**

For a person anywhere at ground, the maximum RF exposure level due to the proposed Verizon operation is calculated to be 0.0036 mW/cm<sup>2</sup>, which is 0.55% of the applicable public exposure limit.

\* Assumed for the purposes of this study.

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**Verizon Wireless • Proposed Base Station (Site No. 252121 "Green Springs Ranch")  
2367 East Green Springs Court • Rescue, California**

The maximum calculated level at the second-floor elevation of any nearby residence would be 0.65% of the public exposure limit. It should be noted that these results include several "worst-case" assumptions and therefore are expected to overstate actual power density levels from the proposed operation.

**No Recommended Mitigation Measures**

Due to their mounting locations, the Verizon antennas would not be accessible to the general public, and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. It is presumed that PG&E already takes adequate precautions to ensure that there is no unauthorized access to its tower. To prevent exposures in excess of the occupational limit by authorized PG&E workers, it is expected that they will adhere to appropriate safety protocols adopted by that company.

**Conclusion**

Based on the information and analysis above, it is the undersigned's professional opinion that operation of the base station proposed by Verizon Wireless at 2367 East Green Springs Court in Rescue, California, will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not for this reason cause a significant impact on the environment. The highest calculated level in publicly accessible areas is much less than the prevailing standards allow for exposures of unlimited duration. This finding is consistent with measurements of actual exposure conditions taken at other operating base stations.

**Authorship**

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2013. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

April 19, 2013



*William F. Hammett*  
William F. Hammett, P.E.  
707/996-5200

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## FCC Radio Frequency Protection Guide

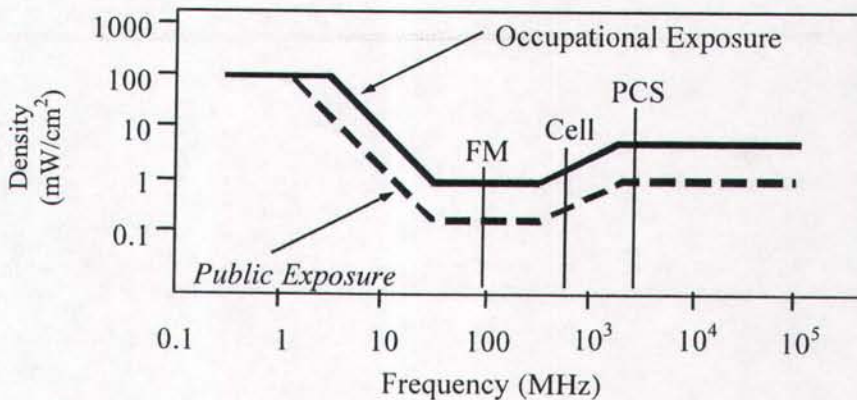
The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers and approved as American National Standard ANSI/IEEE C95.1-2006, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," includes similar limits. These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in *italics* and/or dashed) up to five times more restrictive:

Frequency Applicable Range (MHz)	Electromagnetic Fields ( <i>f</i> is frequency of emission in MHz)					
	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm <sup>2</sup> )	
0.3 – 1.34	614	<i>614</i>	1.63	<i>1.63</i>	100	<i>100</i>
1.34 – 3.0	614	<i>823.8/f</i>	1.63	<i>2.19/f</i>	100	<i>180/f<sup>2</sup></i>
3.0 – 30	1842/f	<i>823.8/f</i>	4.89/f	<i>2.19/f</i>	900/f <sup>2</sup>	<i>180/f<sup>2</sup></i>
30 – 300	61.4	<i>27.5</i>	0.163	<i>0.0729</i>	1.0	<i>0.2</i>
300 – 1,500	3.54√ <i>f</i>	<i>1.59√f</i>	√ <i>f</i> /106	<i>√f/238</i>	<i>f/300</i>	<i>f/1500</i>
1,500 – 100,000	137	<i>61.4</i>	0.364	<i>0.163</i>	5.0	<i>1.0</i>

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Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits. However, neither of these allowances is incorporated in the conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels. Hammett & Edison has built those formulas into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radio sources. The program allows for the description of buildings and uneven terrain, if required to obtain more accurate projections.



