verizon✓

THE CBR GROUP
COMMUNICATIONS BASED RESOURCE GROUP

October 25, 2019

VIA HAND DELIVERY

Department of Public Works
1 North San Antonio Road
Los Altos CA 94022

RE: Resubmittal for Application #SE19-00019, Verizon Wireless Small Cell "Los Altos 001" on replacement PG&E pole near 155 Almond Avenue.

Dear Director of Public Works,

Please find enclosed the documents required in response to the Denial Letter dated September 11, 2019.

The resubmitted items include the following:

- (1) PG&E Letter of Authorization
- (1) Photosims
- (1) Alternate Site Analysis
- (1) Certificate of Liability Insurance
- (1) Statement of willingness to collocate
- (1) Verizon Wireless Reservation of Rights
- (1) Radio Frequency Electromagnetic Energy Report
- (1) Contsruction Drawings with provided revisions
- (1) Small Cell Noise Study
- Buisness License to be delivered by end of November 2019

If you have questions please feel free to contact Cady Cadiz at (808)283-6122 or Cady@TheCBRGroup.com.

Sincerely,

Cady Cadiz
The CBR Group, Inc.
(Authorized Agent for Verizon Wireless)

Pacific Gas and Electric Company
WE DELIVER ENERGY.

August 06, 2019

City of Los Altos
Planning Department
1 N San Antonio Rd, Los Altos, CA 94022

RE: *Proposed Verizon Wireless telecommunication installation located on PG&E owned utility poles located in the City of Los Altos. 155 Almond Ave. Los Altos, CA 94022; 123 N El Monte Ave. Los Altos, CA 94022; 447 Yerba Buena Ave. Los Altos, CA 94022; 365 Traverso Ave. Los Altos, CA 94022*

To whom it may concern:

PG&E entered into a Master License Agreement (MLA) with Verizon Wireless in October 2016. The MLA allows Verizon to attach their equipment and antennas to PG&E distribution poles, subject to PG&E approval. Verizon had already been authorized to attach their equipment below the primary and secondary power lines in the "communications zone." Under the MLA, Verizon is now licensed to use the "power zone" space owned by PG&E. The power zone is at the pole top, above the power lines. California Public Utilities Commission (CPUC) General Order 95, Rule 94 established that antennas can be installed at the pole top position.

PG&E will comply with CPUC regulations and standards with regard to its distribution poles and reviews of proposed attachments.

However, Verizon is solely liable and responsible for complying with all applicable requirements, including CPUC General Order 95, with regard to its attachments on distribution poles. PG&E provides no guarantees that any or all of Verizon's applications will be approved, but consents to Verizon filing jurisdictional permit applications for space on the pole(s) listed in this LOA.

Please call me at (925) 459-3706 if you have any questions orconcerns regarding this matter.

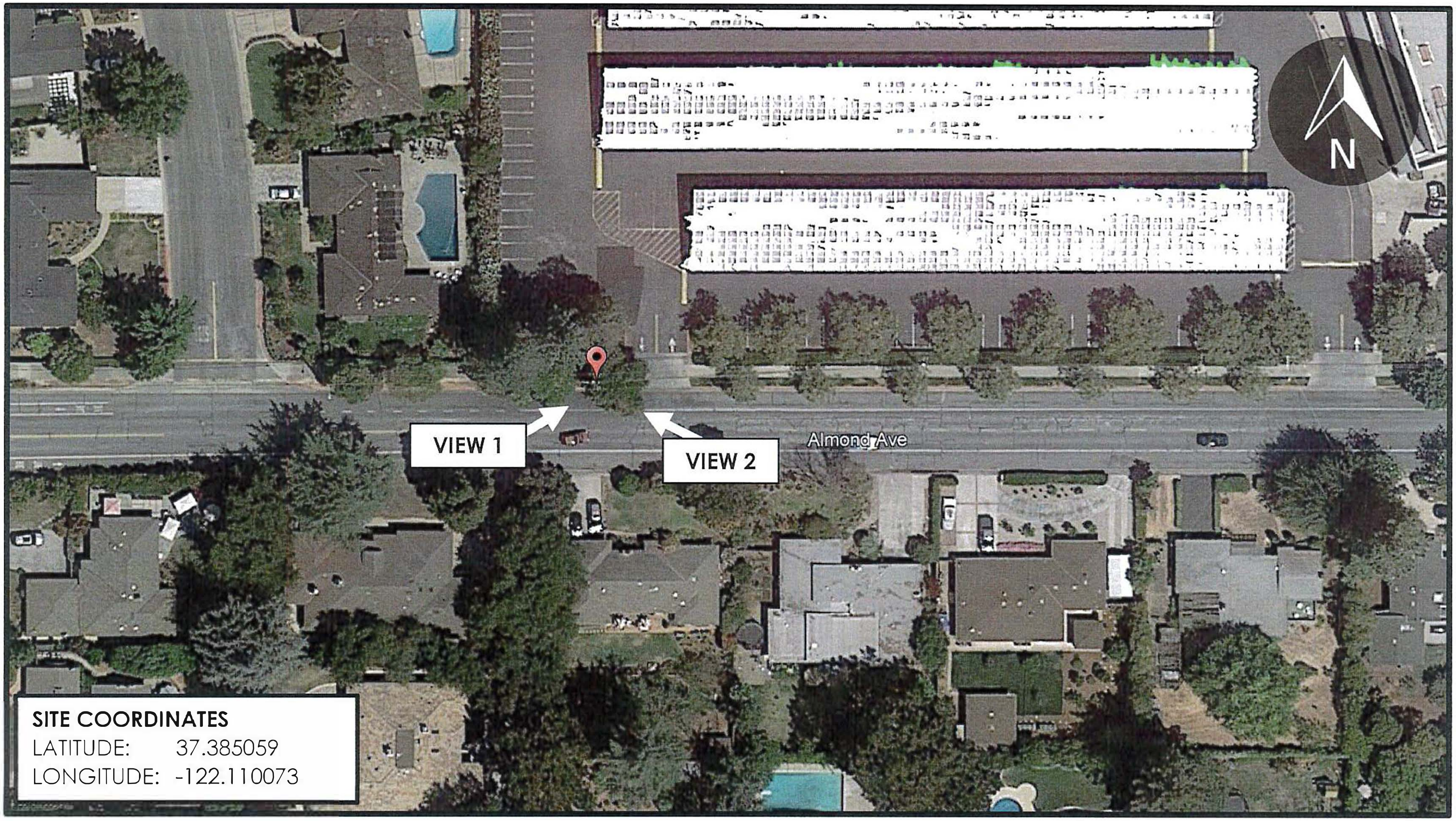
Respectfully,
Kristopher L. Van Liew

Kris Van Liew
k1v6@pge.com
Program Manager
PG&E Joint Utilities

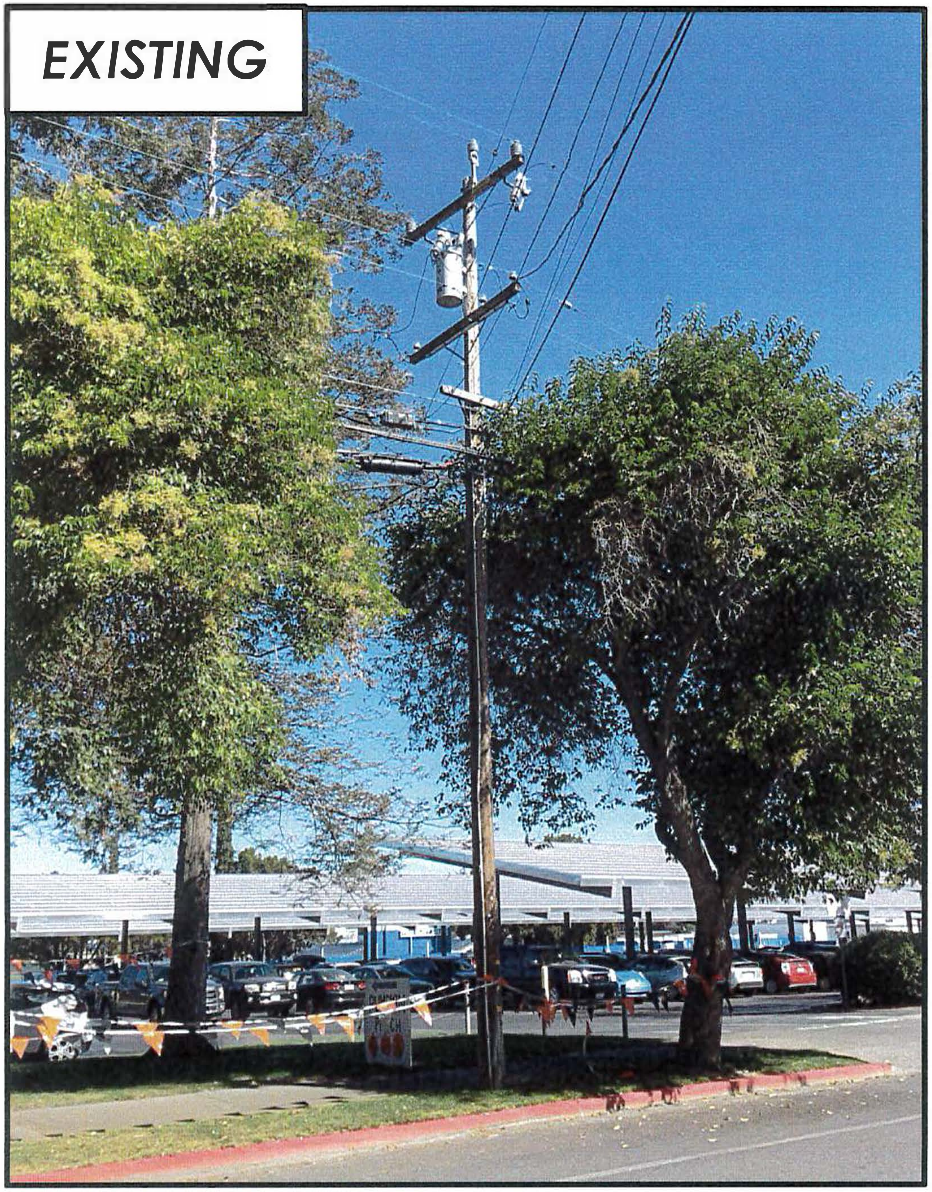
LOA PG&E: Los Altos 001 - 155 Almond Ave. Los Altos, CA 94022
Los Altos 002 - 123 N El Monte Ave. Los Altos, CA 94022
Los Altos 003 - 447 Yerba Buena Ave. Los Altos, CA 94022
Los Altos 004 - 365 Traverso Ave. Los Altos, CA 94022

PROPOSED SITE LOCATION

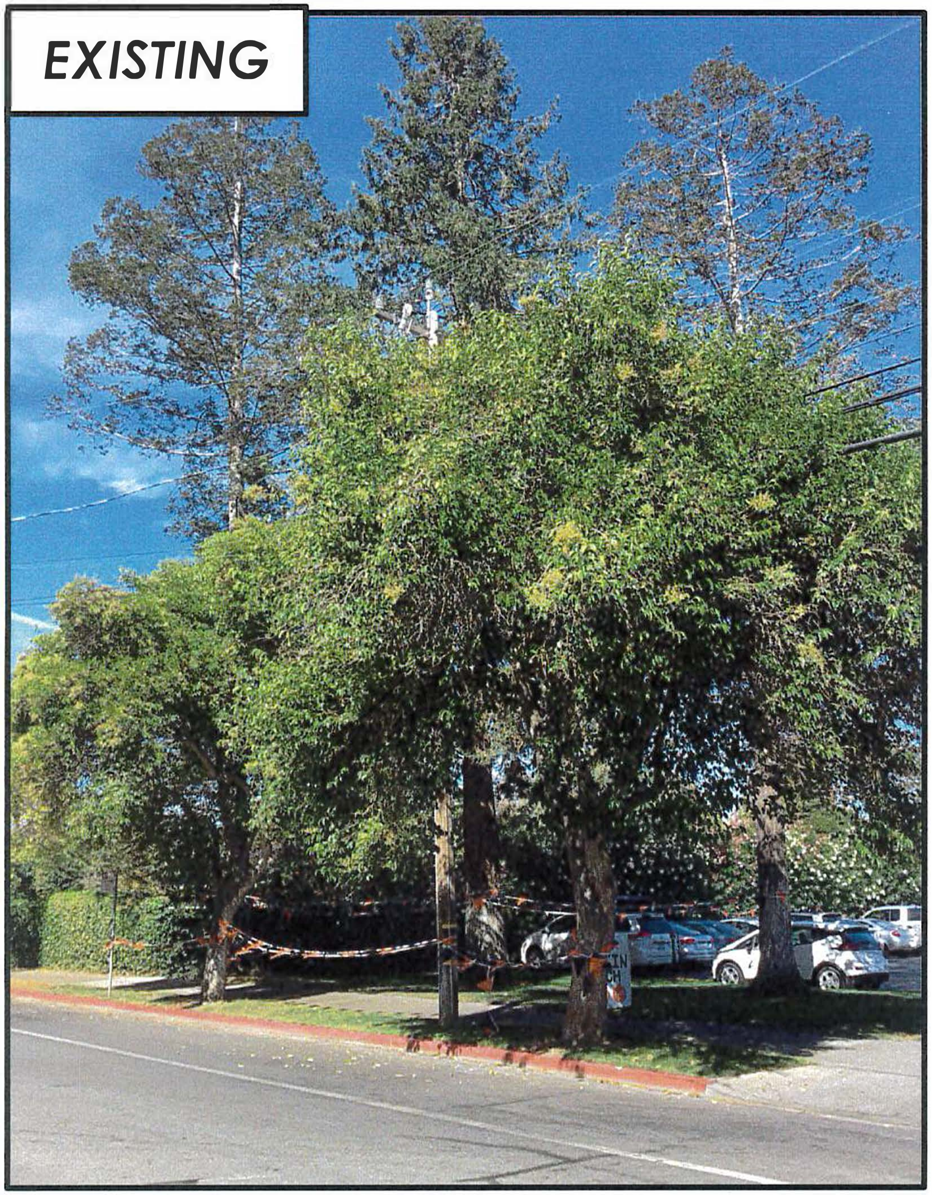
verizon



CA_LOS ALTOS 001 155 ALMOND AVE LOS ALTOS, CA 94022 Location Code: 427814	***SHOT MAP*** ***Verizon Node: "LOS ALTOS 001"*** ***Verizon Location Code: 427814***	THE CBR GROUP The CBR Group 841 Arnold Dr., Suite A Martinez, CA 94553 info@thecbrgroup.com



