



DEPARTMENT OF PLANNING AND BUILDING

Promoting the wise use of land – Helping to build great communities

THIS IS A NEW PROJECT REFERRAL

DATE: 11/6/2015

TO: _____

FROM: MEGAN MARTIN, 805-781-4163, mamartin@co.slo.ca.us
SOUTH COUNTY Team / Development Review

PROJECT DESCRIPTION: DRC2015-00051 VERIZON WIRELESS – MUP PROPOSED INSTALLATION OF 2 NEW ANTENNAS, 1 NEW CROSS ARM ANTENNA MOUNT, 1 NEW EQUIPMENT CABINET, 2 NEW RRUS 1 NEW DIPLEXER, 1 NEW PG&E/VERIZON WIRELESS METER AND 1 NEW PG&E SHUT-DOWN SWITCH LOCATED WITHIN PUBLIC RIGHT-OF WAY OF FRONTAGE ROAD NE OF APN 091-328-024 APN: (N/A – IN RIGHT OF WAY)

Return this letter with your comments attached no later than 14 days from receipt of this referral. CACs please respond within 60 days. Thank you.

PART 1 - IS THE ATTACHED INFORMATION ADEQUATE TO COMPLETE YOUR REVIEW?

- YES (Please go on to PART II.)
- NO (Call me ASAP to discuss what else you need. We have only 10 days in which we must obtain comments from outside agencies.)

PART II - ARE THERE SIGNIFICANT CONCERNS, PROBLEMS OR IMPACTS IN YOUR AREA OF REVIEW?

- YES (Please describe impacts, along with recommended mitigation measures to reduce the impacts to less-than-significant levels, and attach to this letter.)
- NO (Please go on to PART III.)

PART III - INDICATE YOUR RECOMMENDATION FOR FINAL ACTION.

Please attach any conditions of approval you recommend to be incorporated into the project's approval, or state reasons for recommending denial.

IF YOU HAVE "NO COMMENT," PLEASE SO INDICATE, OR CALL.

Date

Name

Phone

1. General APPLICATION for

San Luis Obispo County Department of Planning and Build

MINOR USE PERMIT

(2) NEW ANTENNAS (1) NEW CROSS ARM ANTENNA MOUNT (1) NEW EQUIPMENT SCSC/ NIPO

CS

APPLICATION TYPE CHECK ALL THAT APPLY

- Emergency Permit
- Zoning Clearance
- Conditional Use Permit/Development Plan
- Surface Mining/Reclamation Plan
- Other
- Tree Permit
- Site Plan
- Curb, Gutter & Sidewalk Waiver
- Modification to approved land use permit
- Plot Plan
- Minor Use Permit
- Variance

APPLICANT INFORMATION Check box for contact person assigned to this project

Landowner Name NCJPA Daytime Phone (925) 681-0378
 Mailing Address 1800 Sutter St., Ste 830 Concord, CA Zip 94520
 Email Address: _____

Applicant Name Verizon Wireless Daytime Phone (925) 279-6000
 Mailing Address 2785 Mitchell Drive, Bldg 9 Walnut Creek, CA Zip 94598
 Email Address: _____

Agent Name Tricia Knight Daytime Phone (805) 448-4221
 Mailing Address 123 Seacliff Dr. Pismo Beach Zip 93449
 Email Address: triciaknight@charter.net

PROPERTY INFORMATION

Total Size of Site: right-of-way Assessor Parcel Number(s): northeast of 091-328-024
 Legal Description: Public Right-of-Way
 Address of the project (if known): Within Right-of-Way of Frontage Rd northeast of APN:091-328-024
 Directions to the site - describe first with name of road providing primary access to the site, then nearest roads, landmarks, etc.: Hwy 101 South- Exit R Tefft- R Mary Av.- R Juniper St.- L N. Frontage Rd.- Destination will be on the left

Describe current uses, existing structures, and other improvements and vegetation on the property:
Public Right-Of-Way

PROPOSED PROJECT

Describe the proposed project (inc. sq. ft. of all buildings): (2) New Antennas (1) New Cross Arm Antenna Mount (1) New Equipment Cabinet (2) New RRUS (1) New Diplexer (1) New PG&E/Verizon Wireless Meter (1) New PG&E Shut-down Switch

LEGAL DECLARATION

I, the owner of record of this property have completed this form accurately and declare that all statement here are true. I do hereby grant official representatives of the county authorization to inspect the subject property.

Property owner signature Joint pole Association Date 10.27.15
See Attached

FOR STAFF USE ONLY

Reason for Land Use Permit: _____

2. LAND USE PERMIT APPLICATION

San Luis Obispo County Department of Planning and Building File No _____

Type of project: Commercial Industrial Residential
 Recreational Other

Describe any modifications/adjustments from ordinance needed and the reason for the request (if applicable): none

Describe existing and future access to the proposed project site: n/a

Surrounding parcel ownership: Do you own adjacent property? Yes No
If yes, what is the acreage of all property you own that surrounds the project site?: _____

Surrounding land use: What are the uses of the land surrounding your property (when applicable, please specify all agricultural uses):

North: Public Use South: Public Use
East: Public Use West: Commercial

For all projects answer the following:

Square footage and percentage of the total site (approximately) that will be used for the following:

Buildings: n/a sq. feet n/a % Landscaping: n/a sq. feet n/a %
Paving: n/a sq. feet n/a % Other (specify) : _____

Total area of all paving and structures: n/a sq. feet acres

Total area of grading or removal of ground cover: n/a sq. feet acres

Number of parking spaces proposed: n/a Height of tallest structure: _____

Number of trees to be removed: 0 Type: _____

Setbacks: Front _____ Right _____ Left _____ Back _____

N/A Proposed water source: On-site well Shared well Other _____
 Community System - List the agency or company responsible for provision: _____
Do you have a valid will-serve letter? Yes If yes, please submit copy No

N/A Proposed sewage disposal: Individual on-site system Other _____
 Community System -List the agency or company responsible for sewage disposal: _____
Do you have a valid will-serve letter? Yes If yes, please submit copy No

N/A Fire Agency: - List the agency responsible for fire protection: _____

For commercial/industrial projects answer the following:

Total outdoor use area: _____ sq. feet acres

Total floor area of all structures including upper stories: _____ sq. feet

For residential projects, answer the following:

N/A Number of residential units: _____ Number of bedrooms per unit: _____

Total floor area of all structures including upper stories, but not garages and carports: _____

Total of area of the lot(s) minus building footprint and parking spaces: _____

3. ENVIRONMENTAL DESCRIPTION FORM

San Luis Obispo County Department of Planning and Building File No _____

The California Environmental Quality Act (CEQA) requires all state and local agencies to consider and mitigate environmental impacts for their own actions and when permitting private projects. The Act also requires that an environmental impact report (EIR) be prepared for all actions that may significantly affect the quality of the environment. The information you provide on this form will help the Department of Planning and Building determine whether or not your project will significantly affect the quality of the environment.

To ensure that your environmental review is completed as quickly as possible, please remember to:

Answer **ALL** of the questions as accurately and completely as possible.

Include any additional information or explanations where you believe it would be helpful or where required. Include additional pages if needed.

If you are requesting a land division or a re-zoning, be sure to include complete information about future development that may result from the proposed land division or rezoning.

Include references to any reports or studies you are aware of that might be relevant to the questions asked or the answers you provide.

Should a determination be made that the information is inaccurate or insufficient, you will be required to submit additional information upon request.

Physical Site Characteristic Information

Your site plan will also need to show the information requested here

1. Describe the topography of the site:
Level to gently rolling, 0-10% slopes: n/a acres
Moderate slopes of 10-30%: n/a acres
Steep slopes over 30%: n/a acres
2. Are there any springs, streams, lakes or marshes on or near the site? Yes No
If yes, please describe: _____
3. Are there any flooding problems on the site or in the surrounding area Yes No
If yes, please describe: _____
4. Has a drainage plan been prepared? Yes No
If yes, please include with application.
5. Has there been any grading or earthwork on the project site? Yes No
If yes, please explain: _____
6. Has a grading plan been prepared? Yes No
If yes, please include with application.
7. Are there any sewer ponds/waste disposal sites on/adjacent to the project? Yes No
8. Is a railroad or highway within 300 feet of your project site? Yes No
9. Can the proposed project be seen from surrounding public roads? Yes No
If yes, please list: _____

N/A

Solid Waste Information

- 1. What type of solid waste will be generated by the project? Domestic Industrial
 Agricultural Other, please explain? _____
- 2. Name of Solid Waste Disposal Company: _____
- 3. Where is the waste disposal storage in relation to buildings? _____
- 4. Does your project design include an area for collecting recyclable materials and/or composting materials? Yes No

N/A

Community Service Information

- 1. Name of School District: _____
- 2. Location of nearest police station: _____
- 3. Location of nearest fire station: _____
- 4. Location of nearest public transit stop: _____
- 5. Are services (grocery / other shopping) within walking distance of the project? Yes No
If yes, what is the distance? _____ feet / miles

Historic and Archeological Information

- 1. Please describe the historic use of the property: _____

- 2. Are you aware of the presence of any historic, cultural or archaeological materials on the project site or in the vicinity? Yes No
If yes, please describe: _____
- 3. Has an archaeological surface survey been done for the project site? Yes No
If yes, please include **two** copies of the report with the application.