**HAMMETT & EDISON, INC.**  
CONSULTING ENGINEERS  
SAN FRANCISCO

FCC Guidelines  
Figure 1



## RFR.CALC™ Calculation Methodology

### Assessment by Calculation of Compliance with FCC Exposure Guidelines

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The maximum permissible exposure limits adopted by the FCC (see Figure 1) apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits.

#### Near Field.

Prediction methods have been developed for the near field zone of panel (directional) and whip (omnidirectional) antennas, typical at wireless telecommunications base stations, as well as dish (aperture) antennas, typically used for microwave links. The antenna patterns are not fully formed in the near field at these antennas, and the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) gives suitable formulas for calculating power density within such zones.

For a panel or whip antenna, power density  $S = \frac{180}{\theta_{BW}} \times \frac{0.1 \times P_{net}}{\pi \times D \times h}$ , in mW/cm<sup>2</sup>,

and for an aperture antenna, maximum power density  $S_{max} = \frac{0.1 \times 16 \times \eta \times P_{net}}{\pi \times h^2}$ , in mW/cm<sup>2</sup>,

where  $\theta_{BW}$  = half-power beamwidth of the antenna, in degrees, and

$P_{net}$  = net power input to the antenna, in watts,

$D$  = distance from antenna, in meters,

$h$  = aperture height of the antenna, in meters, and

$\eta$  = aperture efficiency (unitless, typically 0.5-0.8).

The factor of 0.1 in the numerators converts to the desired units of power density.

#### Far Field.

OET-65 gives this formula for calculating power density in the far field of an individual RF source:

$$\text{power density } S = \frac{2.56 \times 1.64 \times 100 \times RFF^2 \times ERP}{4 \times \pi \times D^2}, \text{ in mW/cm}^2,$$

where ERP = total ERP (all polarizations), in kilowatts,

RFF = relative field factor at the direction to the actual point of calculation, and

$D$  = distance from the center of radiation to the point of calculation, in meters.

The factor of 2.56 accounts for the increase in power density due to ground reflection, assuming a reflection coefficient of 1.6 (1.6 x 1.6 = 2.56). The factor of 1.64 is the gain of a half-wave dipole relative to an isotropic radiator. The factor of 100 in the numerator converts to the desired units of power density. This formula has been built into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radiation sources. The program also allows for the description of uneven terrain in the vicinity, to obtain more accurate projections.

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Environmental Noise Analysis

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## Green Springs Ranch Cell Tower Site

El Dorado County, California

BAC Job # 2013-031

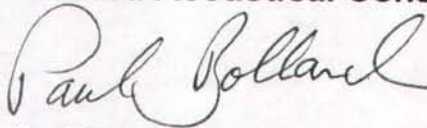
Prepared For:

Complete Wireless Consulting

Attn: Mr. David Downs  
2009 V Street  
Sacramento, CA. 95818

Prepared By:

**Bollard Acoustical Consultants, Inc.**



Paul Bollard, President

April 23, 2013



# S 13-0012



## Introduction

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The Green Springs Ranch Verizon Wireless Unmanned Telecommunications Facility Project (project) proposes the construction of a cellular tower and cellular equipment cabinets inside a 25' fenced area near a private residence located at 2367 East Green Springs Court, Rescue (El Dorado County), California (APN # 126-231-03-100). The equipment cabinets and emergency diesel standby generator have been identified as primary noise sources associated with the project. Please see Figure 1 for the general site location. The studied site design is dated March 26, 2013.

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Bollard Acoustical Consultants, Inc. has been contracted by Complete Wireless Consulting, Inc. to complete an environmental noise assessment regarding the proposed project cellular equipment operations. Specifically, the following addresses daily noise production and exposure associated with operation of the project emergency generator and external HVAC equipment.

Please refer to Appendix A for definitions of acoustical terminology used in this report.

## Criteria for Acceptable Noise Exposure

### El Dorado County General Plan Noise Element

The El Dorado County Noise Element of the General Plan contains policies identifying acceptable levels of noise within the County. Specifically, Policy 6.5.1.7 states that noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table 1 (Table 6.2 of the Noise Element) for noise-sensitive uses.

**Table 1**  
**Noise Level Performance Standards for Noise Sensitive Land Uses (Rural Areas)**  
**Affected by Non-Transportation Sources**  
**El Dorado County Noise Element**

Noise Level Descriptor	Daytime 7 a.m. – 7 p.m.	Evening 7 p.m. – 10 p.m.	Night 10 p.m. – 7 a.m.
Hourly $L_{eq}$ , dB	50	45	40
Maximum Level, dB	60	55	50

**Notes:**

Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive tones.