CA_LOS_ALTOS_001 155 ALMOND AVE LOS ALTOS, CA 94022 Location Code: 427814	**VIEW 1: LOOKING NORTH EAST ALONG ALMOND AVE** PHOTOSIMS PRODUCED 6/20/2019 **verizon**	THE CBR GROUP The CBR Group 841 Arnold Dr., Suite A Martinez, CA 94553 info@thecbrgroup.com



LOS ALTOS 001
155 ALMOND AVE.
LOS ALTOS, CA 94022
Location Code: 427814

VIEW 2: LOOKING NORTH WEST ALONG ALMOND AVE

PHOTOSIMS PRODUCED 6/20/2019

verizon

THE CBR GROUP
The CBR Group
841 Arnold Dr., Suite A
Martinez, CA 94553
info@thecbrgroup.com

VERIZON SMALL CELL FOR STAND ALONE SMALL CELL ALTERNATIVE SITE ANALYSIS

verizon

Verizon Small Cell Node "Los Altos 001" (near 155 Almond Ave.)

Prepared October 21, 2019

THE CBR GROUP
COMMUNICATIONS BASED RESOURCE GROUP

OVERVIEW

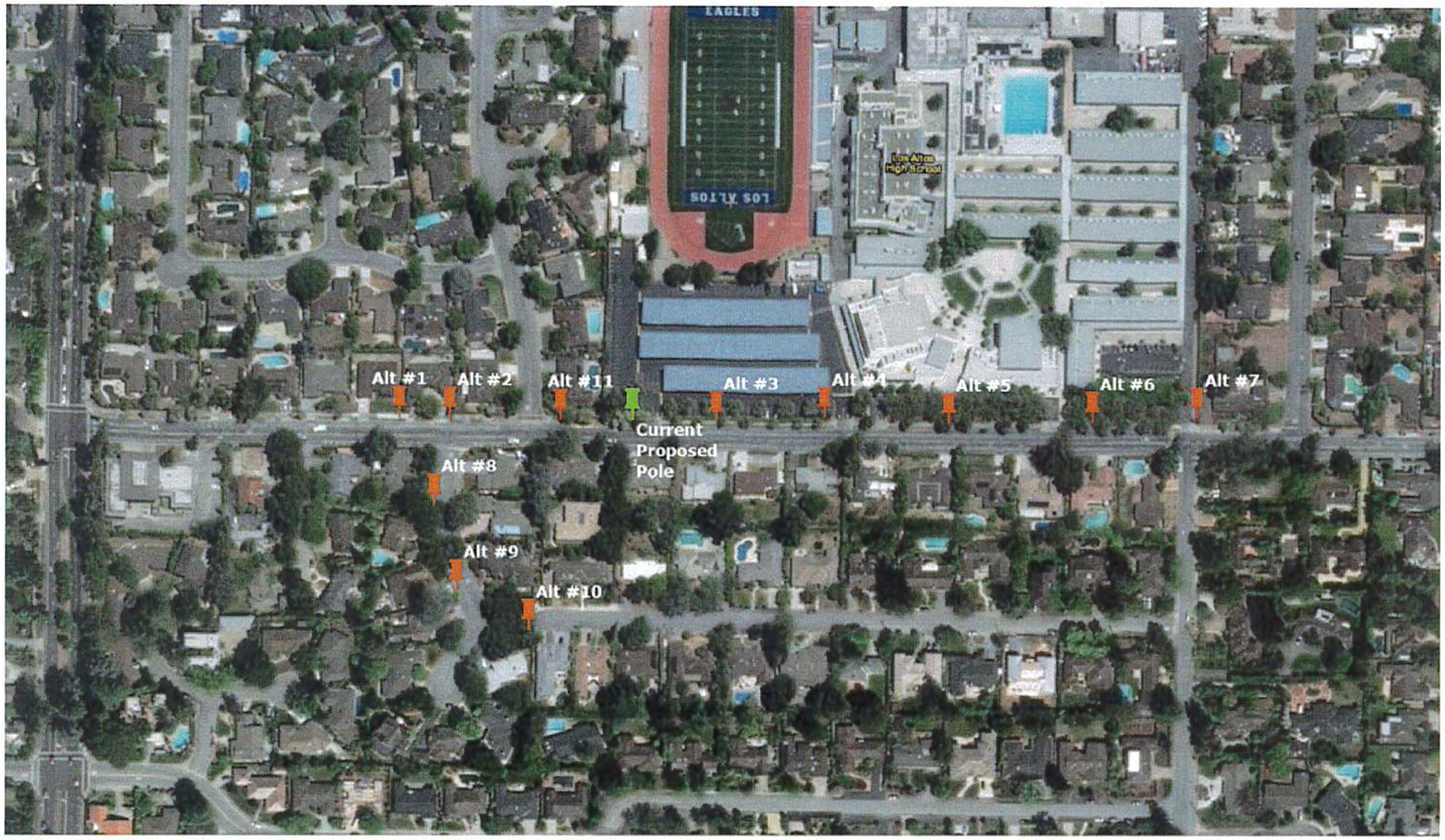
- Verizon is proposing to install a small cell standalone project in the area to improve network coverage and capacity.

- A small cell is just like the name implies. A small cell augments Verizon's capacity in a given area. It consists of a radio, antenna, power and a fiber connection. Small Cells are short range mobile cell sites used to complement larger macro cells (or cell towers). Small cells enable the Verizon network team to strategically add capacity to high traffic areas.

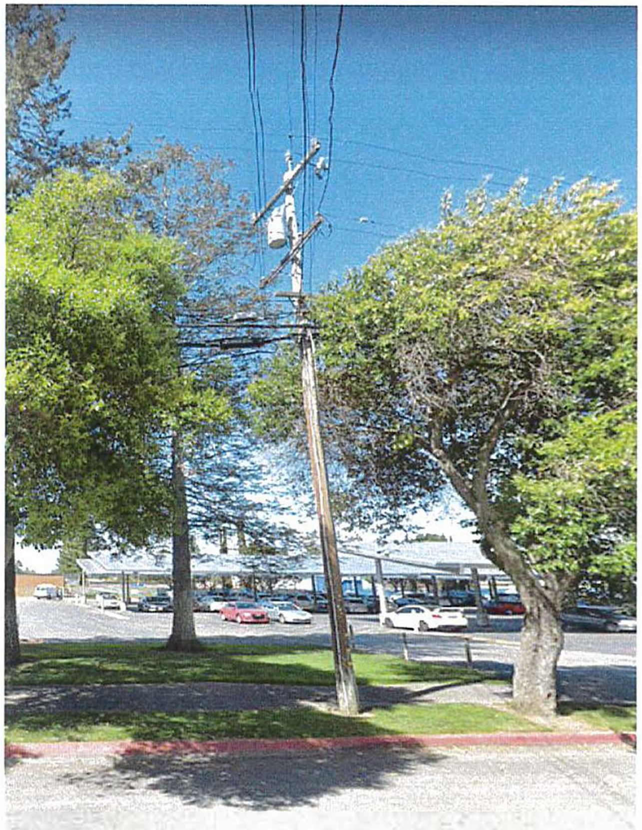
- Demand for wireless data services has nearly doubled over the last year, and is expected to grow 650% between 2013 and 2018 according to Cisco. It's part of Verizon's network strategy to provide reliable service and to stay ahead of this booming demand for wireless data.

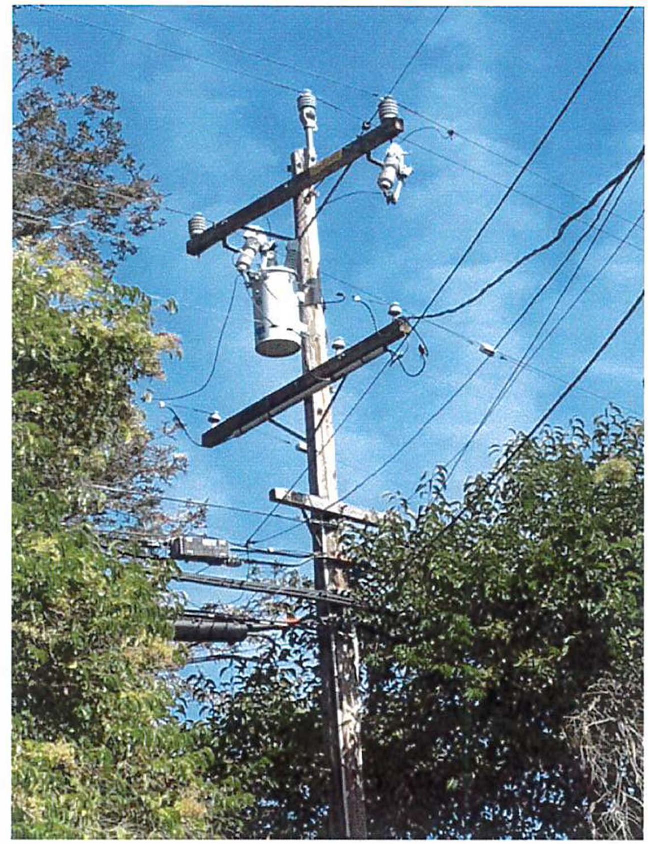
SHOT MAP OF PROPOSED SITE LOCATION AND ALTERNATIVES CONSIDERED

SHOT MAP OF PROPOSED SITE LOCATION AND ALTERNATIVES CONSIDERED



CURRENT PROPOSED SITE (155 ALMOND AVE.)

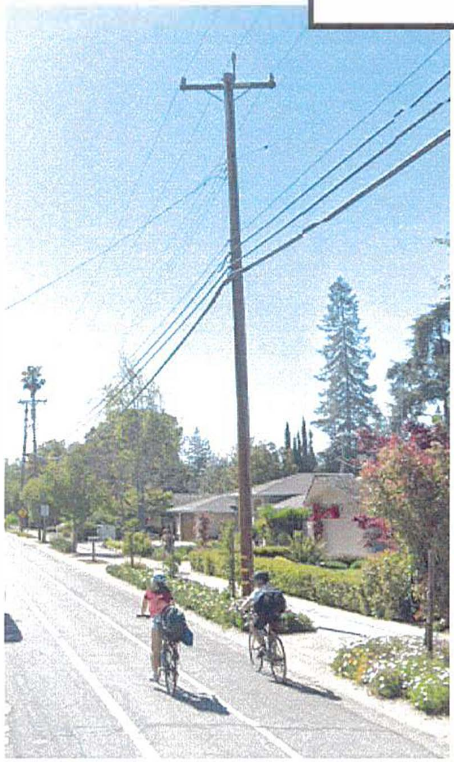




ALTERNATIVES REVIEW

Alternatives	Coordinates		Comments (Expanded explanation on each slide)	Location
	Latitude	Longitude		
Alternative #1	37.385052	-122.112158	Less preferable, adjacent to residential front yard.	83 Almond Ave.
Alternative #2	37.385053	-122.111856	Cut outs on pole.	93 Almond Ave.
Alternative #3	37.385056	-122.110234	Less vegetated screening.	A/F 154 Almond Ave.
Alternative #4	37.385086	-122.109582	Cut outs and Primary riser on pole.	A/F 200 Almond Ave.
Alternative #5	37.385067	-122.108829	Cut outs and Primary riser on pole.	199 Almond Ave.
Alternative #6	37.385085	-122.107957	Primary riser on pole.	A/F 288 Almond Ave.
Alternative #7	37.385117	-122.107321	Cut outs on pole.	A/F 300 Almond Ave.
Alternative #8	37.384630	-122.111941	Less preferable, adjacent to residential front yard.	Between 170 & 174 Fredrick Ct.
Alternative #9	37.384212	-122.111794	Less preferable, adjacent to residential front yard.	146 Fredrick Ct.
Alternative #10	37.384024	-122.111348	Cut outs on pole.	124 Merrit Rd.
Prior Candidate #11	37.385051	-122.111181	Moved off the location at the request of Los Altos Public Works. Less preferable, adjacent to residential front yard.	A/F 128 Almond Ave.

ALTERNATE SITE #1
(83 ALMOND AV.)



Node - Alternative Site #1

This alternative location is a wood utility pole located in the Public ROW.The nearest address is 83 Almond Ave.