Commercial/Industrial Project Information

Only complete this section if you are proposing a commercial or industrial project or zoning change.

- 1. Days of Operation: 7 Hours of Operation: 24
- 2. How many people will this project employ? one / once a month
- 3. Will employees work in shifts? Yes No
If yes, please identify the shift times and number of employees for each shift _____
- 4. Will this project produce any emissions (i.e. gasses, smoke, dust, odors, fumes, vapors,)?
 Yes No
If yes, please explain: _____
- 5. Will this project increase the noise level in the immediate vicinity? Yes No
If yes, please explain: _____
(If loud equipment is proposed, please submit manufacturers estimate on noise output)
- 6. What type of industrial waste materials will result from the project? Explain in detail:

7. Will hazardous products be used or stored on-site? Yes No
If yes, please describe in detail: _____
8. Has a traffic study been prepared? Yes No If yes, please attach a copy
9. Please estimate the number of employees, customer and other project-related traffic trips to or from the project.
Between 7:00 - 9:00 a.m. _____ Between 4:00 to 6:00 p.m. _____
10. Are you proposing any special measures (carpooling, public transit, telecommuting) to reduce automobile trips by employees?
 Yes No If yes, please specify what you are proposing _____
11. Are you aware of any potentially problematic roadway conditions that may exist or result from the proposed project, such as poor sight distance at access points, connecting with the public road? Yes No
If yes, please describe _____

Agricultural Information

Only complete this section: 1) within the Agricultural land use category or 2) your site is currently in agricultural production.

1. Is the site currently in Agricultural Preserve (Williamson Act)? Yes No
2. If yes, is the site currently under land conservation contract? Yes No
3. If your land is currently vacant or in agricultural production, are there any restrictions on the crop productivity of the land? That is, are there any reasons (i.e. poor soil, steep slopes) the land cannot support a profitable agricultural crop? Please explain in detail: _____

Special Project Information

1. Describe any amenities included in the project, such as park areas, open spaces, common recreation facilities, etc.(these also need to be shown on your site plan): none
2. Will the development occur in phases? Yes No
If yes describe: _____
3. Do you have any plans for future additions, expansion or further activity related to or connected with this proposal? Yes No
If yes, explain: _____
4. Are there any proposed or existing deed restrictions? Yes No
If yes, please describe: _____

Energy Conservation Information

1. Describe any special energy conservation measures or building materials that will be incorporated into your project*: none

* The county's Building Energy Efficient Structures (BEES) program can reduce your construction permit fees. Your building must exceed the California State Energy Standards (Title 24) in order to qualify for this program. If you are interested in more information, please contact the Building Services Division of the Department of Planning and Building at (805) 781-5600.

Environmental Information

1. List any mitigation measures that you propose to lessen the impacts associated with your project: none proposed

2. Are you aware of any unique, rare or endangered species (vegetation or wildlife) associated with the project site? Yes No
If yes, please list: _____
3. Are you aware of any previous environmental determinations for all or portions of this property? Yes No
If yes, please describe and provide "ED" number(s): _____

Other Related Permits

1. List all permits, licenses or government approvals that will be required for your project (federal, state and local): building permit

(If you are unsure if additional permits are required from other agencies, please ask a member of department staff currently assigned in either current planning or the environmental division)

6. SUMMARY SHEET - RF EXPOSURE

San Luis Obispo County Department of Planning and Building File No _____

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SUMMARY SHEET FOR RF EXPOSURE

This sheet should accompany the report required by Sections 22.30.180 and 23.08.284a(2)

Land Owner: NCJPA
Applicant: Tricia Knight
APN: northeast of 091-328-024

1. Is this the only transmitting facility proposed or permitted on this property?
 Yes No (please answer questions 7 - 9)
2. Structure type Freestanding Building/Roof mounted Other
3. Will the lowest point of the antenna be at least 10 meters above the ground? Yes No
4. Please indicate height above ground of lowest point of the antenna 37.6 ft high
5. Indicate the estimated exposure from this facility See RF Reports
6. What percent of the FCC guidelines does this represent? See RF Reports

CUMULATIVE ANALYSIS

7. Enter number of transmitting facilities on site: 1
8. Indicate the total estimated RF exposure from this site: See RF Reports
9. What percent of the FCC guidelines does this represent? See RF Reports

PROPOSED MITIGATION

None proposed

FOR MORE INFORMATION

For questions, contact Airlin Singewald, County Planner, at (805) 781-5198 or by email: asingewald@co.slo.ca.us.

On-site pre-application meetings can be arranged to discuss design issues and potential locations. We encourage you to schedule a pre-application meeting in advance of completing lease negotiations and applications for new wireless communications facilities.

**Verizon Wireless • Proposed Base Station (Site No. 276923 “Nipomo Swap Meet SC1”)
263 North Frontage Road • Nipomo, 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. 276923 “Nipomo Swap Meet SC1”) proposed to be located at 263 North Frontage Road in Nipomo, California, for compliance with appropriate guidelines limiting human exposure to radio frequency (“RF”) electromagnetic fields.

Executive Summary

Verizon proposes to install a directional panel antenna on the existing utility pole sited in front of the commercial property located at 263 North Frontage Road in Nipomo. 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)	5–80 GHz	5.00 mW/cm ²	1.00 mW/cm ²
WiFi (and unlicensed uses)	2–6	5.00	1.00
BRS (Broadband Radio)	2,600 MHz	5.00	1.00
WCS (Wireless Communication)	2,300	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

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 transceivers are often located at ground level and are connected to the antennas by coaxial cables. A

**Verizon Wireless • Proposed Base Station (Site No. 276923 “Nipomo Swap Meet SC1”)
263 North Frontage Road • Nipomo, California**

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 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 SAC Wireless Engineering Group, dated June 26, 2015, it is proposed to install one Amphenol Model QXW-632X634X-DP-EDIN directional panel antenna at the top of the existing 38½-foot utility pole sited at the front entrance to the Nipomo Swap Meet & Fleamarket located at 263 North Frontage Road in Nipomo. The antenna would employ no downtilt, would be mounted at an effective height of about 36½ feet above ground, and would be oriented toward 220°T. The maximum effective radiated power in that direction would be 2,160 watts, representing simultaneous operation at 1,090 watts for AWS and 1,070 watts for PCS; no operation on cellular or 700 MHz frequencies is presently proposed from this site. 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 0.021 mW/cm², which is 2.1% of the applicable public exposure limit. The maximum calculated level at any of the nearby one-story buildings* is 0.99% of the public exposure limit. The maximum calculated level at the second-floor elevation of any nearby residence† is 0.042% of the public exposure limit. It should be noted that these results include several “worst-

* Located at least 230 feet away, based on photographs from Google Maps.

† Located at least 860 feet away, based on photographs from Google Maps.

**Verizon Wireless • Proposed Base Station (Site No. 276923 “Nipomo Swap Meet SC1”)
263 North Frontage Road • Nipomo, California**

case” assumptions and therefore are expected to overstate actual power density levels from the proposed operation.

Recommended Mitigation Measures

Due to its mounting location and height, the Verizon antenna would not be accessible to unauthorized persons, and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. To prevent occupational exposures in excess of the FCC guidelines, it is recommended that appropriate RF safety training, to include review of personal monitor use and lockout/tagout procedures, be provided to all authorized personnel who have access to the top of the pole, including employees and contractors of Verizon and of the utility company. No access within 12 feet directly in front of the antenna itself, such as might occur during certain maintenance activities, should be allowed while the base station is in operation, unless other measures can be demonstrated to ensure that occupational protection requirements are met. It is recommended that explanatory signs[‡] be posted at the antenna and/or on the pole below the antenna, readily visible from any angle of approach to persons who might need to work within that distance.

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 263 North Frontage Road in Nipomo, 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. Training authorized personnel and posting explanatory signs are recommended to establish compliance with occupational exposure limits.

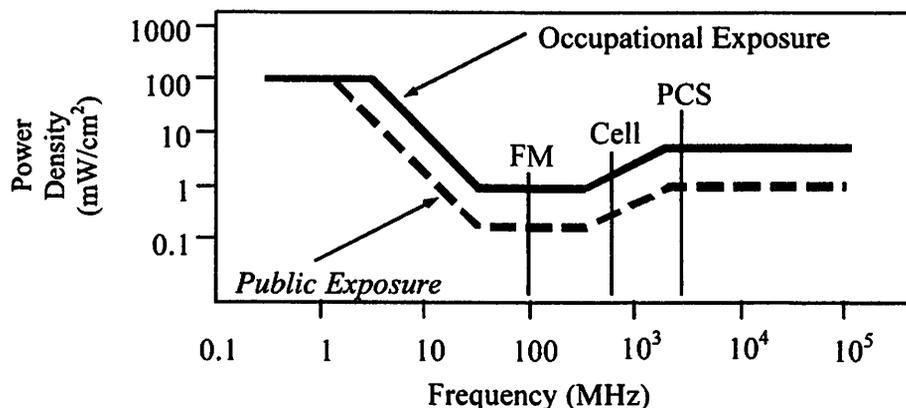
‡ Signs should comply with OET-65 color, symbol, and content recommendations. Contact information should be provided (e.g., a telephone number) to arrange for access to restricted areas. The selection of language(s) is not an engineering matter, and guidance from the landlord, local zoning or health authority, or appropriate professionals may be required. Signage may also need to comply with the requirements of California Public Utilities Commission General Order No. 95.