In Rural Areas the exterior noise level standard shall be applied at a point 100' away from the residence.



## Existing Ambient Noise Environment

To quantify existing background noise levels at the project site, Bollard Acoustical Consultants, Inc. conducted long-term (24-hour) ambient noise level measurements in the project vicinity. Please see Figure 2 for the approximate measurement location. The ambient noise level measurements were completed on April 10-11, 2013.

Noise level measurement equipment included Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meter equipped with an LDL Model 2560 ½" microphone. The system was calibrated in the field before use with a LDL Model CAL200 acoustical calibrator. The measurement microphone was placed on a tripod approximately 5 feet above the ground.

Table 2 shows a summary of the ambient noise measurement results.

**Table 2**  
**Summary of Continuous Hourly Ambient Noise Monitoring at Project Site**  
**Green Springs Ranch Cell Tower – April 10-11, 2013**

Date	Average Measured Hourly Noise Levels (dB)						
	Daytime (7 a.m. to 10 p.m.)			Nighttime (10 p.m. to 7 a.m.)			
	L <sub>eq</sub>	L <sub>50</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>50</sub>	L <sub>max</sub>	L <sub>dn</sub>
April 10	46	39	57-81	44	34	34-68	51
April 11	45	38	47-69	42	33	38-64	49

Source: Bollard Acoustical Consultants, Inc.

Based on ambient noise level measurements data seen in Table 2, existing daytime ambient noise exposure in the project vicinity, 45-46 dB L<sub>eq</sub>, is below the County's daytime exterior noise exposure criteria of 50 dB L<sub>eq</sub> (Table 1). The project equipment is not expected to produce noise exposure with significant pure-tone or repetitive character. Therefore, the standards presented in Table 1 are not adjusted (decreased) in the analysis presented below.

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**Figure 1**  
Green Springs Ranch Cell Site - Rescue (El Dorado County), California  
Project Area and Nearest Noise-Sensitive Receivers