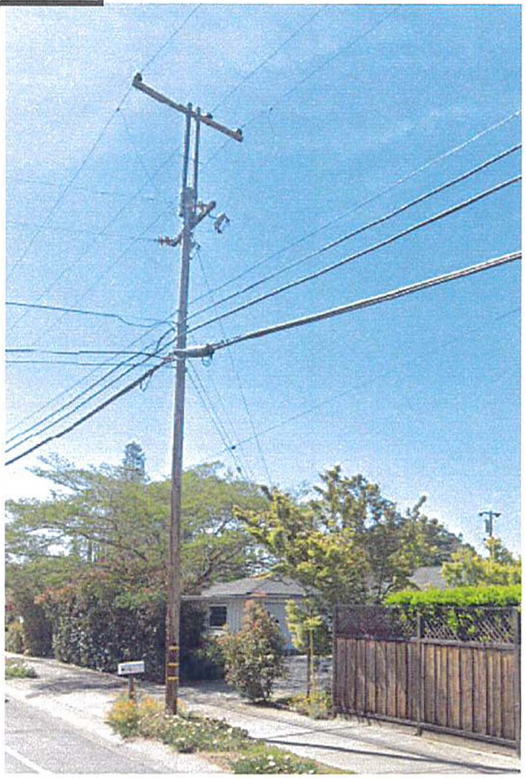
This pole is not a preferred candidate due to being adjacent to residential front yard.

ALTERNATE SITE #2
(93 ALMOND AVE.)

Node - Alternative Site #2

This alternative location is a wood utility pole located in the Public ROW. This pole is located near 93 Almond Ave.

This pole has PG&E safety cut outs. Wireless equipment is not allowed on poles with these configurations. PG&E considers this "operable" equipment.



ALTERNATE SITE #3
(A/F 154 ALMOND AVE.)

Node - Alternative Site #3

This alternative location is a wood utility pole located in the Public ROW. The nearest address is A/F 154 Almond Ave.

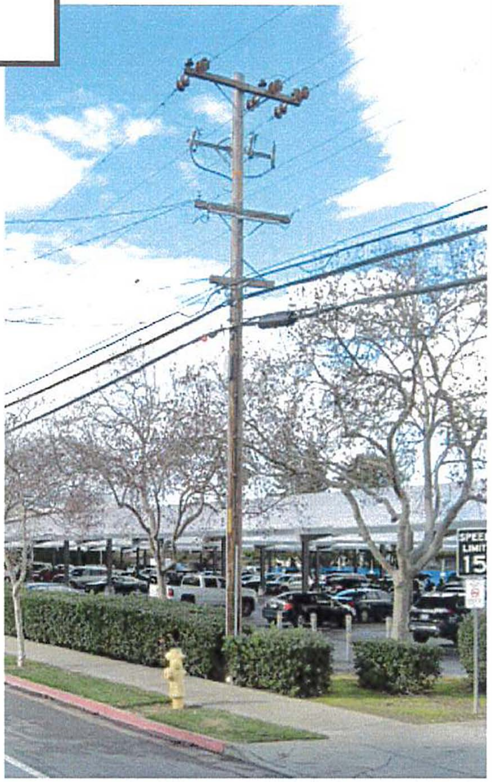
This pole is not well screened as the proposed candidate.

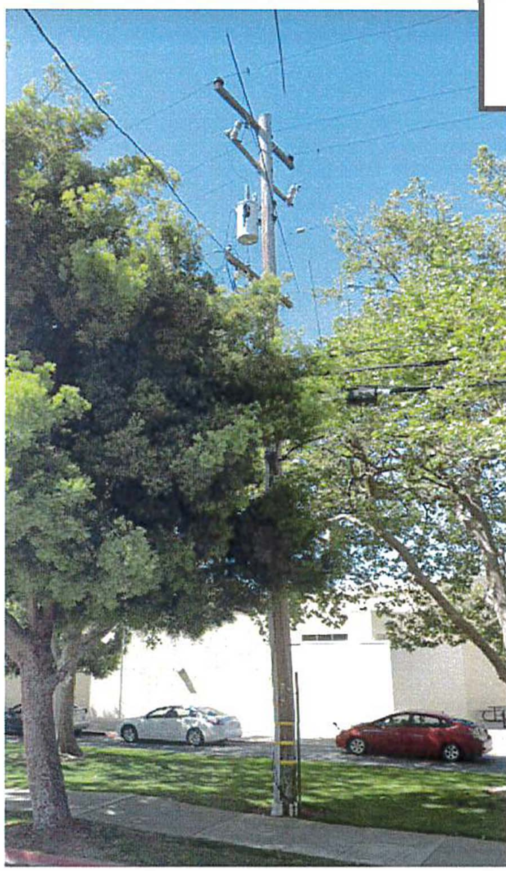
ALTERNATE SITE #4
(A/F 200 ALMOND AVE.)

Node - Alternative Site #4

This alternative location is a wood utility pole located in the Public ROW. This pole is located across from 200 Almond Ave.

This pole has PG&E primary service riser. Wireless equipment is not allowed on poles with these configurations.





ALTERNATE SITE #5
(199 ALMOND AVE.)

Node - Alternative Site #5

This alternative location is a wood utility pole located in the Public ROW. The nearest address is 199 Almond Ave.

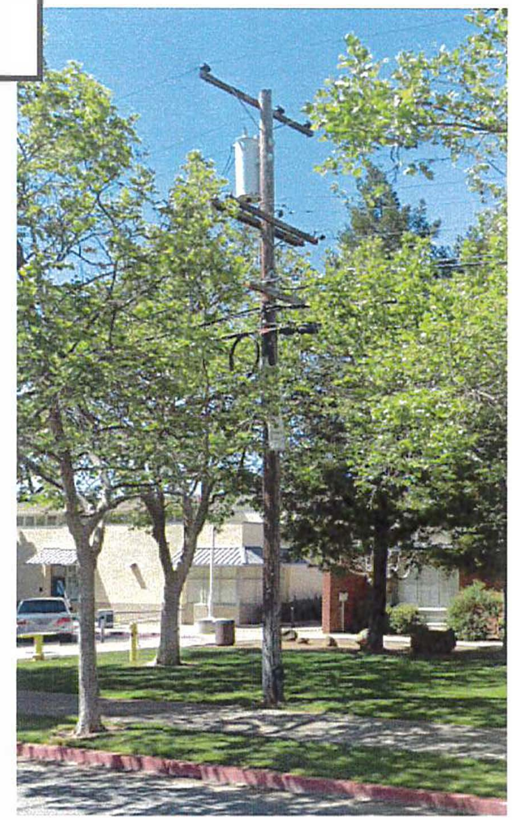
This pole has PG&E primary service riser. Wireless equipment is not allowed on poles with these configurations.

ALTERNATE SITE #6
(A/F 288 ALMOND AVE.)

Node - Alternative Site #6

This alternative location is a wood utility pole located in the Public ROW. This pole is located near across from 288 Almond Ave.

This pole has PG&E primary service riser. Wireless equipment is not allowed on poles with these configurations.



ALTERNATE SITE #7
(A/F 300 ALMOND AVE.)

Node - Alternative Site #7

This alternative location is a wood utility pole located in the Public ROW. The nearest address is across from 300 Almond Ave.

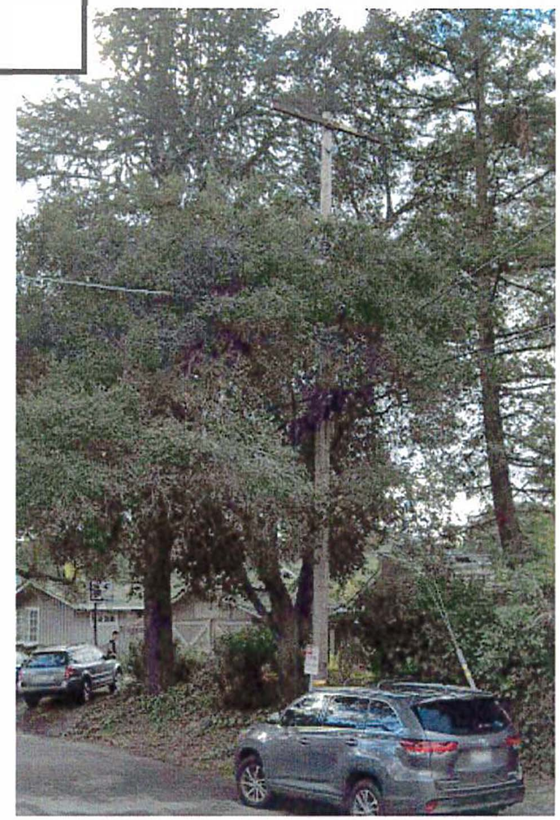
This pole has PG&E primary service riser. Wireless equipment is not allowed on poles with these configurations.

ALTERNATE SITE #8
(BTWN 170 & 174 FREDRICK CT.)

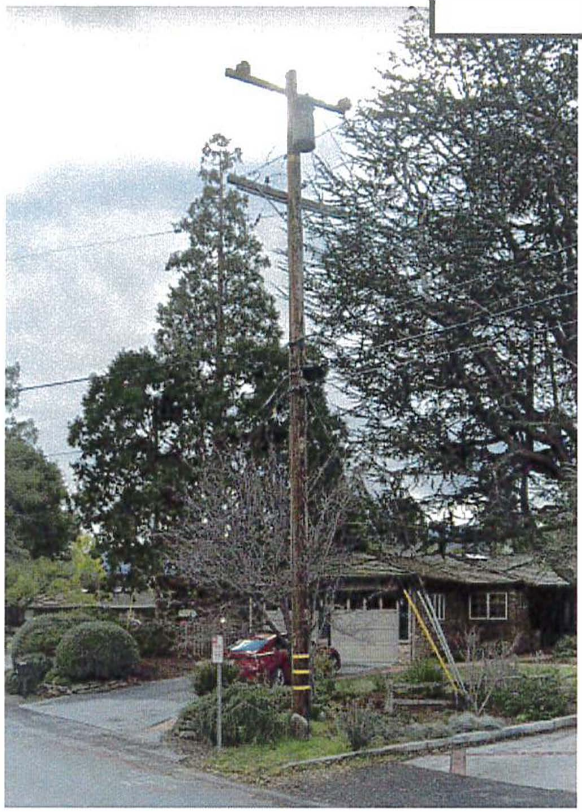
Node - Alternative Site #8

This alternative location is a wood utility pole located in the Public ROW. This pole is located between 170 & 174 Fredrick Ct.

This pole is a less preferred candidate due to being adjacent to residential front yard.



ALTERNATE SITE #9
(146 FREDRICK CT.)



Node - Alternative Site #9

This alternative location is a wood utility pole located in the Public ROW. The nearest address is 146 Fredrick Ct.

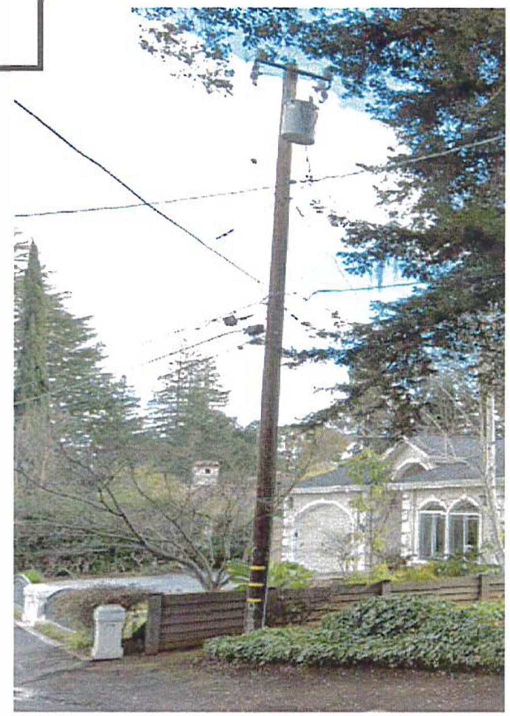
This pole is a less preferred candidate due to being adjacent to residential front yard.

ALTERNATE SITE #10
(124 MERRIT RD.)

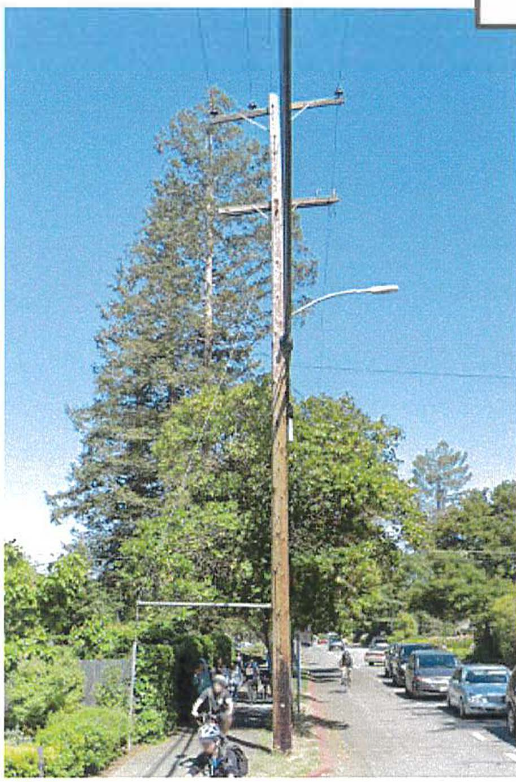
Node - Alternative Site #10

This alternative location is a wood utility pole located in the Public ROW. This pole is located near 124 Merrit Rd.

This pole has PG&E safety cut outs. Wireless equipment is not allowed on poles with these configurations.