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 (f is frequency of emission in MHz)					
	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm ²)	
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/f²</i>
3.0 – 30	1842/f	<i>823.8/f</i>	4.89/f	<i>2.19/f</i>	900/f ²	<i>180/f²</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√f	<i>1.59√f</i>	√f/106	<i>√f/238</i>	f/300	<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>



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.



**Verizon Wireless • Proposed Base Station (Site No. 276923 “Nipomo Swap Meet SC1”)
263 North Frontage Road • Nipomo, California**

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, 2017. 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.



William F. Hammett, P.E.

707/996-5200

September 1, 2015



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/cm²,

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/cm²,

- where θ_{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
 η = 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:

power density $S = \frac{2.56 \times 1.64 \times 100 \times RFF^2 \times ERP}{4 \times \pi \times D^2}$, in mW/cm²,

- 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.





Verizon Wireless Cell Site Necessity Case – Nipomo Swap Meet SC1

Prepared by Verizon Wireless
RF Engineering
Tom McGuire for Dewayne
Bonham



Introduction:

There are two main drivers that prompt the creation of a cell site project, coverage and/or capacity. Most sites provide a mixture of both, but increasingly some sites are pure capacity.

Coverage is the need for expanded service often requested by our customers or emergency services personnel. While this initially meant providing coverage in vehicles, as usage patterns have shifted this now means improving coverage inside of buildings and in residential areas.

Capacity is the need for more bandwidth of service. In the simplest form this means a cell site can handle a limited number of voice calls, data mega bites, or total number of active users. When any one of these limits are met the user experience within the coverage area of that cell quickly starts to degrade during the busier hours of use.



Coverage is best shown in coverage maps. We use tools that take into account terrain, vegetation, building types, and cell site specifics to show predictions of the existing coverage and what we expect to see with a given cell site. The prediction models make some assumptions such as that the antennas are above the nearby ground clutter (Buildings and vegetation). Once the antennas fall below the ground clutter the models become inaccurate and cannot tell that specific trees or buildings are blocking the RF signal. Due to this, modeling of tower height requirements is frequently not accurate and misleading.



Capacity is best shown in graphs of usage growth and projected exhaustion. We utilize sophisticated programs to model current usage growth and project it into the future to determine when additional capacity will be required. The algorithms that predict capacity growth output numbers that are not easily explained. Since it takes 2-3 years on average to complete a cell site project, we have to be looking about 3 years into the future to meet future customer demand.

While data capacity may not seem urgent, beginning in 2014 voice traffic will begin to migrate from the older 3G voice technology to 4G VoLTE (Voice over IP). This will add additional load to the 4G data network. Since voice is delay sensitive, exhaustion of the data network can cause degradation of voice calls including 911 calls.



“Why do you need a site here???”

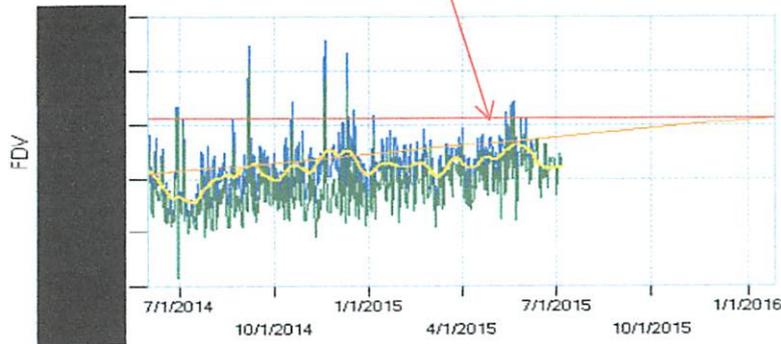
A good capacity cell will be close to the user population and have the traffic evenly spread around the site. When we cannot get a location that accomplishes being close to the customers and central to the usage, we end up having to build additional cells to meet the demands for service. Capacity sites are generally lower in height than a coverage site with a full cell needing to be above the ground clutter (buildings, trees, & etc.) and a small cell being one that is at or below the ground clutter.

Where our customers use their wireless devices continues to evolve. While we once needed to cover highways and business districts, we are seeing increasing issues with high growth in residential areas. Current statistics show that about 1 of 3 American households no longer have a landline phone. To serve this need we have to increase the cells we have in or very near residential areas.



Need Case for: Nipomo Swap Meet SC1

The green line shows FDV (Forward Data Volume).
Red line is the threshold where significant service degradation is seen.
The yellow line is the trend.



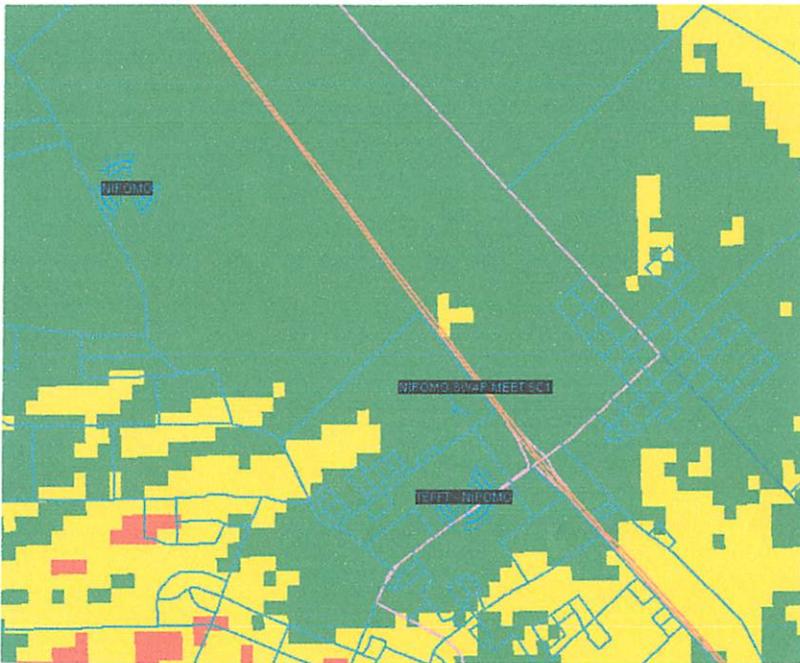
Summary: This graph for the Tefft Nipomo cell site shows data volume (FDV) is high and is projected to exhaust in late 2015.

The graph above shows FDV (Forward Data Volume) FDV is the total mega bytes of data flowing through the cell. It can rise just above the red line, then reaches a limit and data delivery is delayed. With voice traffic transitioning from the old 3G technology to the new 4G technology we will see further increases in 4G data traffic. Since the 4G network will be carrying 911 calls and is used extensively in support of police and fire emergency response it is critical that we do not allow service quality to degrade.

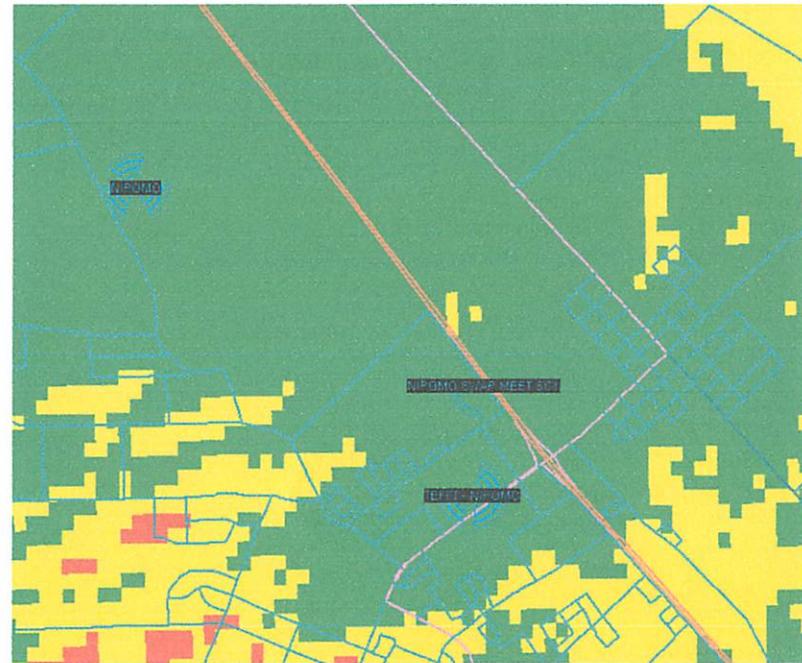


Need Case for: Nipomo Swap Meet SC1

Existing Coverage



Proposed Coverage



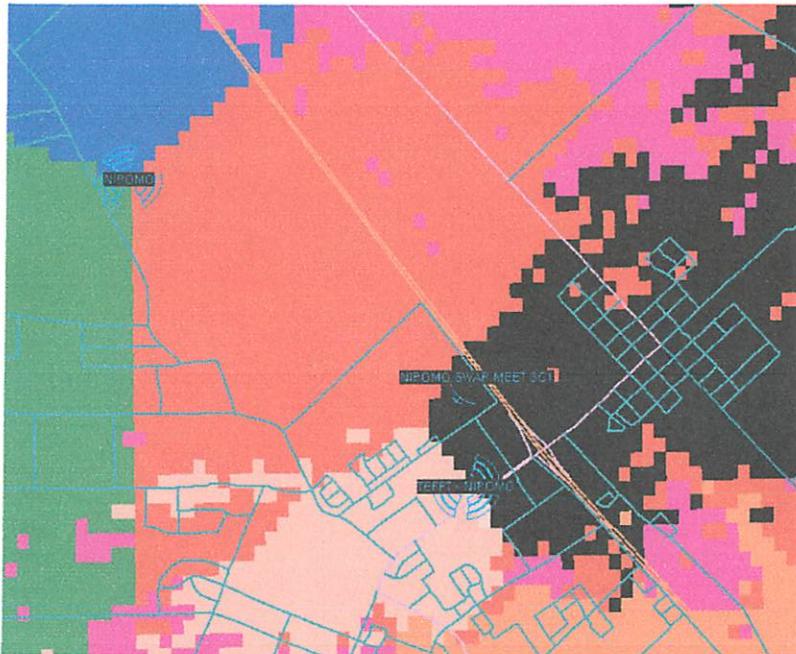
The proposed Nipomo Swap Meet SC1 site is a capacity site to serve weekend traffic spikes associated with the weekly swap meets. The primary objective of this site is to support the rapid growth in 4G data use we are seeing in this area. Due to the timing of these spikes we believe them to be associated with wireless credit card verification at the swap meets. This small cell will provide ample capacity to isolate the surrounding area from these surges.