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Scale (feet)  
0 75 150

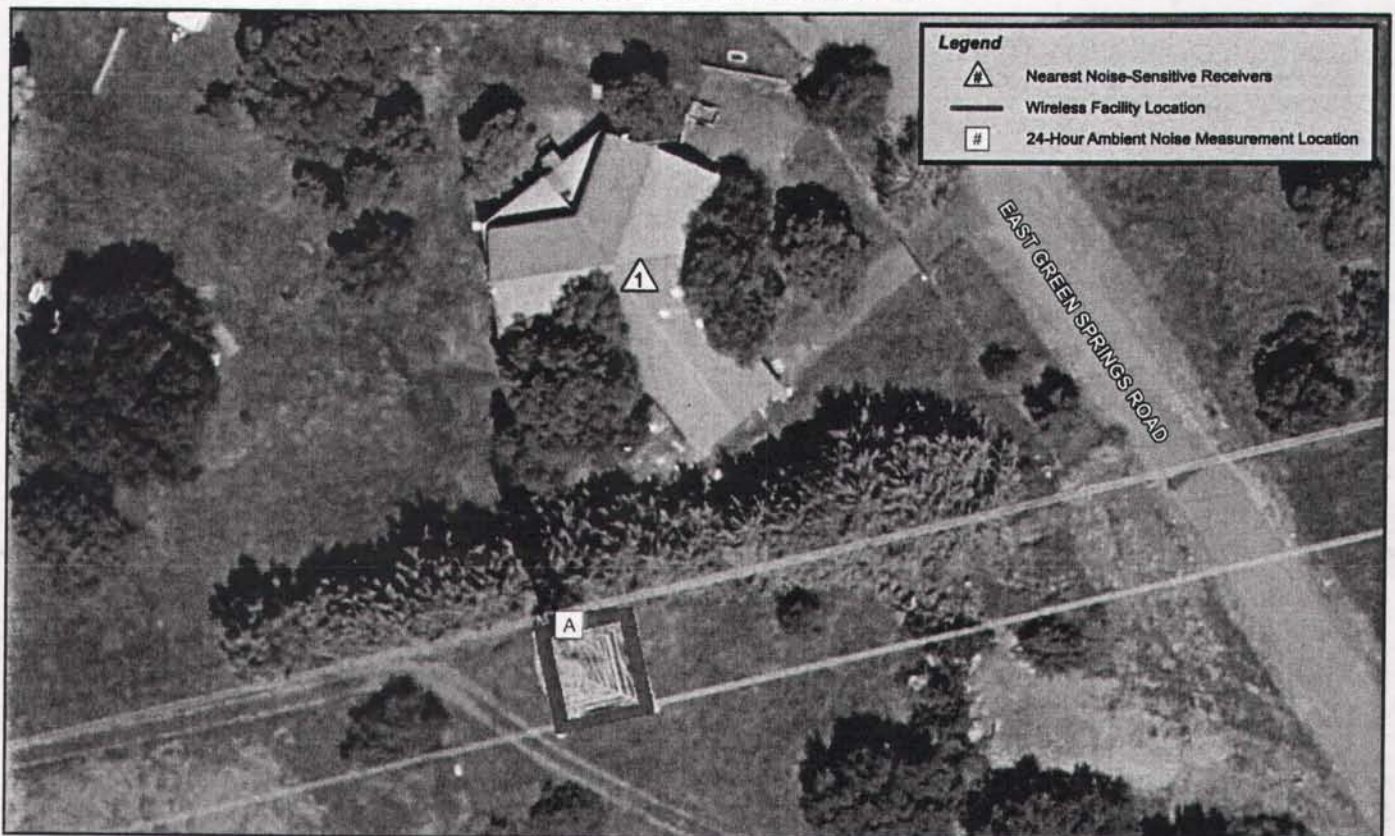




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**Figure 2**  
Green Springs Ranch Cell Site - Rescue (El Dorado County), California  
Ambient Noise Measurement Location



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Scale (feet)  
0 25 50

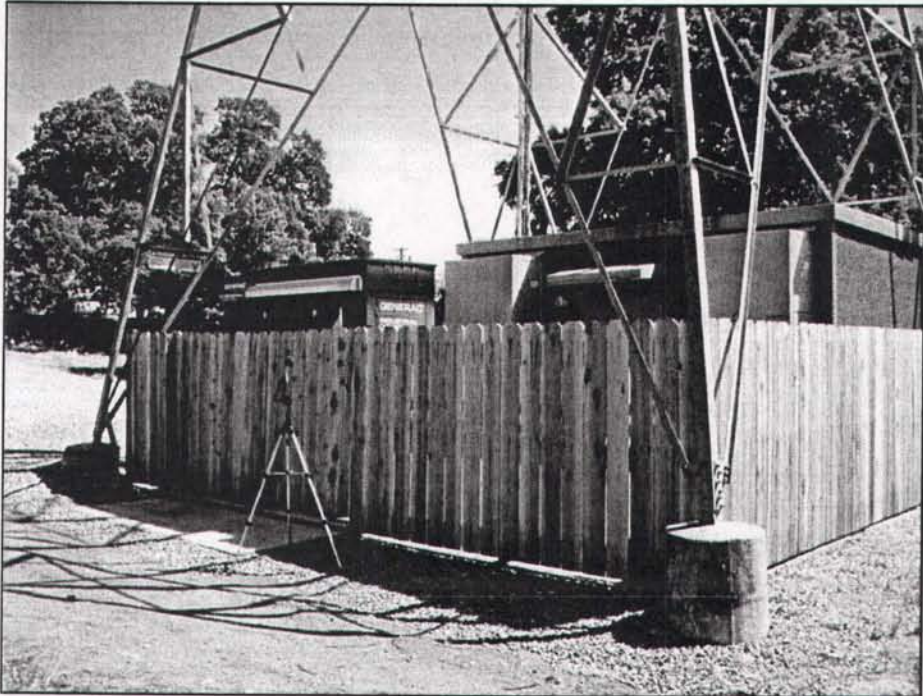




## Reference Noise Level Measurements

Reference noise level measurements were completed at a cell tower site similar to the proposed project. Measurements were completed at the Folsom Prison Wireless Communications Facility located approximately 600 feet east of the East Natoma Street and Fargo Way intersection in Folsom, California on April 9, 2013 from 2-3 p.m. A photograph of the facility is provided as Figure 3. As shown in Figure 3, the facility is located at the base of an existing PG&E lattice tower. The noise level measurements were completed at a distance of 15 feet from the air conditioner units.