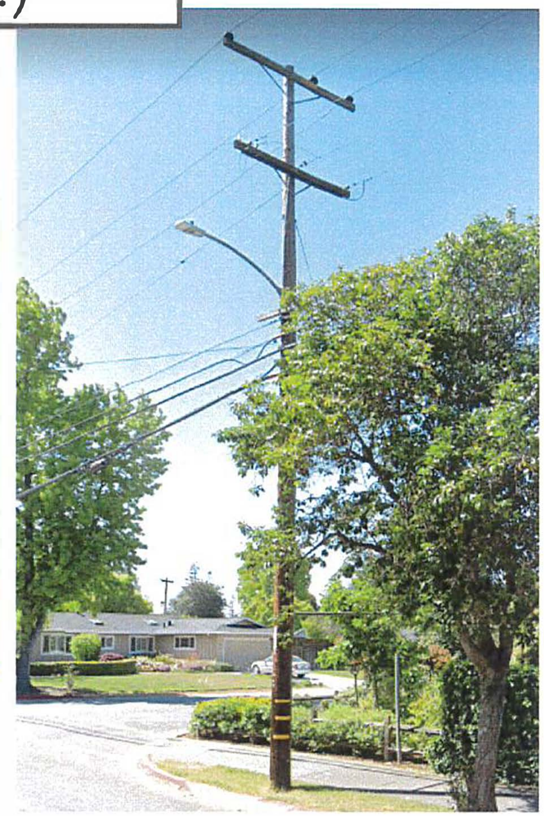
PRIOR CANDIDATE #11 (A/F 128 ALMOND AVE.)



Node – Prior Candidate #11

This alternative location is a wood utility pole located in the Public ROW. The nearest address is across from 128 Almond Ave.

This pole is a less preferred candidate due to being adjacent to residential front yard.



THANK YOU

The CBR Group, Inc.

CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY) 07/24/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

Holder Identifier :

PRODUCER
Aon Risk Services Northeast, Inc.
New York NY Office
One Liberty Plaza
165 Broadway, Suite 3201
New York NY 10006 USA

CONTACT NAME:
PHONE (A/C. No. Ext): (866) 283-7122
FAX (A/C. No.): (800) 363-0105
E-MAIL ADDRESS:

INSURED
Cellco Partnership dba Verizon Wireless
1095 Avenue of the Americas
New York NY 10036 USA

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A:	National Union Fire Ins Co of Pittsburgh	19445
INSURER B:	New Hampshire Insurance Company	23841
INSURER C:	AIU Insurance Company	19399
INSURER D:	American Home Assurance Co.	19380
INSURER E:	Illinois National Insurance Co	23817
INSURER F:		

COVERAGES **CERTIFICATE NUMBER:** 570077603194 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

Limits shown are as requested

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			GL6412251	06/30/2019	06/30/2020	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$2,000,000
	X XCU Coverage is Included						MED EXP (Any one person)	$10,000
							PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							
A	AUTOMOBILE LIABILITY			CA 299-19-14 AOS	06/30/2019	06/30/2020	COMBINED SINGLE LIMIT (Ea accident)	$2,000,000
A	X ANY AUTO			CA 299-19-18 MA	06/30/2019	06/30/2020	BODILY INJURY (Per person)	
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	
A	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY			CA 299-19-15 VA	06/30/2019	06/30/2020	PROPERTY DAMAGE (Per accident)	
A				See Next Page	06/30/2019	06/30/2020		
	UMBRELLA LIAB / OCCUR						EACH OCCURRENCE	
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	
	DED RETENTION							
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			WC014649148 AOS	06/30/2019	06/30/2020	X PER STATUTE / OTH-ER	
D	ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) N	N/A		WC014649146 CA	06/30/2019	06/30/2020	E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE-EA EMPLOYEE	$1,000,000
							E.L. DISEASE-POLICY LIMIT	$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: Public Rights-of-way throughout the City of San Jose. City of San Jose, its officers, officials, agents and volunteers are included as Additional insured with respect to the General Liability and Automobile Liability policies.

Certificate No : 570077603194

CERTIFICATE HOLDER

City of San Jose
Attn: City of San Jose Finance
Department, Risk Management
200 E. Santa Clara St., 14th Floor
San Jose CA 95113 USA

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Aon Risk Services Northeast, Inc.

AGENCY CUSTOMER ID: 570000027366

LOC #:

ACORD®

ADDITIONAL REMARKS SCHEDULE

Page _ of _

AGENCY	NAMED INSURED
Aon Risk Services Northeast, Inc.	Cellco Partnership dba Verizon Wireless
POLICY NUMBER: See Certificate Number: 570077603194	
CARRIER: See Certificate Number: 570077603194 / NAIC CODE:	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,
FORM NUMBER: ACORD 25 **FORM TITLE:** Certificate of Liability Insurance

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER	
INSURER	
INSURER	
INSURER	

ADDITIONAL POLICIES If a policy below does not include limit information, refer to the corresponding policy on the ACORD certificate form for policy limits.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS	
	AUTOMOBILE LIABILITY							
A				CA 299-19-16 NH - Primary	06/30/2019	06/30/2020		
A				CA 299-19-17 NH - Excess	06/30/2019	06/30/2020		
	WORKERS COMPENSATION							
C		N/A		WC014649149 NY	06/30/2019	06/30/2020		
E		N/A		WC014649144 FL	06/30/2019	06/30/2020		
B		N/A		WC014649145 MA,ND,OH,WI,WY	06/30/2019	06/30/2020		
B		N/A		WC014649147 NJ,TX,VA	06/30/2019	06/30/2020		

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THE CBR GROUP
COMMUNICATIONS BASED RESOURCE GROUP

October 25, 2019

VIA HAND DELIVERY

Department of Public Works
1 North San Antonio Road
Los Altos CA 94022

Dear Director of Public Works,

This letter serves as Verizon Wireless' authorization to allow collocation by other carriers and or companies. Collocation is authorized so long as the company's equipment does not interfere with Verizon's service and does not impact the structural integrity of the pole.

Sincerely,

Cady Cadiz
The CBR Group, Inc.
(Authorized Agent for Verizon Wireless)

DATE STAMP WITH APPLICATION AND RETURN COPY TO:	
Verizon Wireless 2785 Mitchell Drive, Bldg 9 Walnut Creek, CA 94598 Attn: Small Cell Real Estate Manager	**PLEASE DATE STAMP TOGETHER WITH VERIZON WIRELESS APPLICATION**

Verizon Wireless
Reservation of Rights

We have attached Verizon Wireless's permit application to install a small wireless facility in the public right-of-way as more particularly described in the application. Please be advised that Verizon Wireless reserves all of its rights under California Public Utilities Code § 7901, the federal Telecommunications Act, 47 U.S.C. §§ 253 and 332, Section 6409 of *the Middle Class Tax Relief and Job Creation Act of 2012* codified at 47 U.S.C. § 1455, the Federal Communications Commission ("FCC") ruling *In Re: Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review, Etc.*, FCC 09-99 (November 18, 2009), the FCC order *In Re: Acceleration of Broadband Deployment by Improving Wireless Facilities Siting Policies, Etc.*, FCC 14-153 (FCC October 17, 2014) and associated rules codified at 47 C.F.R. § 1.6100, the FCC ruling and order *In Re: Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, FCC 18-133 (September 27, 2018) and associated rules codified at 47 C.F.R. § 1.6001 *et seq.*, the licenses granted to it by the FCC, and all of its other rights that arise under any federal or state statute, regulation, or other legal authority (collectively, "Federal and State Rights").

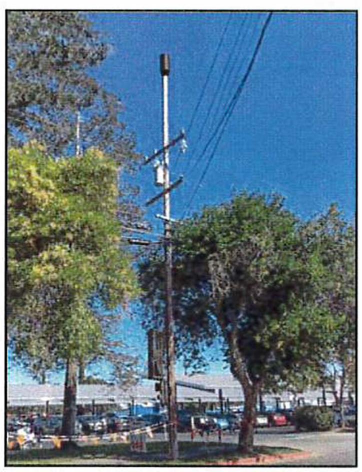
Among other Federal and State Rights, California Public Utilities Code § 7901 grants telephone corporations such as Verizon Wireless a statewide franchise to place telephone equipment in the public rights-of-way, and the use of the rights-of-way by telephone corporations is a matter of statewide concern that is not subject to local regulation except where such use incommodes the public use of a road or highway. In addition, the Telecommunications Act limits the authority of local jurisdictions by, among other restrictions, requiring final action within a reasonable period of time as specified in 47 C.F.R. 1.6003. A recent FCC order requires local jurisdictions to review small wireless facility applications under aesthetic standards that are reasonable, non-discriminatory and objective.

In submitting this application, Verizon Wireless expressly reserves all of its Federal and State Rights, including, without limitation, its rights under federal and state law to challenge excessive permit requirements for its proposed small wireless facility in the public right-of-way. Neither the act of submitting the application nor anything contained therein shall be construed as a waiver of any such rights.

Radio Frequency Electromagnetic Energy (RF-EME)
Maximum Permissible Exposure (MPE)
Public Exposure Safety Report

Verizon Wireless 4G Small Cell Site
"CA_LOS ALTOS_001"
155 ALMOND AVE.
Los Altos, California 94022
LAT:37.385059, LONG:-122.11073

October 22, 2019



Prepared by RF GLOBAL SAFETY CONSULTANTS
California Registered Professional Engineer

REGISTERED PROFESSIONAL ENGINEER
WAFIC M. HOJEIJ
No. E16587
Exp. 6/30/20
ELECTRICAL
STATE OF CALIFORNIA

Rfglobalsafety.com
Reports@RFGlobalSafety.com

Executive Summary

This report concludes that the proposed wireless 4G small cell site equipment to be installed at the aforementioned location with the specifications provided by Verizon Wireless complies with the applicable FCC- approved safety standards and guidelines for general public and occupational exposure.

General Information

In 1992, the American National Standards Institute (ANSI) published IEEE Standard C95.1-1991, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz.". This current publication defines "controlled" (i.e., occupational) and "uncontrolled" (i.e., public) environments, setting for the latter more restrictive exposure limits, but longer periods for time averaging.

The FCC has provided direction to the telecommunications industry on determining compliance with ANSI standards. This is presented in the Office of Engineering and Technology Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," dated August 1997. The equations given in this document are designed to yield a "worst-case" prediction of RF power densities in the near-field of an antenna.

The occupational (controlled) exposure limit is for personnel operating and maintaining the facilities small cell wireless equipment. This type of personnel should have training on the radiating equipment and will be able to disable the equipment when performing routine maintenance and replacement of equipment.

The general public (uncontrolled) exposure limit is for people who are unaware of the facilities small cell equipment and they are unfamiliar with any safety measures for being near this type of equipment.

I. Introduction

Verizon Wireless is proposing to build a 4G small cell site at the location described below. This is part of the 4G Network Verizon Wireless is building nationwide. The equipment to be installed at this site will be mounted on the electric utility pole. The cell site will include a radio mounted near the base of the pole and antenna will be mounted on an extended mast on top of the utility pole. This report will determine if the proposed cell site equipment when in operation, complies with the applicable FCC and ANSI safety guidelines.

II. Proposed Site Information

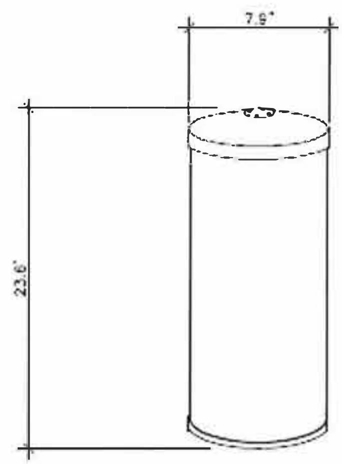
The proposed site will be located in the City of Lost Altos at aforementioned location. The equipment will be mounted on the utility pole at 48.9 feet above ground. The base station and antenna units will be mounted at the designated height and connected to the Verizon fiber network.

II.a Site Map - Google Earth

Equipment Information

The site equipment will be comprised of base station(s) and antenna(s) mounted on a utility pole.
Base Station make and Model: Ericsson, RRU-2208 & 2205.
Operating Frequencies (MHz): 1900 (PCS); 2100 (AWS).
Antenna make and model: ANDREW/COMMSCOPE, VVSSP-360S-M.
Output Power (ERP, dBm): 1900 (52.64); 2100 (52.64).
Antenna Type: Quasi-Omnidirectional multi-port.
Unit Dimension (in), Height x Diameter: 23.6 x 7.9.

Table-3 Below is a snapshot of the unit specification



IV. Theoretical Calculation of the proposed cell site exposure limits

Table IV.1

Ground Level,	% of Limit, (Highest)	Compliance Y/N	Mitigation Y/N
Occupational/ Controlled Exposure	0.10	Y	N,1
General Public/ Uncontrolled Exposure	0.49	Y	N,1

Table IV.2

Antenna Face Level	Distance, Feet (closest)	% of limit	Compliance, Y/N	Mitigation Y/N
Occupational/ Controlled Exposure	5.5	86	Y	N,1
General Public/Uncontrolled Exposure	12	90	Y	N,1

1 It is recommended that RF safety signage and warnings to be posted to remind general public and personnel of the existence of cell transmitter that is generating electromagnetic energy equipment at this location.