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

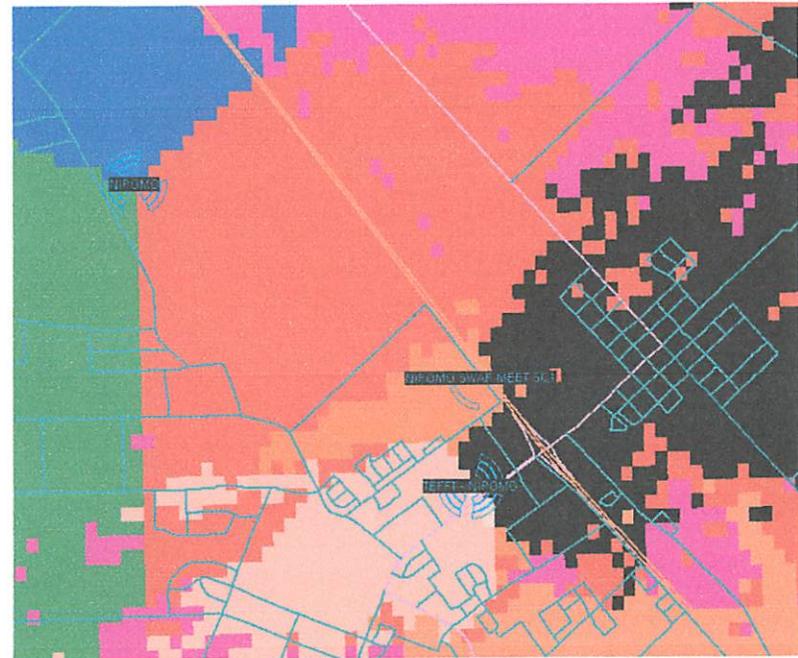


Need Case for: Nipomo Swap Meet SC1

Best Server without Nipomo Swap Meet SC1



Best Server with Nipomo Swap Meet SC1

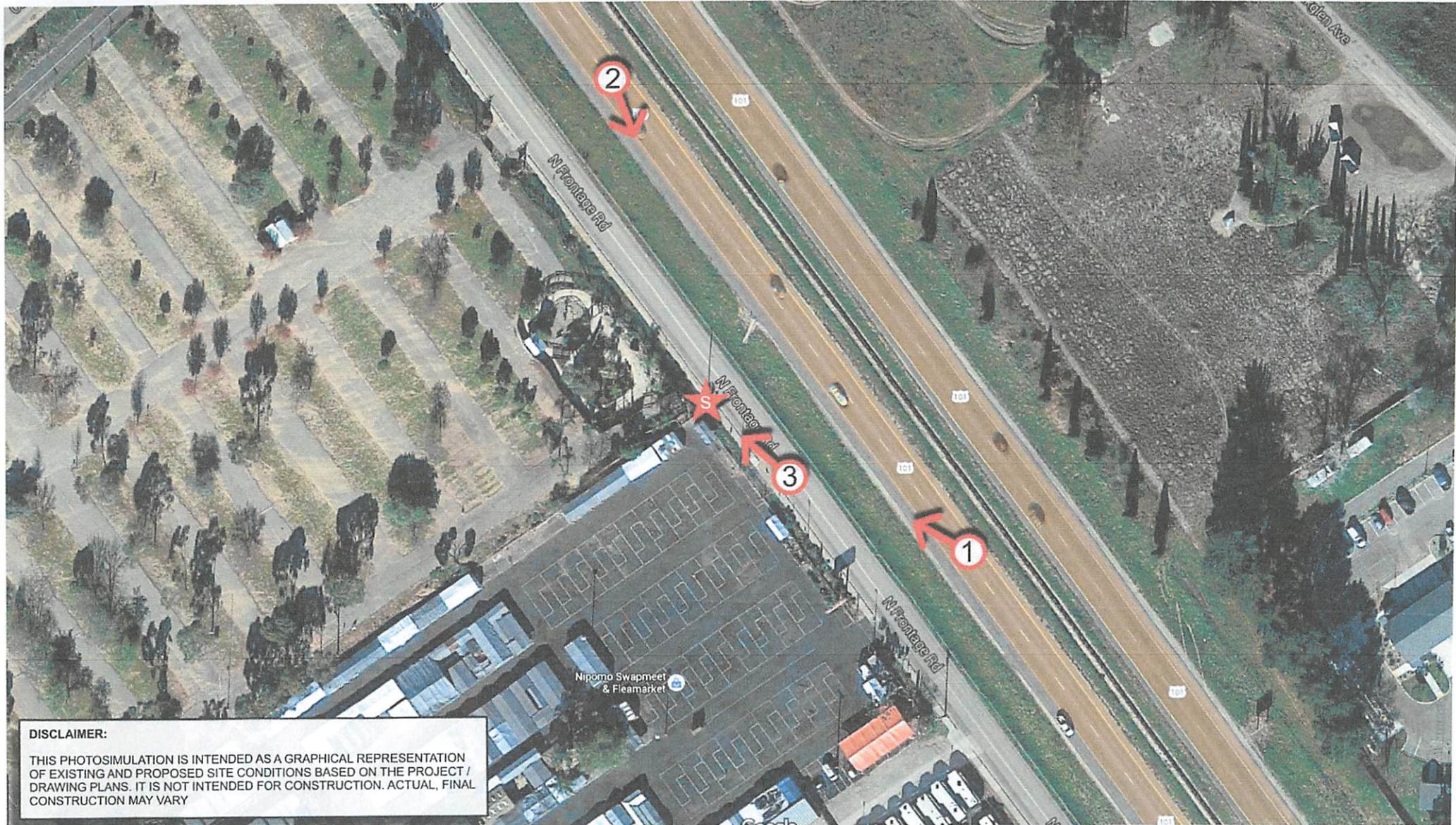


The plots above show the best server or sectors that cover this area. The Nipomo Swap Meet area is now covered by the Tefft Nipomo cell site to the south (shown in black). This project will improve service by offloading the event traffic from swap meets onto the Nipomo Swap Meet SC1 cell which will improve data service for the users at the swap meet grounds.

VICINITY MAP
PHOTOSIMULATION VIEWPOINTS



NIPOMO SWAP MEET SC1
PSL # 276923
263 NORTH FRONTAGE ROAD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LATITUDE: 35° 02' 28.51" N
LONGITUDE: 120° 29' 20.80" W



DISCLAIMER:
THIS PHOTOSIMULATION IS INTENDED AS A GRAPHICAL REPRESENTATION OF EXISTING AND PROPOSED SITE CONDITIONS BASED ON THE PROJECT / DRAWING PLANS. IT IS NOT INTENDED FOR CONSTRUCTION. ACTUAL, FINAL CONSTRUCTION MAY VARY

PHOTOSIMULATION VIEW 1



NIPOMO SWAP MEET SC1
PSL # 276923
263 NORTH FRONTAGE ROAD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LATITUDE: 35° 02' 28.51" N
LONGITUDE: 120° 29' 20.80" W



NEW

EXISTING



EXISTING 38.4' TALL
COMMUNICATION POLE
(#LC39850/245)