**Figure 3 – Folsom Prison Cellular Facility**



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## Project Noise Generation

As noted above in the “Reference Noise Level Measurement” section, exposure from the proposed project HVAC units is expected to be approximately 55 dB ( $L_{eq}$ ) at a distance of 15 feet from the air conditioning equipment. The generator which is proposed at this site would only operate during emergencies only (power outages) and brief (15-minute) daytime periods for periodic maintenance/lubrication approximately once per week. The reference noise level for the generator is 73 dB at 20 feet (Generac Power Systems, Inc. SD048 2.4L John Deere with Sound Attenuated Enclosure).



Assuming standard spherical spreading loss (-6 dB per doubling of distance), directionality of the sound produced by the air conditioning equipment (the units would face south and be shielded from view of the residence to the north by the equipment building), project-equipment noise exposure at the closest residential receiver to the immediate north is predicted to be below 40 dB  $L_{eq}$  for the air conditioning equipment. This level would satisfy the 40 dB  $L_{eq}$  nighttime noise standard of El Dorado County, so no additional noise mitigation measures would be warranted for this aspect of the project.

The project emergency generator would be tested during daytime hours only, and even then only for brief periods of time. The emergency generator would only operate at night during emergency power outage conditions. It is expected that nighttime operation of the project emergency generator would be exempt from the County's exterior noise exposure criteria due to the need for continuous cellular service provided by the project equipment. Due to the brief period of daytime operation required for routine maintenance, the County's daytime exterior noise standard of 60 dB  $L_{max}$  is applied to the assessment of generator noise impacts.

Using the reference noise level data above, the noise level associated with intermittent generator maintenance is predicted to be approximately 63 dB  $L_{max}$  at the nearest residence to the north during the brief daytime generator maintenance operations. Although this level would exceed the El Dorado County 60 dB  $L_{max}$  daytime noise standard for the brief period the generator is in operation during weekly maintenance, this level is below existing maximum noise levels measured at the project site (69-81 dB  $L_{max}$ , See Table 2). Nonetheless, to further reduce noise generated during weekly testing of the generator, the proposed wood slat fence surrounding the site could be improved by providing overlapping wood slats to remove any acoustic gaps between boards. The fence boards should overlap at least 1 inch and be screwed to the frame (rather than nailed or stapled) to prevent development of gaps between boards. In addition, the fence should be maintained at annual intervals to ensure that acoustic gaps do not form between fence planks after exposure to the elements. Following construction of this upgraded fence, maximum noise levels produced by weekly generator testing are expected to be satisfactory relative to El Dorado County daytime noise level standards at the nearest residence to the north.

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## Conclusions

Based on the equipment noise level data and analyses presented above, project-related equipment noise exposure is expected to satisfy the applicable El Dorado County noise exposure limits at the closest residential receivers, including the residence located immediately north of the project site, provided generator testing is limited to daytime hours and the proposed wood fencing includes the following upgraded construction:

1. A double row of wood fence boards should be used, with a minimum overlap of 1 inch at each board.
2. Fence boards should be screwed to the fence framing rather than nailed or stapled.
3. The fence should be maintained at annual intervals to prevent the formation of acoustic gaps between boards which occur with prolonged exposure to the elements.

This concludes our environmental noise assessment for the proposed Green Springs Ranch Cell Tower in Rescue (El Dorado County), California. Please contact me at (916) 663-0500 or [paulb@bacnoise.com](mailto:paulb@bacnoise.com) if you have any questions or require additional information.

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## Appendix A Acoustical Terminology

<b>Acoustics</b>	The science of sound.
<b>Ambient Noise</b>	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
<b>Attenuation</b>	The reduction of an acoustic signal.
<b>A-Weighting</b>	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
<b>Decibel or dB</b>	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
<b>CNEL</b>	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
<b>L<sub>dn</sub></b>	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
<b>L<sub>eq</sub></b>	Equivalent or energy-averaged sound level.
<b>L<sub>max</sub></b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>Masking</b>	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
<b>Noise</b>	Unwanted sound.
<b>Peak Noise</b>	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
<b>RT<sub>60</sub></b>	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
<b>Sabin</b>	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
<b>SEL</b>	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
<b>Threshold of Hearing</b>	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
<b>Threshold of Pain</b>	Approximately 120 dB above the threshold of hearing.



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