IV.a Power Density calculation method

The calculation was based on the OET Bulletin 65 guidelines for Maximum Permissible Exposure (MPE) to humans. A worst case scenario is used to calculate the power density using the following mathematical formula:

$S = 0.0334*P/R^2$

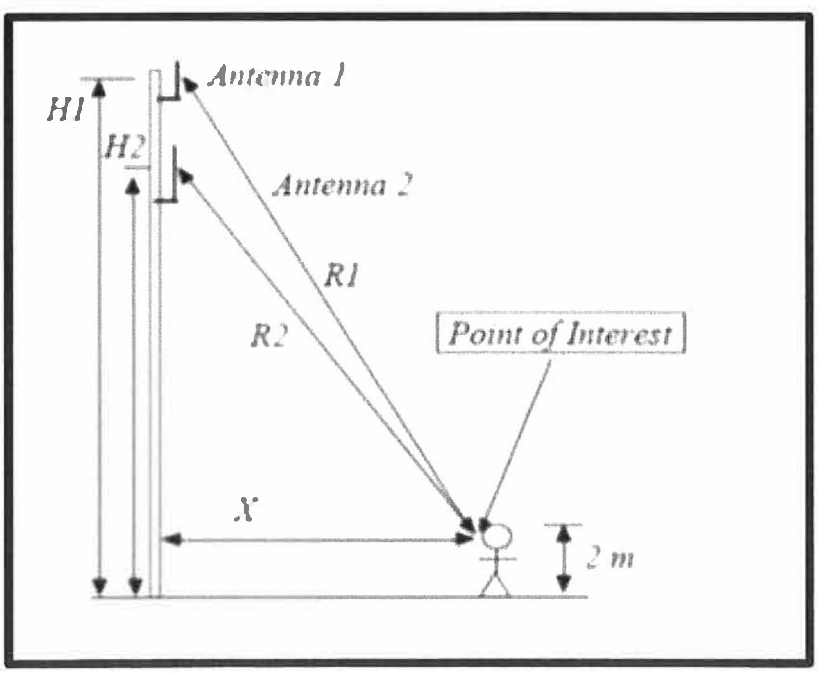
S is the power density in mW/cm^2
P is the Effective radiated power in Watts
R is the distance from the center of the antenna in meters

IV.b Distance Calculation from the small cell antenna

The above calculation was based on a worst case scenario for a person with an average height of 6.56 feet and standing at various distances in feet from the base of the utility pole. The direct distance R used in the calculation below is determined by using the mathematical formula:

$R = SQRT(H^2+X^2)$

Illustration-1



Where X is the distance from the general public to the base of the pole and H is the distance from the general public (individual) standing on the ground to the bottom of the panel antenna. The average height of an individual used in the calculations is 2 meters or 6.56 feet.

It should be noted that the strongest energy radiated from the antenna is at the face and center of the antenna. The general public may be exposed to more RF energy when standing in the face of the panel antenna. Additional calculations were done to determine the power density when general public is exposed to the energy at the antenna face level, such as on balconies in a residential area or in an office building that is in close proximity to the cell site. Calculations were completed at various distances for locations in direct path of the antenna beam. The table shows the calculated values of the minimum safe distances from the cell site.

V. Conclusion

The proposed Verizon Wireless 4G small cell site to be installed at the designated location with the equipment specifications provided will comply with the applicable FCC safety guidelines for maximum permissible occupational and general public exposure limits. This conclusion based on the analysis conducted in this report that showed the power density calculated to be below the safety limits set by the FCC OET Bulletin 65. The minimum distance from the face of the antenna where occupational and general public are below safety guidelines are 5.5 feet and 12 feet respectively. The power density calculated at the roof of the closest building (about 85 feet from the antenna pole) is 1.81% of the general public exposure limit. Furthermore, since the study was based on worst case scenario, the actual power density that may result from the equipment when in operation will most likely be far less than showing in the tables IV.1 and IV.2. And even though the proposed site to be installed will comply with applicable safety standards, it is recommended that signage to be posted on the utility pole to let the general public and personnel know of the presence of the cell site.

References:

A) Technical Standards applicable to this measurement

1. "Safety Levels with Respect to Human Exposure Frequency Electromagnetic Fields", American National Standards Institute (ANSI); IEEE Standard C95.1-1991.

2. "Evaluating Compliance with FCC Guidelines for Human Exposure to Frequency Electromagnetic Fields, Federal Communications Commission, Office of Engineering and Technology; OET Bulletin 65, Edition 97-01, August 1997.

B) Occupational and general public exposure limits as guidelines per the FCC OET Bulletin 65.

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength(E) (V/m)	Magnetic Field Strength(H) (A/m)	Power Density(S) (mW/cm2)
0.3-3.0	614	1.63	(100)*
3.0-30	1842/f	4.89/f	(900/f2)*
30-300	61.4	0.163	1.0
300-1500	--	--	f/300
1500-100,000	--	--	5.0

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength(E) (V/m)	Magnetic Field Strength(H) (A/m)	Power Density(S) (mW/cm2)
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f2)*
30-300	27.5	0.073	0.2
300-1500	--	--	f/1500
1500-100,000	--	--	1.0

f=frequency in MHz ***Plane-wave equivalent power density**

LOS ALTOS 001

155 ALMOND AVENUE
LOS ALTOS, CA 94022
STRUCTURE TYPE: PG&E POLE-TOP
LOCATION CODE: 427814

verizon

PROJECT DESCRIPTION

THIS IS AN UNMANNED WIRELESS TELECOMMUNICATION FACILITY FOR VERIZON WIRELESS CONSISTING OF THE INSTALLATION AND OPERATION OF AN ANTENNA AND ASSOCIATED EQUIPMENT. SCOPE OF WORK CONSISTS OF THE FOLLOWING:

1. INSTALL (N) CANISTER ANTENNA ON (N) 55' REPLACEMENT POLE (47'-0" ABOVE GROUND LEVEL, 8'-0" UNDERGROUND EMBEDMENT).
2. INSTALL (1) (N) SHROUD ON (N) UTILITY POLE.
3. INSTALL (1) (N) RRU UNIT INSIDE (N) SHROUD.
4. INSTALL (1) (N) RADIO 2205 AND (1) (N) RADIO 2208 INSIDE (N) SHROUD.
5. INSTALL (1) (N) 6302 POWER SUPPLY UNIT INSIDE (N) SHROUD.
6. INSTALL (1) (N) DISTRIBUTION PANEL ON (N) UTILITY POLE.
7. INSTALL (1) (N) DISCONNECT SWITCH ON (N) UTILITY POLE.
8. INSTALL (1) (N) PG&E SMART METER ON (N) UTILITY POLE.
9. INSTALL (N) FCC SIGNAGE ON (N) UTILITY POLE.
10. INSTALL (N) GROUND RODS/WELLS.
11. INSTALL (3) (N) CONDUITS FOR POWER, TELCO AND COAX.

CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

1) 2016 CALIFORNIA BUILDING CODE (CBC)
2) 2016 CALIFORNIA RESIDENTIAL CODE (CRC)
3) 2016 CALIFORNIA HISTORICAL BUILDING CODE (CHBC)
4) 2016 CALIFORNIA EXISTING BUILDING CODE (CEBC)
5) 2016 CALIFORNIA GREEN BUILDINGS STANDARDS CODE (CGBSC)
6) 2016 CALIFORNIA FIRE CODE (CFC)
7) 2016 CALIFORNIA MECHANICAL CODE (CMC)
8) 2016 CALIFORNIA PLUMBING CODE (CPC)
9) 2016 CALIFORNIA ELECTRICAL CODE (CEC)
10) 2016 CALIFORNIA ENERGY CODE (CEC)
11) ANSI / EIA-TIA-222-G
12) 2015 NFPA 101, LIFE SAFETY CODE
13) 2015 NFPA 72, NATIONAL FIRE ALARM CODE
14) 2015 NFPA 13, FIRE SPRINKLER CODE
15) G.O. 95

SHEET INDEX

OCCUPANCY AND CONSTRUCTION TYPE

OCCUPANCY : U (UNMANNED COMMUNICATIONS FACILITY)

CONSTRUCTION TYPE: –

HANDICAP REQUIREMENTS
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. ACCESSIBILITY ACCESS AND REQUIREMENTS ARE NOT REQUIRED, IN ACCORDANCE WITH CALIFORNIA STATE ADMINISTRATIVE CODE, PART 2, TITLE 24, SECTION 1103B.1, EXCEPTION I & SECTION 1134B.2.1, EXCEPTION 4.

RADIO FREQUENCY DATA PLAN

INITIATIVE:	REVISION LEVEL	DATE:
–	–	–

GENERAL CONTRACTOR NOTES

DO NOT SCALE DRAWINGS

THESE DRAWINGS ARE FORMATTED TO BE FULL SIZE AT 24" x 36". CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOBSITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR MATERIAL ORDERS OR BE RESPONSIBLE FOR THE SAME.

CALL 811 BEFORE YOU DIG — 811 — SAFE DIGGING PARTNER

PROJECT TEAM

APPLICANT/LESSEE:
VERIZON WIRELESS
2785 MITCHELL DRIVE, BLDG 9
WALNUT CREEK, CA 94598

APPLICANT/ENGINEER:
THE CBR GROUP
2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
PH: (925) 246-3212
EMAIL: projects@thecbrgroup.com

PROJECT INFORMATION

CURRENT USE:
UTILITY POLE

PROPOSED USE:
UTILITY POLE & TELECOMMUNICATIONS FACILITY

JURISDICTION:
CITY OF LOS ALTOS

LATITUDE:
37.385059

LONGITUDE:
-122.11073

AMSL:
±150' AMSL

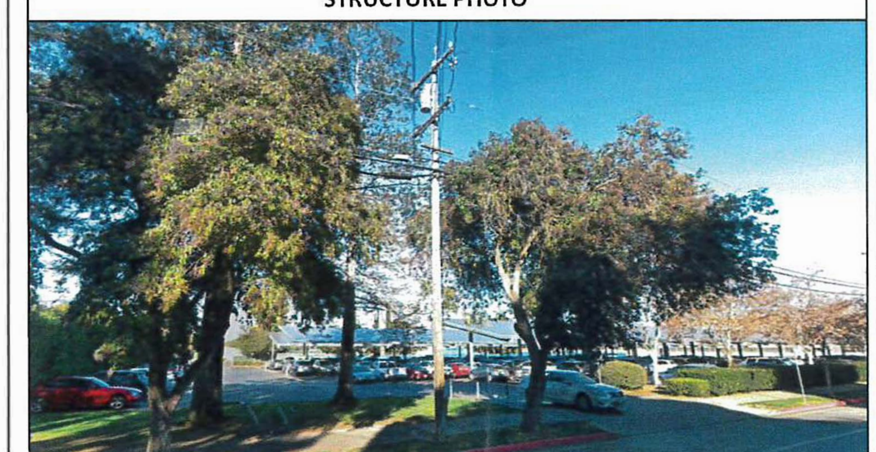
PROPERTY OWNER:
R.O.W.

POLE OWNER:
PG&E

POWER AGENCY:
PG&E
77 BEALE STREET
SAN FRANCISCO, CA 94109
PH: (800) 743-5000

VICINITY MAP

STRUCTURE PHOTO



Prepared For:
verizon
2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:
THE CBR GROUP
2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www. TheCBRGroup.com

Vendor:

Site Number:
427814

Site Name:
LOS ALTOS 001

Site Address:
155 ALMOND AVENUE
LOS ALTOS, CA 94022

County:
SANTA CLARA COUNTY

Issued For:
CONSTRUCTION

REV	DATE	DESCRIPTION	BY
C	10/22/19	DESIGN CHANGE	ALR
B	07/12/19	100% CD'S FOR REVIEW	JG
A	05/22/19	90% CD'S FOR REVIEW	JG

Licensor:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. FREEDMAN
No C-86844
Exp. 3/31/21
CIVIL
STATE OF CALIFORNIA