NEW PO&E TRANSFORMER

NEW VERIZON WIRELESS
ANTENNAS, (2) TOTAL
MOUNTED ON NEW CROSS ARM



PHOTOSIMULATION VIEW 2

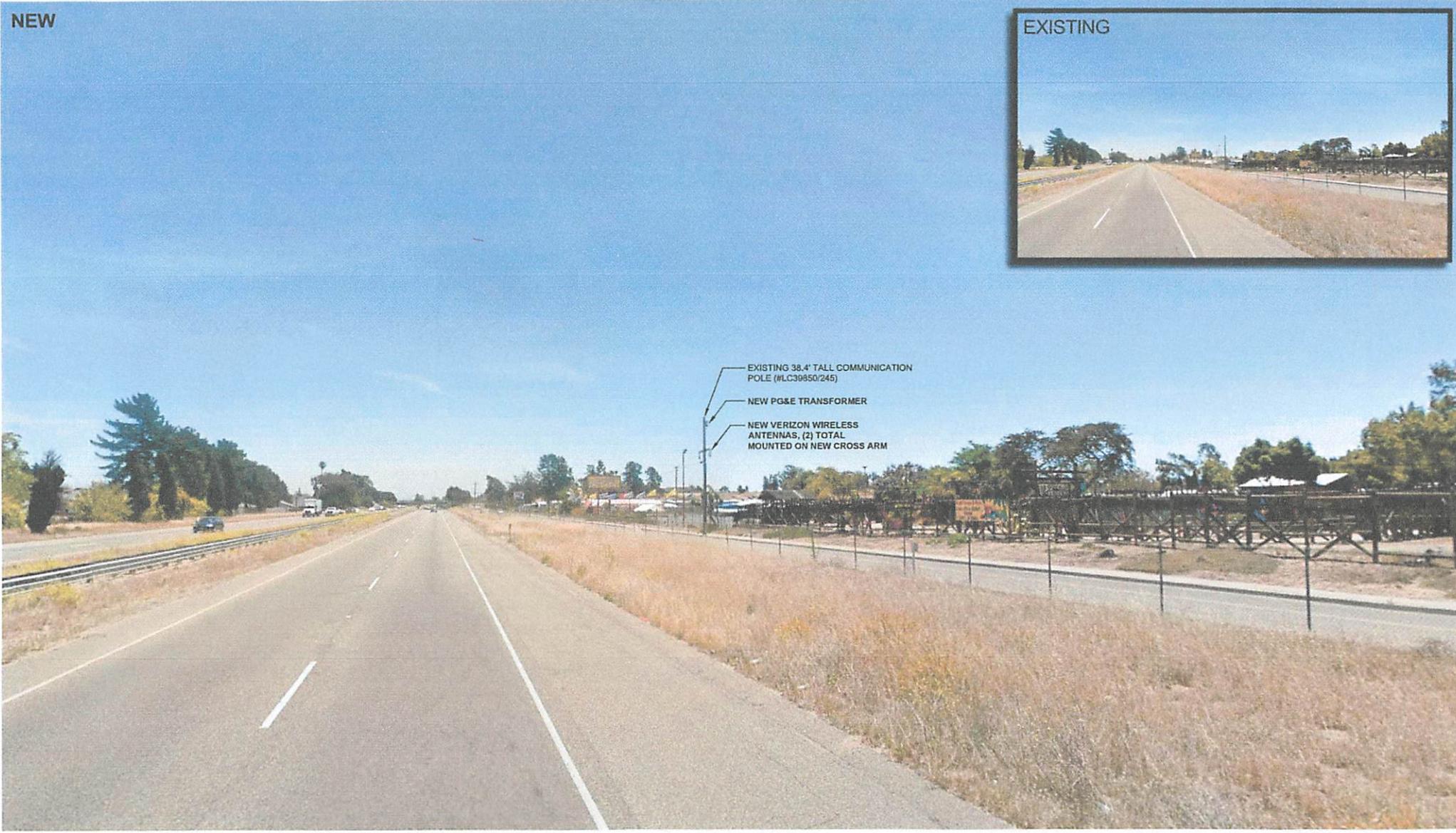


NIPOMO SWAP MEET SC1
PSL # 276923
263 NORTH FRONTAGE ROAD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LATITUDE: 35° 02' 28.51" N
LONGITUDE: 120° 29' 20.80" W

SOC
WIRELESS
ENGINEERING GROUP
5015 SHOREHAM PLACE, SUITE 150
SAN DIEGO, CA 92122
OFFICE: (619) 736-3405

NEW

EXISTING



- EXISTING 38.4' TALL COMMUNICATION POLE (#LC30950/245)
- NEW PG&E TRANSFORMER
- NEW VERIZON WIRELESS ANTENNAS, (2) TOTAL MOUNTED ON NEW CROSS ARM

PHOTOSIMULATION VIEW 3



NIPOMO SWAP MEET SC1
PSL # 276923
263 NORTH FRONTAGE ROAD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LATITUDE: 35° 02' 28.51" N
LONGITUDE: 120° 29' 20.80" W

SOC
WIRELESS
ENGINEERING GROUP
5015 SHOREHAM PLACE, SUITE 150
SAN DIEGO, CA 92122
OFFICE: (619) 736-3455

NEW

EXISTING

NEW PG&E OVERHEAD
POWER SERVICE

NEW PG&E TRANSFORMER

NEW VERIZON
WIRELESS
ANTENNAS, (2) TOTAL
MOUNTED ON NEW
CROSS ARM

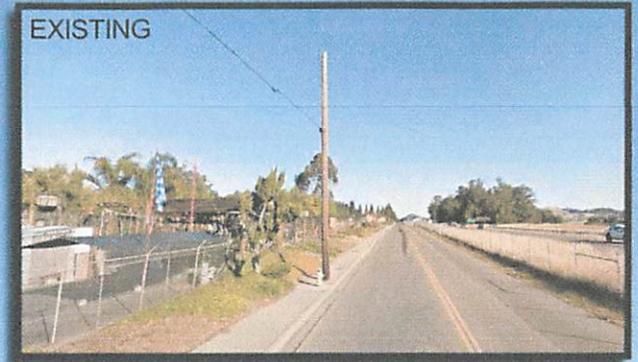
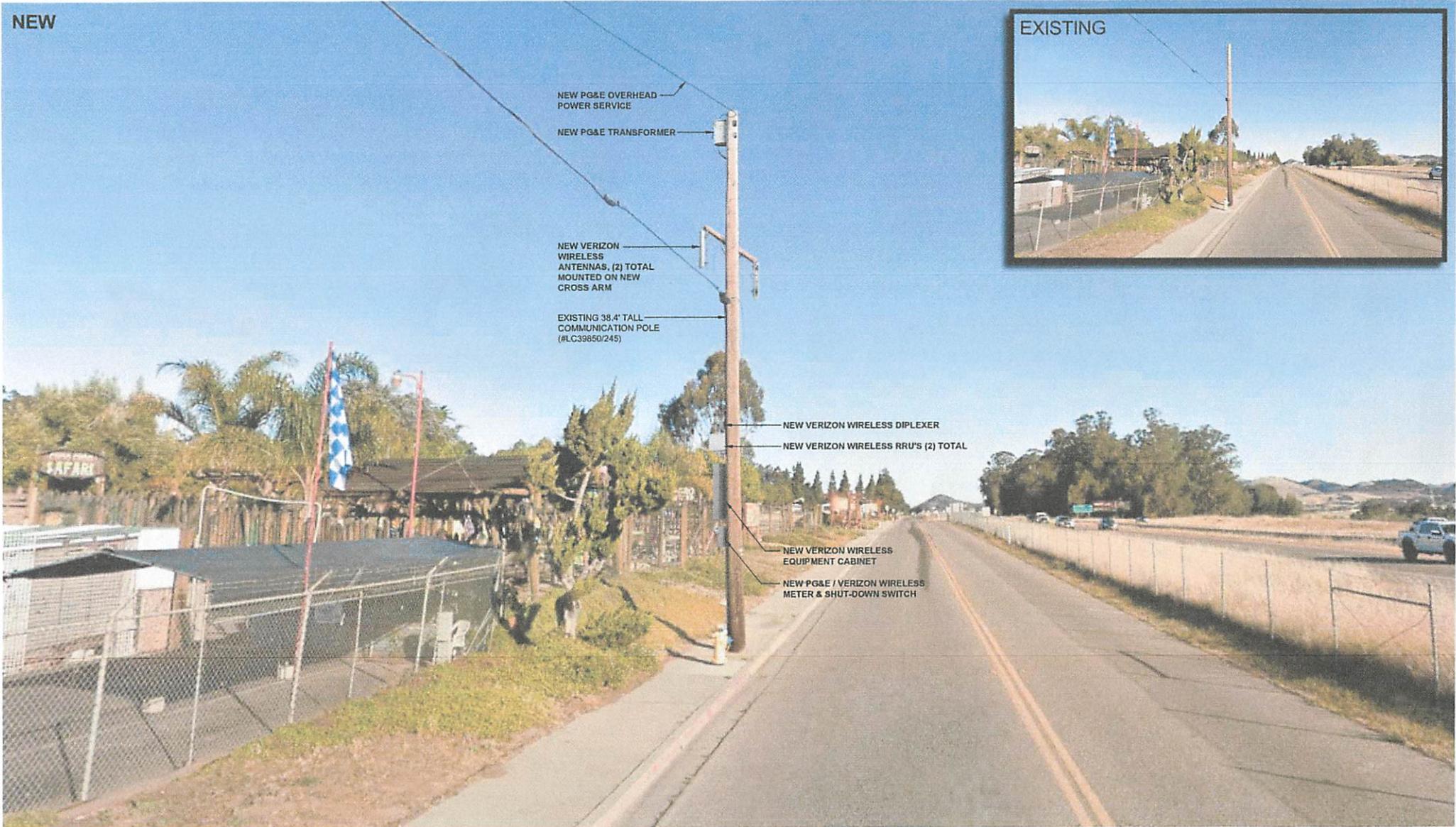
EXISTING 38.4' TALL
COMMUNICATION POLE
(#RLC39850/245)

NEW VERIZON WIRELESS DIPLEXER

NEW VERIZON WIRELESS RRU'S (2) TOTAL

NEW VERIZON WIRELESS
EQUIPMENT CABINET

NEW PG&E / VERIZON WIRELESS
METER & SHUT-DOWN SWITCH



NOTES:

OWNER(S): WITHIN RIGHT-OF-WAY OF FRONTAGE ROAD

THIS DRAWING DOES NOT REPRESENT A BOUNDARY SURVEY OF ANY PARCEL OF LAND, NOR DOES IT IMPLY OR INFER THAT A BOUNDARY SURVEY WAS PERFORMED. THIS IS A SPECIALIZED TOPOGRAPHIC MAP WITH PROPERTY AND EASEMENTS BEING A GRAPHIC DEPICTION BASED ON INFORMATION GATHERED FROM VARIOUS SOURCES OF RECORD AND AVAILABLE MONUMENTATION. PROPERTY LINES AND LINES OF TITLE WERE NEITHER INVESTIGATED NOR SURVEYED AND SHALL BE CONSIDERED APPROXIMATE ONLY. NO PROPERTY MONUMENTS WERE SET.