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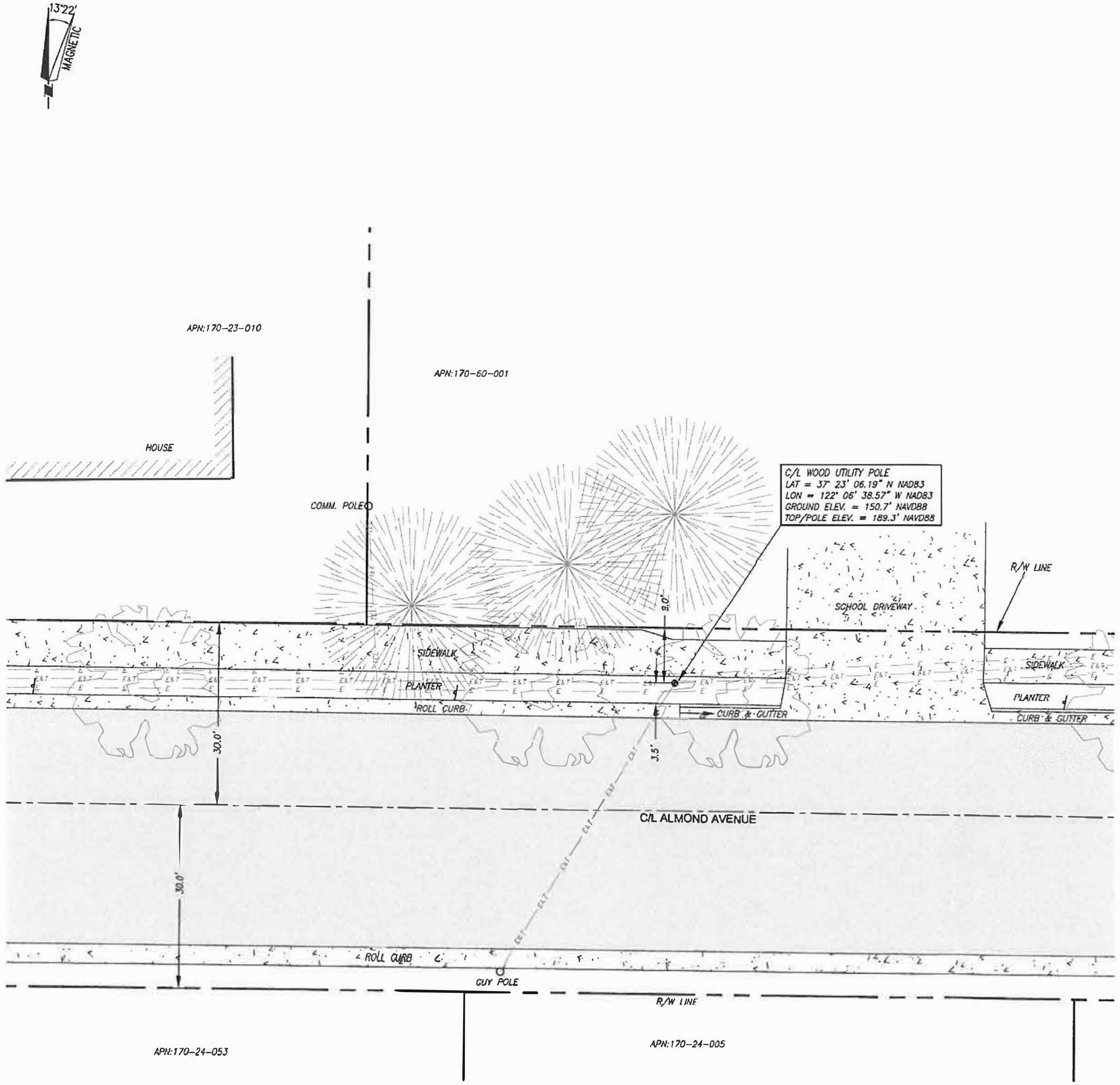
Sheet Title:
TITLE SHEET

Sheet Number:
T-1



JOINT POLE - R/W EXHIBIT
1"=10'

LEGEND

———	PROPERTY LINE
— · —	FLOW LINE
— TEL — TEL —	TELEPHONE LINE
— E — E —	ELECTRIC LINE
— E&T — E&T —	ELECTRIC AND TELEPHONE LINES
— x — x —	FENCE
— — — —	ADJOINER
OG	ORIGINAL GROUND
TC	TOP OF CURB
BFC	BOTTOM FACE OF CURB
TW	TOP OF WALL
BW	BOTTOM OF WALL
TBW	TOP BACK OF WALK
Ⓖ	GROUND WELL
C/L	CENTERLINE

GEODETIC LOCATION

DATE OF SURVEY: OCTOBER 23, 2018
SITE NUMBER / NAME: LOS ALTOS 001
TYPE: EXISTING WOOD UTILITY POLE
SITE ADDRESS: 155 ALMOND AVENUE
LOS ALTOS, CA., 94022

I, TIMOTHY SCHAD, HEREBY CERTIFY THE GEODETIC COORDINATES AT THE CENTER OF THE EXISTING WOOD UTILITY POLE TO BE:

LATITUDE= 37° 23' 06.19" NORTH (NAD83) (37.385053° NORTH)
LONGITUDE= 122° 06' 38.57" WEST (NAD83) (122.110714° WEST)

GROUND ELEVATION= 150.7' NAVD88 (0.0' A.G.L.)
TOP/POLE ELEVATION= 189.3' NAVD88 (38.6' A.G.L.)
TOP/CONDUCTOR ELEV. (HIGHEST PT.)= 191.0' NAVD88 (40.3' A.G.L.)

THE ACCURACY STANDARDS FOR THIS CERTIFICATION ARE AS FOLLOWS:

GEODETIC COORDINATES: +/- FIFTEEN (15) FEET (NAD-83)
ELEVATIONS: +/- THREE (3) FEET (NAVD-88)

SURVEY NOTES

1. ALL LATITUDES AND LONGITUDES ARE NAD 83. ALL ELEVATIONS ARE NAVD 88 (UNLESS NOTED OTHERWISE)

2. ALL BOUNDARY INFORMATION SHOWN HEREON HAS BEEN COMPILED FROM RECORD DATA. THIS IS NOT A BOUNDARY SURVEY.

3. DATE OF FIELD SURVEY OCTOBER 23, 2018.

4. NO PRELIMINARY TITLE REPORT HAS BEEN PROVIDED, ANY EASEMENTS OR OTHER TITLE RELATED ISSUES NOT INCLUDED IN SAID REPORT WHICH ARE PART OF THE TITLE PROCESS MAY OR MAY NOT HAVE BEEN ADDRESSED. TIMOTHY F. SCHAD, L.S. ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR BOUNDARY OR TITLE ITEMS ADDRESSED HEREON. THIS IS NOT A BOUNDARY SURVEY.

verizon

TIMOTHY SCHAD, L.S.
10699 ROUND VALLEY RD.
GRASS VALLEY, CA. 95949
PHONE: (530) 271-7477
FAX: (530) 271-7377

PROJECT NO:
DRAWN BY:
CHECKED BY:

REV	DATE	DESCRIPTION

PROFESSIONAL LAND SURVEYOR
TIMOTHY F. SCHAD
LS 6021
Exp. 3/31/19
STATE OF CALIFORNIA

10/27/2018

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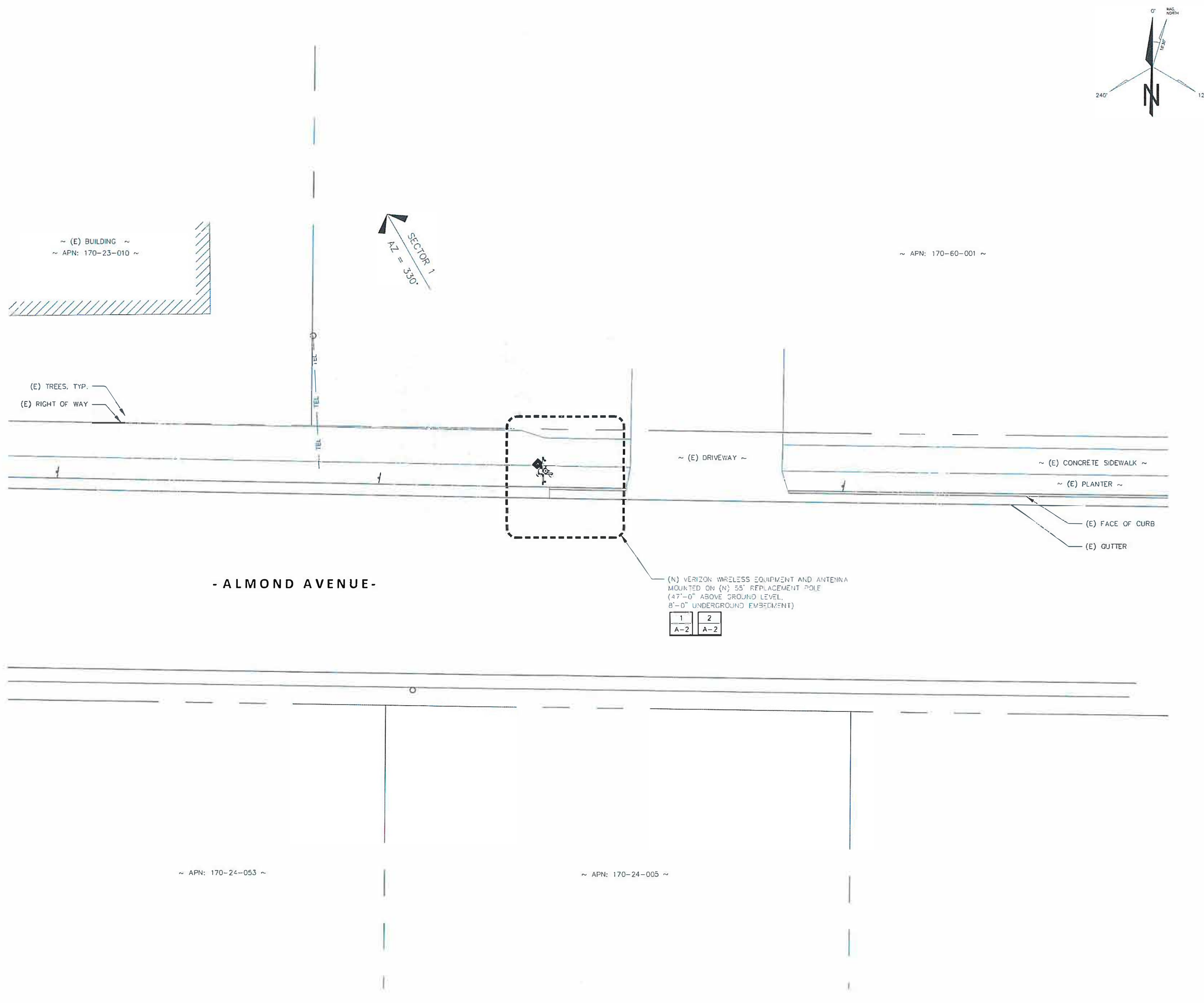
LOS ALTOS 001
155 ALMOND AVENUE
LOS ALTOS, CA. 94022
SANTA CLARA COUNTY
ADJACENT TO APN:170-60-001

SHEET TITLE
UTILITY POLE EXHIBIT

SHEET NUMBER
LS-1

SYMBOLS

2	GRID REFERENCE
1 / A-2	DETAIL REFERENCE
X / X-X	ELEVATION REFERENCE
X / X-X	SECTION REFERENCE
	CENTERLINE
	PROPERTY/LEASE LINE
	MATCH LINE
	WORK POINT
	GROUND CONDUCTOR
T	TELEPHONE CONDUIT
E	ELECTRICAL CONDUIT
A	COAXIAL CABLE
O/H	OVERHEAD SERVICE CONDUCTORS
	GROUT OR PLASTER
	(E) BRICK
	(E) MASONRY
	CONCRETE
	EARTH
	GRAVEL
	PLYWOOD
	SAND
	WOOD CONTINUOUS
	WOOD BLOCKING
	STEEL
(N)	NEW
(E)	EXISTING
	NEW ANTENNA
	EXISTING ANTENNA
	GROUND ROD
	GROUND BUS BAR
	MECHANICAL GRND. CONN.
	CADWELD
	GROUND ACCESS WELL
E	ELECTRIC BOX
T	TELEPHONE BOX
	LIGHT POLE
	FND. MONUMENT
	SPOT ELEVATION
	SET POINT
	REVISION



1 OVERALL SITE PLAN

SCALE: 3/32" = 1'-0"
0' 4' 8' 16' 32'

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www. TheCBRGroup.com

Vendor:

Site Number: 427814

Site Name: LOS ALTOS 001

Site Address: 155 ALMOND AVENUE LOS ALTOS, CA 94022

County: SANTA CLARA COUNTY

Issued For: CONSTRUCTION

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No C-86844
Exp. 3/31/21
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STATE OF CALIFORNIA