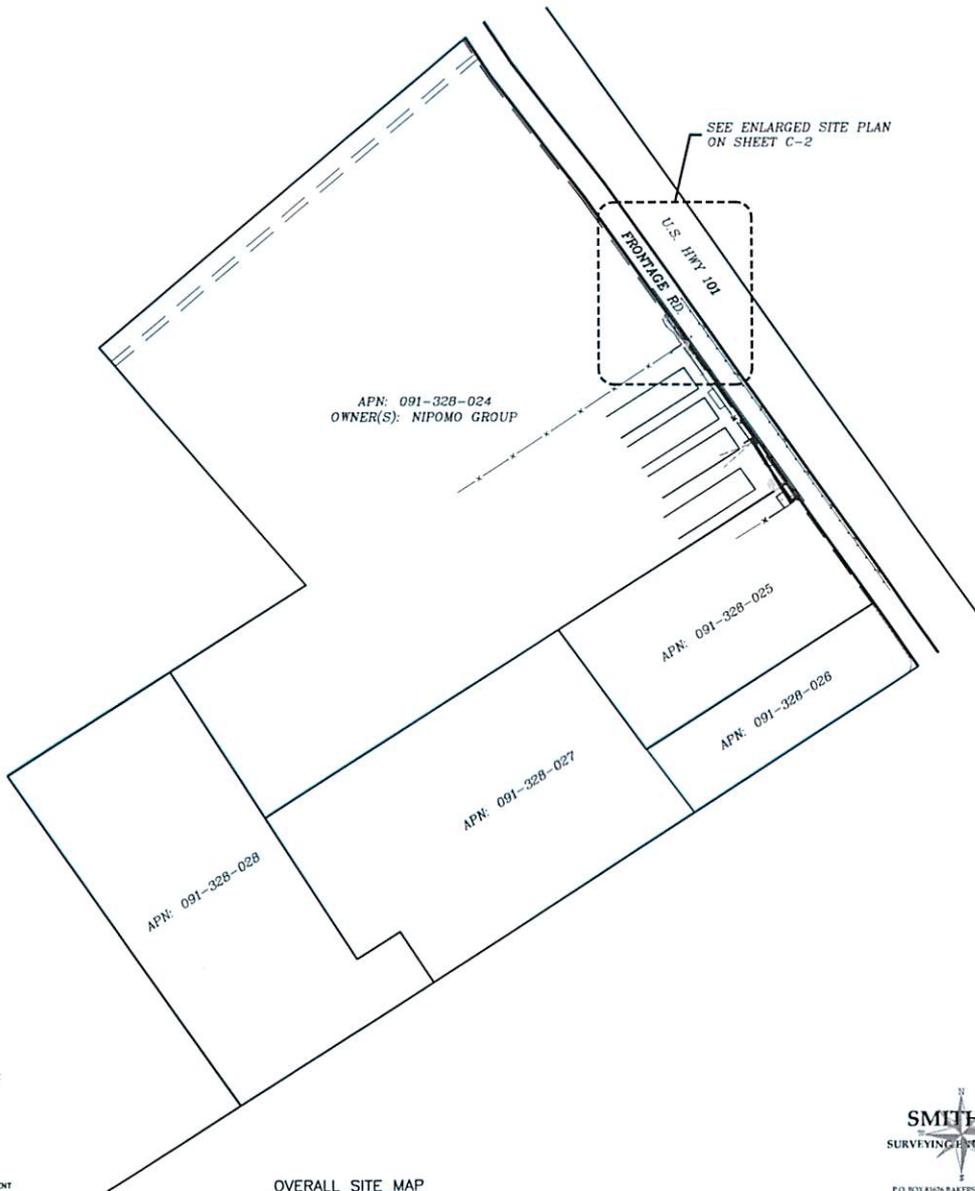
THE UNDERGROUND UTILITIES (IF ANY) THAT APPEAR ON THIS MAP HAVE BEEN LOCATED BY FIELD OBSERVATION. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES STATE THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE.

THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD RATE MAP FOR COMMUNITY NO. 060304, PANEL NO. 1636G, DATED NOVEMBER 16, 2012, SHOWS THAT THE LOCATION OF THIS SITE FALLS WITHIN ZONE X, WHICH ARE AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

THE LATITUDE AND LONGITUDE AT THE LOCATION AS SHOWN WAS DETERMINED BY GPS OBSERVATIONS.

LAT. 35° 02' 28.51" N, NAD 83
 LONG. 120° 29' 20.80" W, NAD 83
 ELEV. 351.7' NAVD 88 (BASIS OF DRAWING)

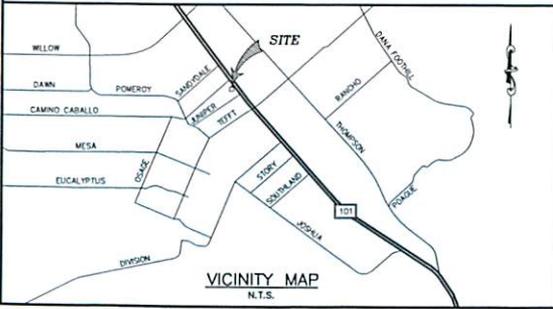
The information shown above meets or exceeds the requirements set forth in FAA order 8250.19D for 1-A accuracy (± 20' horizontally and ± 3' vertically). The horizontal datum (coordinates) are expressed as degrees, minutes and seconds, to the nearest hundredth of a second. The vertical datum (heights) are expressed in feet and decimals thereof and are determined to the nearest 0.1 foot.



LEGEND

- SITE BOUNDARY LINE
- OVERHEAD POWER LINE
- PROPERTY BOUNDARY (PER TITLE REPORT)
- POWER POLE
- GROUND ELEVATION
- EDGE OF PAVEMENT
- CONCRETE PAD
- POB POINT OF BEGINNING
- POC POINT OF COMMENCEMENT

OVERALL SITE MAP
 1" = 100'



ISSUE STATUS			
REV	DATE	DESCRIPTION	BY
0	03/24/14	PRELIMINARY	SL
1	09/22/14	REDLINES	SL
2	09/22/14	UTILITY ROUTE	SL
3	11/03/14	TITLE REVIEW	SL
4	11/18/14	REDLINES	SL
5	05/07/15	MOVE SITE	SL
6	05/18/15	REDLINES	SL

SMITHCO JOB NO. 82-249

WIRELESS
 5885 AVENUE ENCINAS SUITE 142B
 CARLSBAD, CA 92008
 OFFICE (760) 734-5200
 FAX (760) 937-0088

PROPRIETARY INFORMATION
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2785 MITCHELL DRIVE, BLDG 9
 WALNUT CREEK, CA 94598