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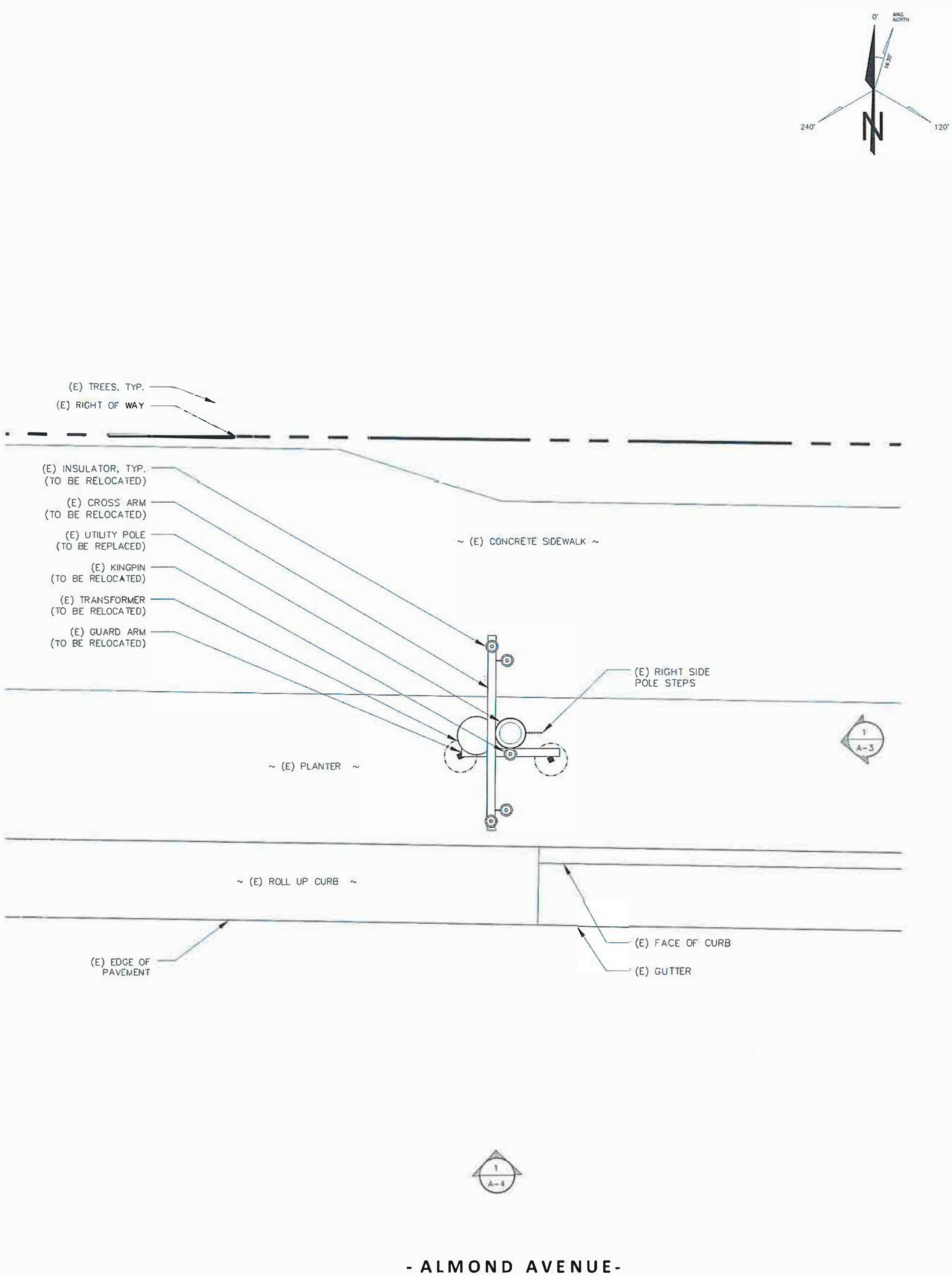
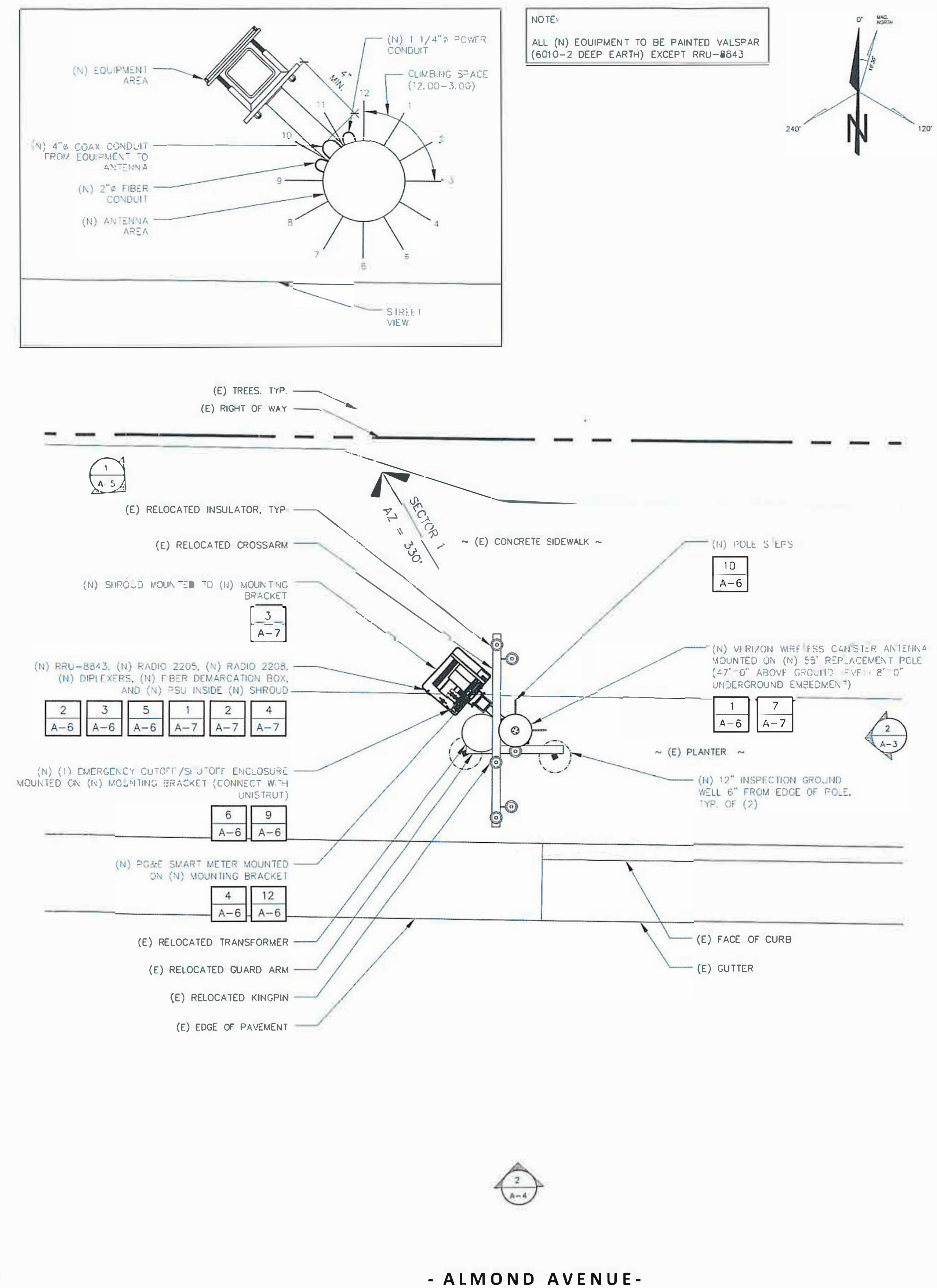
Sheet Title: OVERALL SITE PLAN

Sheet Number: A-1



1 EXISTING EQUIPMENT AND ANTENNA

SCALE: 1/2" = 1'-0"
0' 2' 4' 6'



NOTE:
ALL (N) EQUIPMENT TO BE PAINTED VALSPAR (6010-2 DEEP EARTH) EXCEPT RRU-8843

2 PROPOSED EQUIPMENT AND ANTENNA

SCALE: 1/2" = 1'-0"
0' 2' 4' 6'

Prepared For:

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2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www. TheCBRGroup.com

Vendor:

Site Number:
427814

Site Name:
LOS ALTOS 001

Site Address:
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County:
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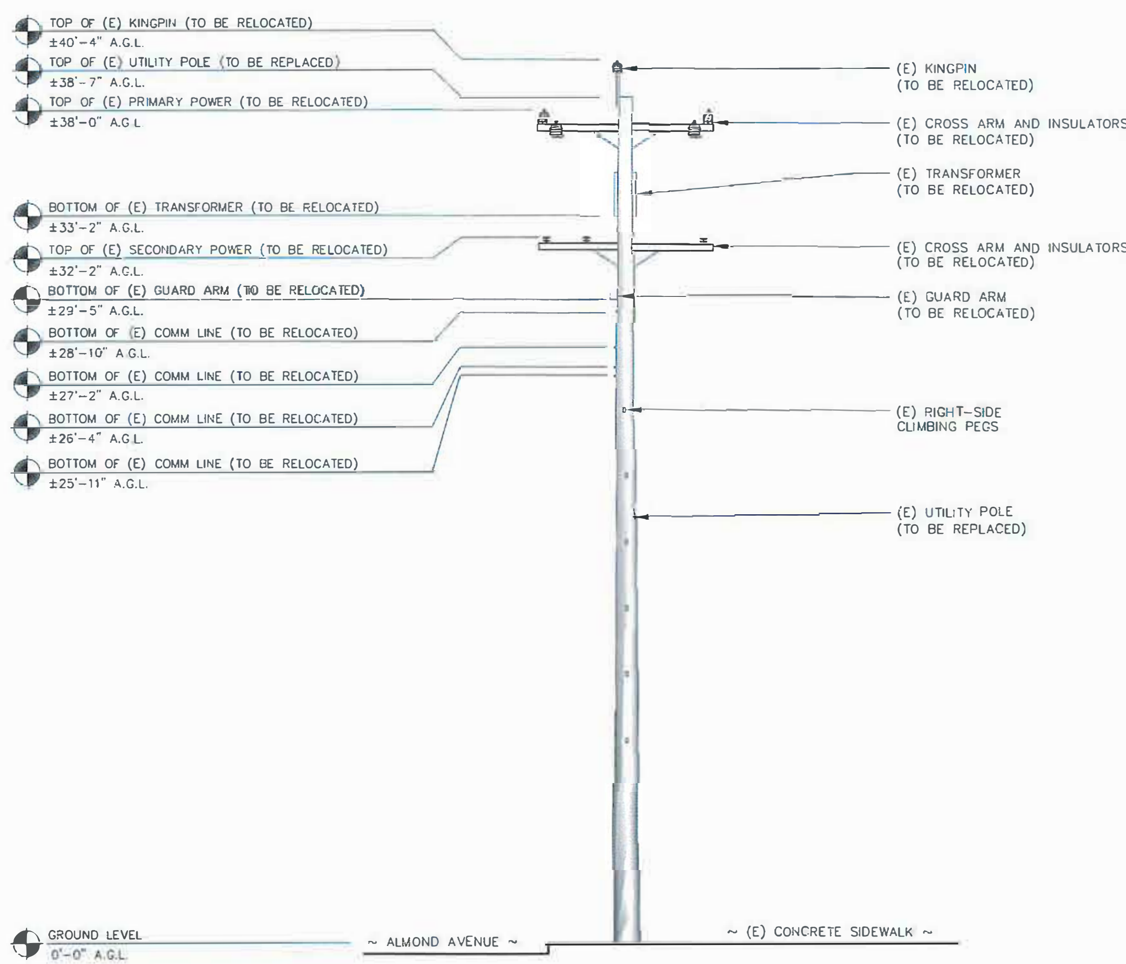
Sheet Title:
EXISTING AND PROPOSED EQUIPMENT AND ANTENNA PLANS

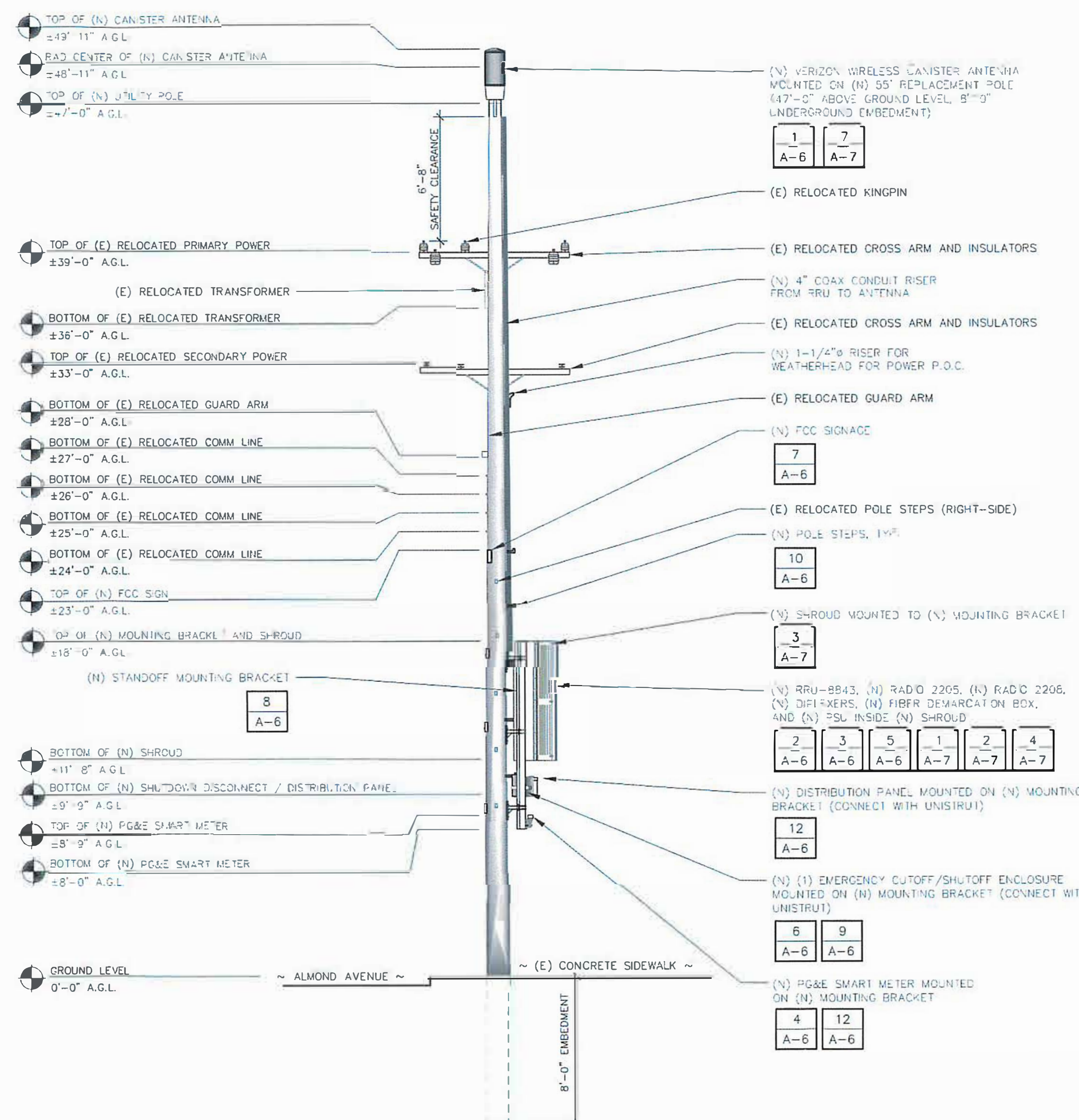
Sheet Number:
A-2



1 EXISTING EAST ELEVATION

SCALE: 1/4" = 1'-0"
0' 2' 4' 8' 12'