276923
 NIPOMO SWAP
 MEET SC1

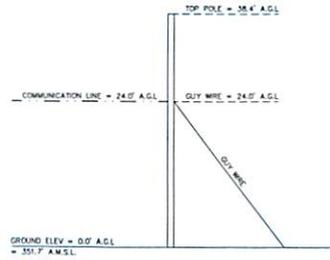
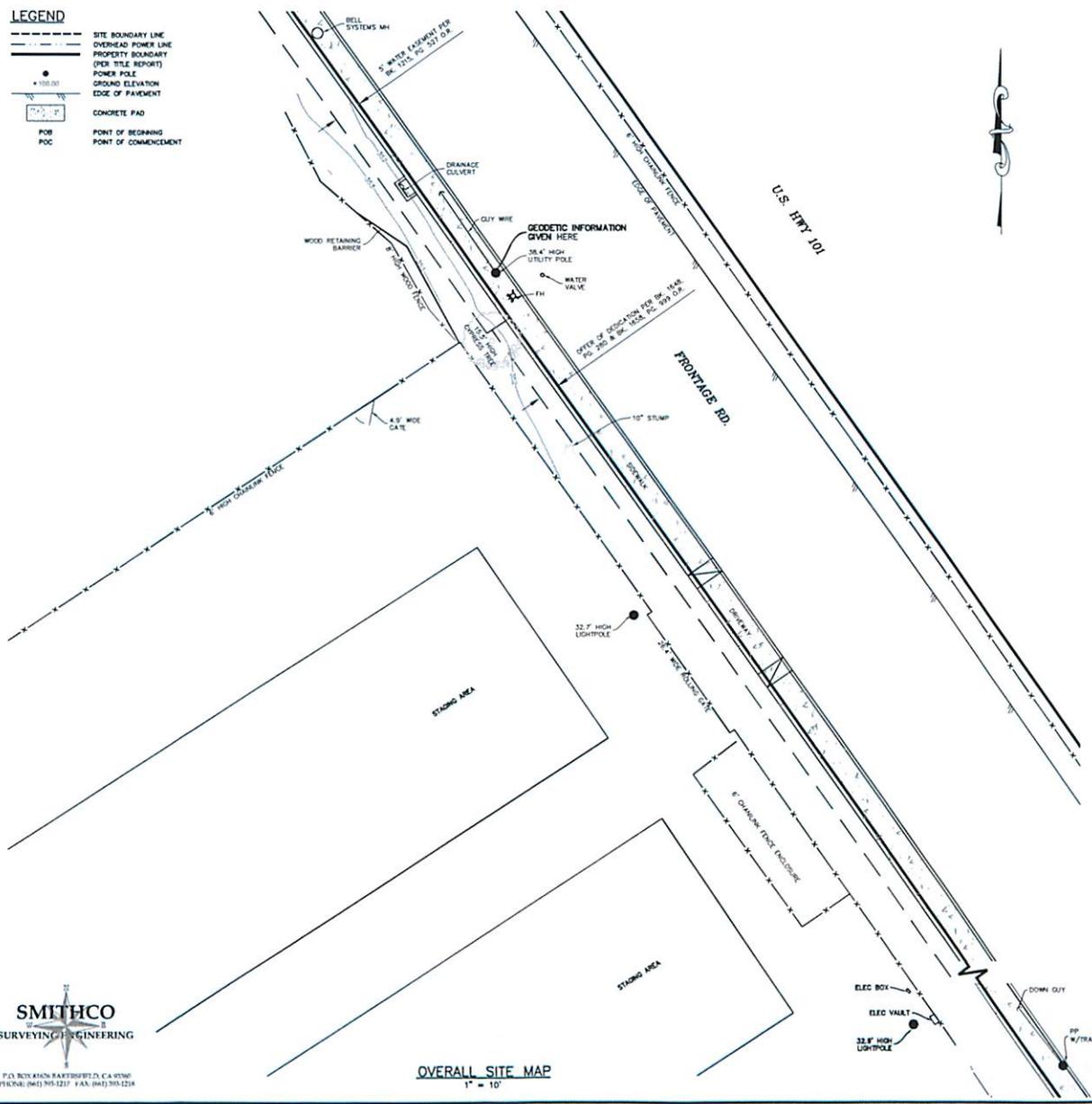
263 N. FRONTAGE ROAD
 WITHIN RIGHT-OF-WAY
 NIPOMO, CA 93444
 LAT.: 35° 02' 28.51" N
 LONG.: 120° 29' 20.80" W
 SAN LUIS OBISPO COUNTY

SHEET TITLE:
 SITE SURVEY
 FOR EXAMINATION ONLY

C-1

NOTE: THE SHOWN USE OF THIS FORM IS FOR 1/4" = 10' SCALE. THIS IS NOT THE SCALE FOR RECORDS OR FINISHED SHEET USE.

- LEGEND**
- SITE BOUNDARY LINE
 - OVERHEAD POWER LINE
 - - - PROPERTY BOUNDARY (PER TITLE REPORT)
 - POWER POLE
 - GROUND ELEVATION
 - EDGE OF PAVEMENT
 - CONCRETE PAD
 - POB POINT OF BEGINNING
 - POC POINT OF COMMENCEMENT



ELEVATION VIEW
1" = 10'

SMITHCO
SURVEYING ENGINEERING

P.O. BOX 8508 BARTSFIELD, CA 95909
PHONE: (916) 394-2237 FAX: (916) 393-2234

OVERALL SITE MAP
1" = 10'

ISSUE STATUS			
REV	DATE	DESCRIPTION	BY
0	03/24/14	PRELIMINARY	SL
1	05/22/14	REDLINES	SL
2	05/22/14	UTILITY ROUTE	SL
3	11/03/14	TITLE REVIEW	SL
4	11/18/14	REDLINES	SL
5	05/07/15	MOVE SITE	SL
6	05/18/15	REDLINES	SL

SMITHCO JOB NO.: 82-249

WIRELESS
5885 AVENUE ENERGAS, SUITE 142B
CARLSBAD, CA 92008
DRPH (760) 754-5000
FAX (760) 831-0008

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verizon wireless
2785 MITCHELL DRIVE, BLDG 9
WALNUT CREEK, CA 94598

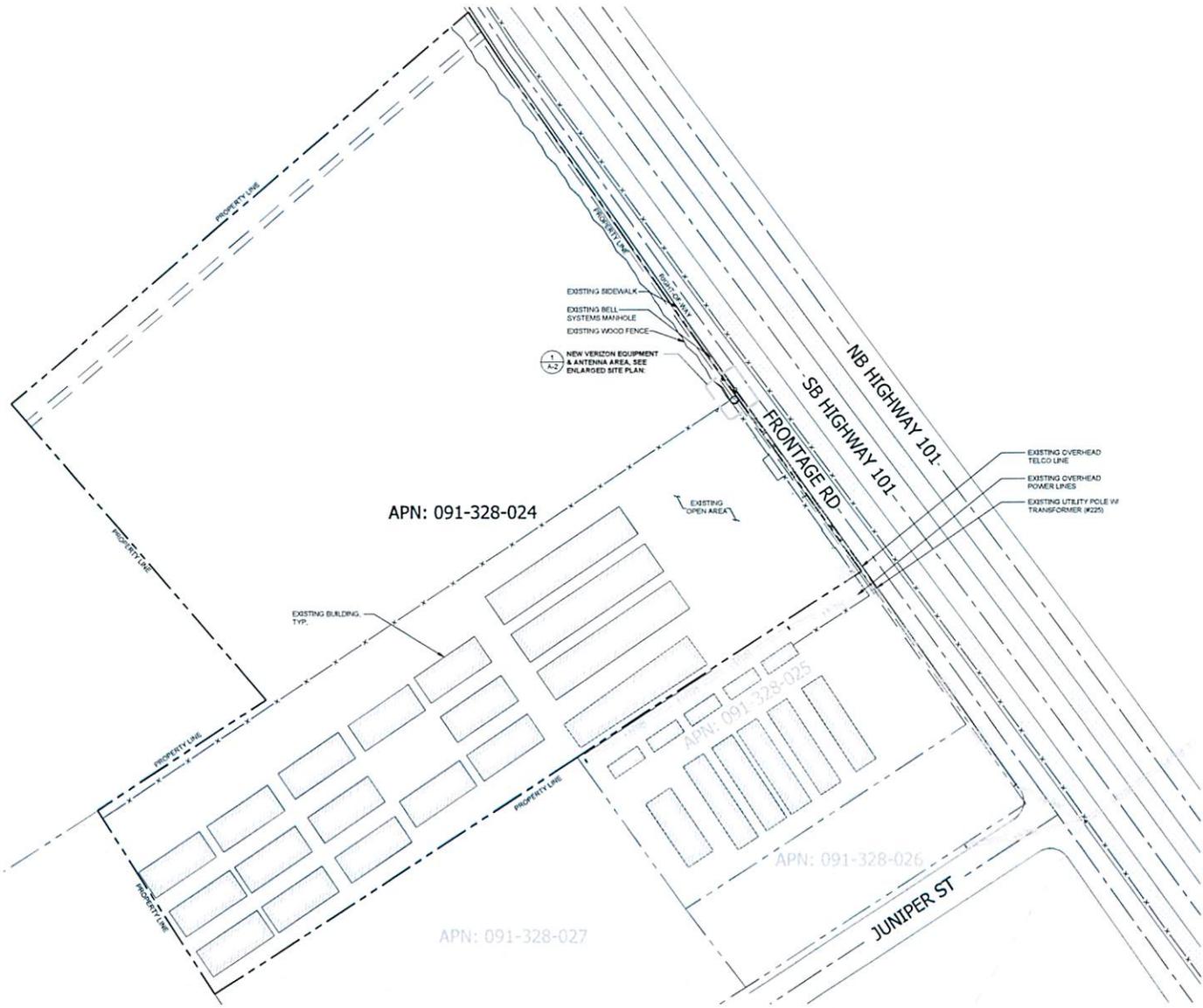
276923
NIPOMO SWAP MEET SC1

263 N. FRONTAGE ROAD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LAT.: 35° 02' 28.51" N
LONG.: 120° 29' 20.80" W
SAN LUIS OBISPO COUNTY

SHEET TITLE:
SITE SURVEY
FOR EXAMINATION ONLY

C-2

NOTE
 POWER PLAN: POLE DESIGN TO BE DETERMINED
 TRANSPORT SOLUTION: FIBER DESIGN TO BE DETERMINED



ISSUE STATUS			
REV	DATE	DESCRIPTION	BY
0	10/29/15	SUBMITTAL	FR

SDC
 WIRELESS
 ENGINEERING GROUP
 5515 SHOREHAM PL, SUITE 150
 SAN DIEGO, CA 92122
 619-444-6000
 761.PM.5200

PROPRIETARY INFORMATION
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verizon
 2755 MITCHELL DRIVE, BLDG 9
 WALNUT CREEK, CA 94598

SMALL CELL PROJECT



NIPOMO SWAP MEET SC1
PSL # 276923
 263 NORTH FRONTAGE RD
 WITHIN RIGHT-OF-WAY
 NIPOMO, CA 93444
 LAT: 35° 02' 28.51" N
 LONG: 120° 29' 20.80" W

SHEET TITLE:
SITE PLAN

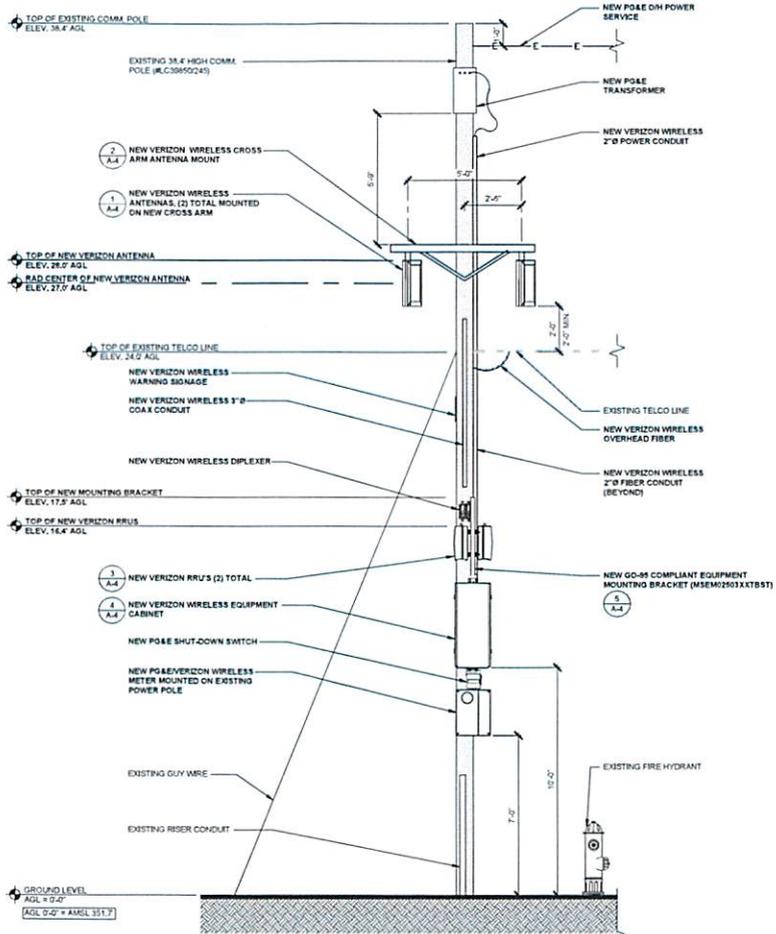
A-1

SITE PLAN

SCALE: 1" = 75'-0" (34x36)
 (OR) 1/2" = 75'-0" (11x17)

1





SOUTHWEST ELEVATION

SCALE: 3/8" = 1'-0" (24x36)
(OR) 3/16" = 1'-0" (11x17)

1

SOUTHEAST ELEVATION

SCALE: 3/8" = 1'-0" (24x36)
(OR) 3/16" = 1'-0" (11x17)

2

REV	DATE	DESCRIPTION	BY
0	10/23/15		



PROPRIETARY INFORMATION
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SMALL CELL PROJECT

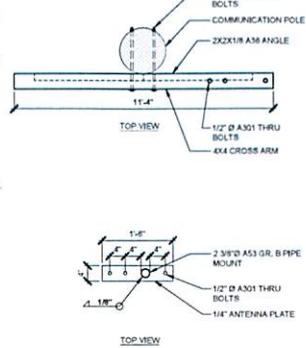
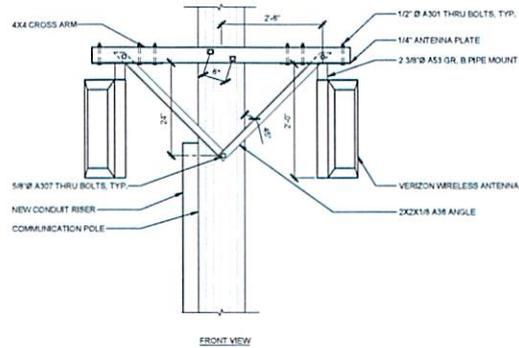
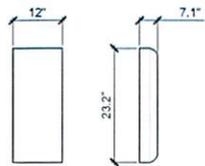
NIPOMO SWAP MEET SC1
PSL # 276923
263 NORTH FRONTAGE RD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LAT: 35° 02' 28.51" N
LONG: 120° 29' 20.80" W

SHEET TITLE:
SOUTHWEST & SOUTHEAST ELEVATION

A-3

AMPHENOL
OXW-632X634XF-EDIN

FOR MOUNTING USE:
2-POINT MOUNTING &
DOWNTILT BRACKET
KIT -
AMPHENOL
PART # 36210008



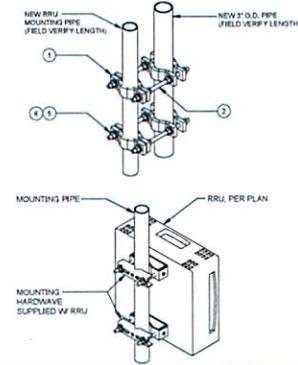
ERICSSON
RRUS-12

LENGTH: 18.2"
WIDTH: 18.5"
DEPTH: 7.3"
WEIGHT: 57.3 LBS

TECHNICAL SPECIFICATIONS:
CLAMP MOUNTING RANGE:
MINIMUM 1.38 X 1.38 IN.
MAXIMUM 3.54 X 3.54 IN.

MECHANICAL SPECIFICATION:
CLAMP ALUMINUM,
NATURE ANODIZED
20UM
FASTENERS STAINLESS
STEEL A4

ITEM PART NO.	DESCRIPTION	QTY	WEIGHT
1	RRUS-12	1	57.3 LBS
2	5/8\"/>		



ANTENNA DETAIL

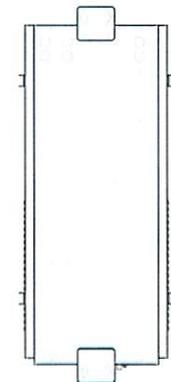
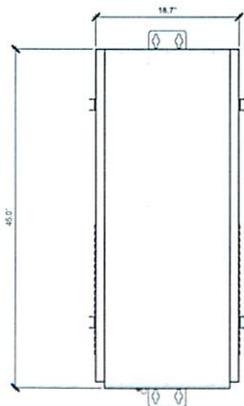
SCALE: 1
N.T.S.

ANTENNA MOUNT DETAIL

SCALE: 2
N.T.S.

RRU SPECIFICATION & MOUNTING DETAIL

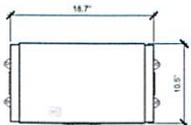
SCALE: 3
N.T.S.



FRONT VIEW

SIDE VIEW

BACK VIEW

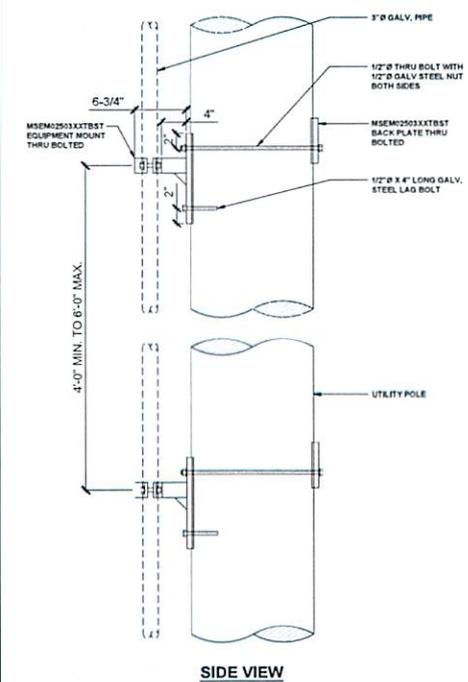


BOTTOM VIEW

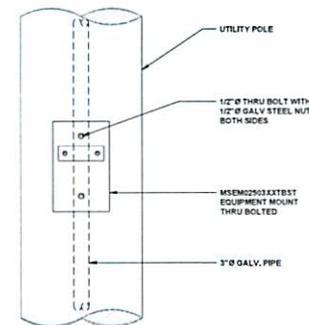
CABINET SPECIFICATIONS

SCALE: 4
N.T.S.

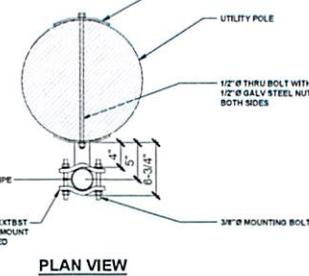
EQUIPMENT MOUNTING DETAIL



SIDE VIEW



FRONT VIEW



PLAN VIEW

SCALE: 5
N.T.S.

ISSUE STATUS

REV.	DATE	DESCRIPTION	BY
0	10/23/15	SUBMITTAL	FR



5015 SHOREHAM PL. SUITE 110
SAN DIEGO, CA 92122
951.584.8100
761.PK.1200

PROPRIETARY INFORMATION
THE INFORMATION CONTAINED IN THIS SET OF
DRAWINGS IS PROPRIETARY & CONFIDENTIAL TO
VERIZON WIRELESS



SMALL CELL PROJECT

NIPOMO SWAP MEET SC1
PSL # 276923

263 NORTH FRONTAGE RD
WITHIN RIGHT-OF-WAY
NIPOMO, CA 93444
LAT: 35° 02' 28.51" N
LONG: 120° 29' 20.80" W

SHEET TITLE:
DETAILS

A-4