NOTE:
ALL (N) EQUIPMENT TO BE PAINTED VALSPAR (6010-2 DEEP EARTH) EXCEPT RRU-8843



2 PROPOSED EAST ELEVATION

SCALE: 1/4" = 1'-0"
0' 2' 4' 8' 12'

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www. TheCBRGroup.com

Vendor:

Site Number: 427814

Site Name: LOS ALTOS 001

Site Address: 155 ALMOND AVENUE LOS ALTOS, CA 94022

County: SANTA CLARA COUNTY

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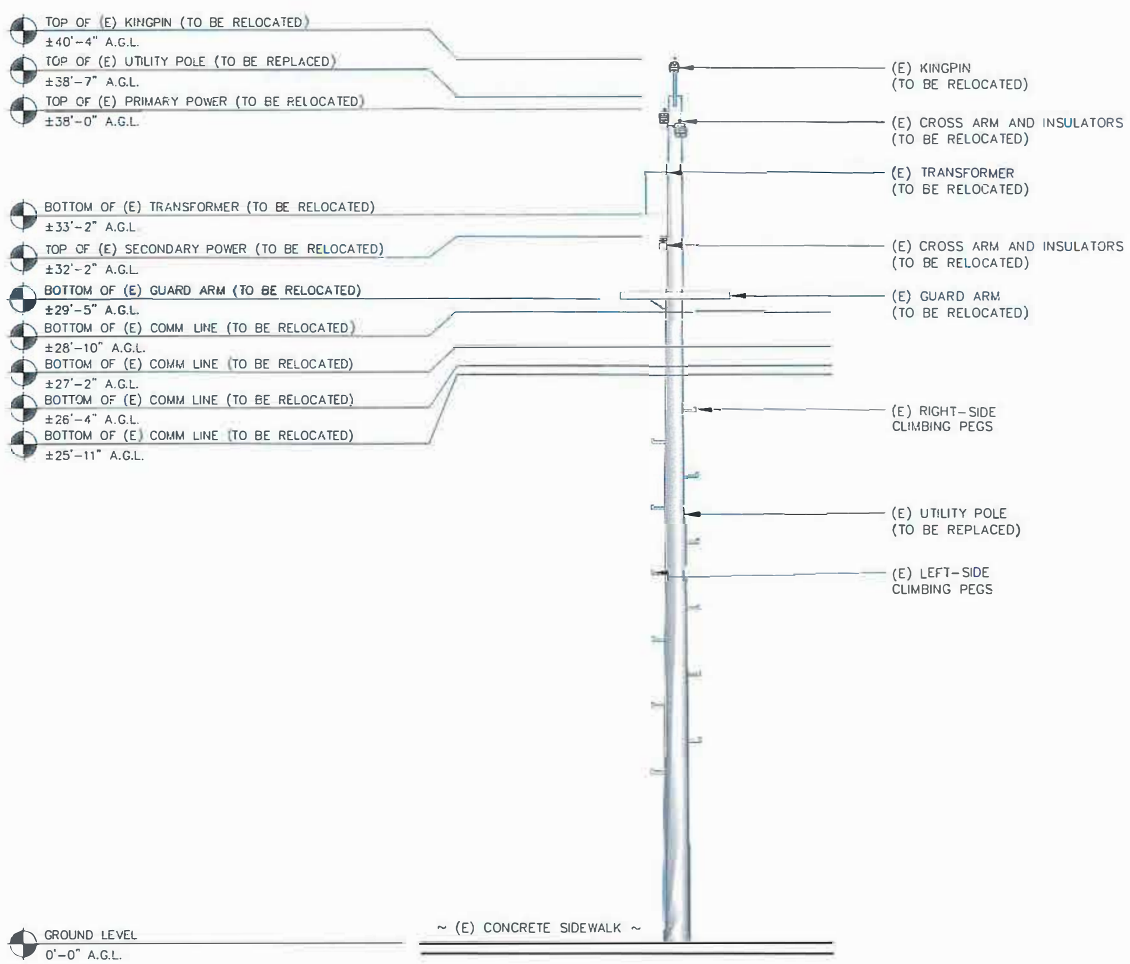
Sheet Title: EXISTING AND PROPOSED EAST ELEVATION

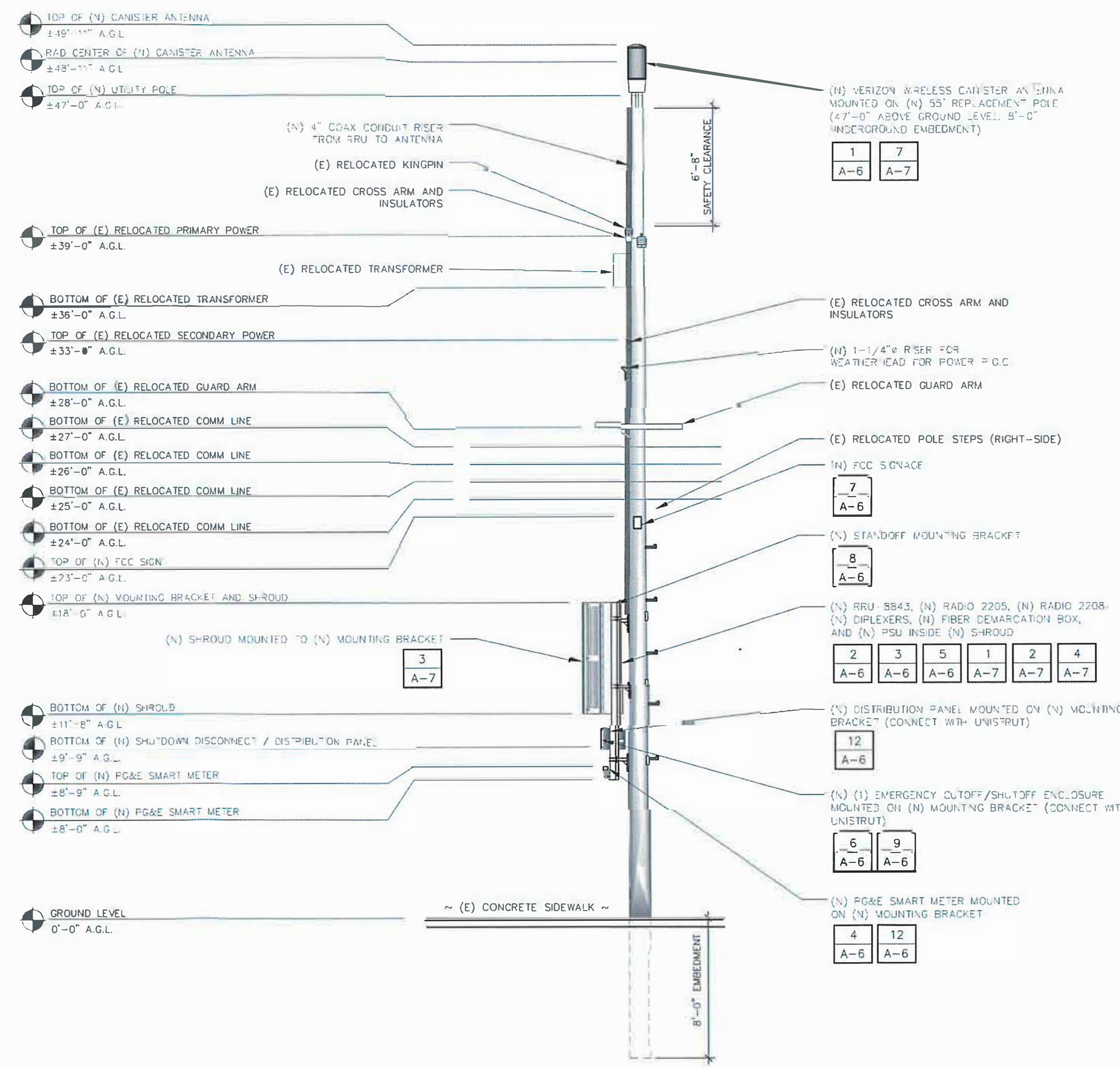
Sheet Number: A-3



1 EXISTING SOUTH ELEVATION

SCALE: 1/4" = 1'-0"
0' 2' 4' 8' 12'

NOTE:
ALL (N) EQUIPMENT TO BE PAINTED VALSPAR (5010-2 DEEP EARTH) EXCEPT RRU-8843



2 PROPOSED SOUTH ELEVATION

SCALE: 1/4" = 1'-0"
0' 2' 4' 8' 12'

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www. TheCBRGroup.com

Vendor:

Site Number:
427814

Site Name:
LOS ALTOS 001

Site Address:
155 ALMOND AVENUE
LOS ALTOS, CA 94022

County:
SANTA CLARA COUNTY

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CONSTRUCTION

REV	DATE	DESCRIPTION	BY
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B	07/12/19	100% CD'S FOR REVIEW	JG
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Licensor:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. FREEDMAN
No C-86844
Exp. 3/31/21
CIVIL
STATE OF CALIFORNIA

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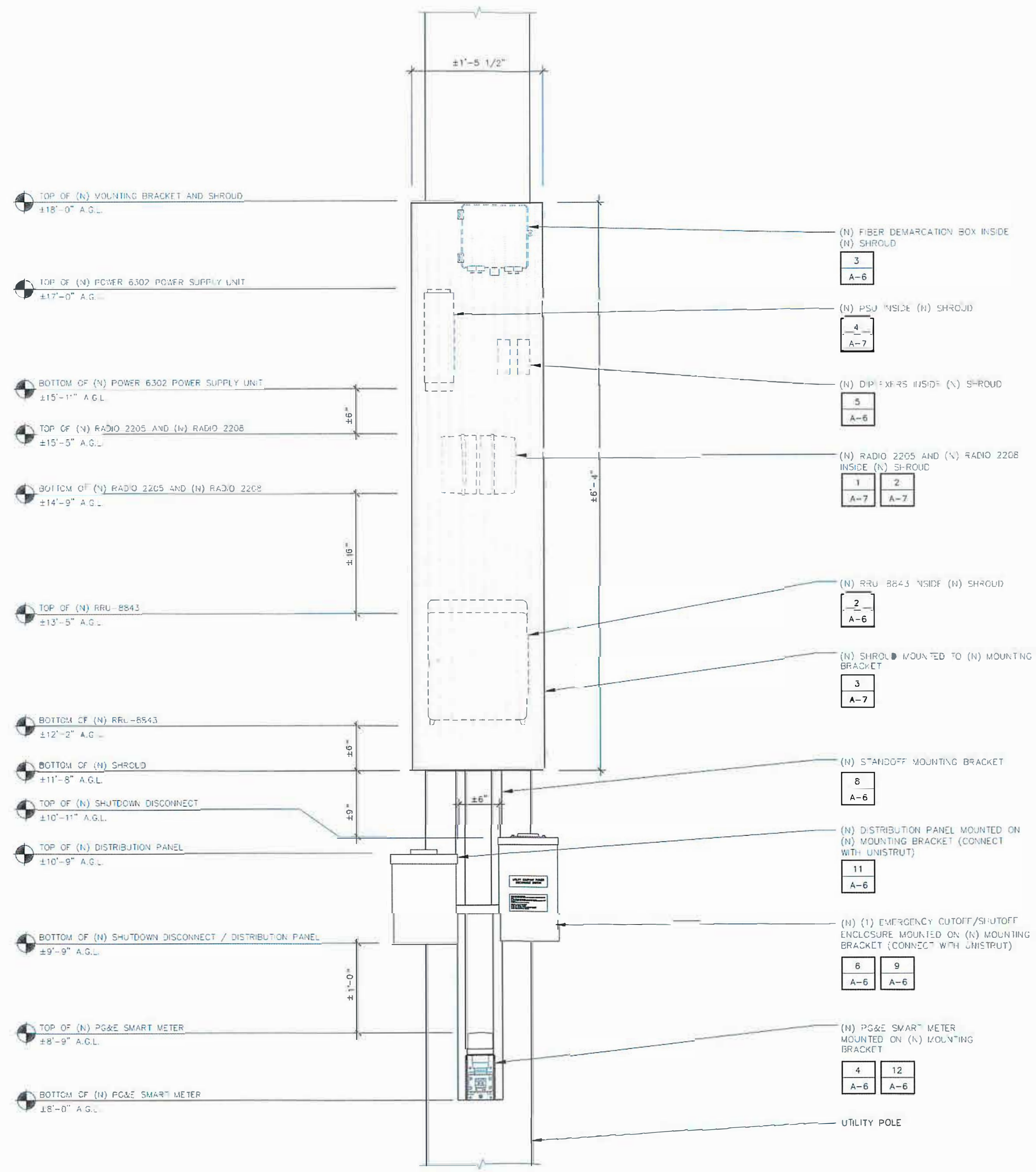
Sheet Title:
EXISTING AND PROPOSED SOUTH ELEVATION

Sheet Number:
A-4

NOTE:
ALL (N) EQUIPMENT TO BE PAINTED VALSPAR (6010-2 DEEP EARTH) EXCEPT RRU-8843



1 PROPOSED FRONT VIEW ELEVATION

SCALE: 1-1/2" = 1'-0"
0' 1' 2'

Prepared For:
verizon
2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:
THE CBR GROUP
2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www. TheCBRGroup.com

Vendor:

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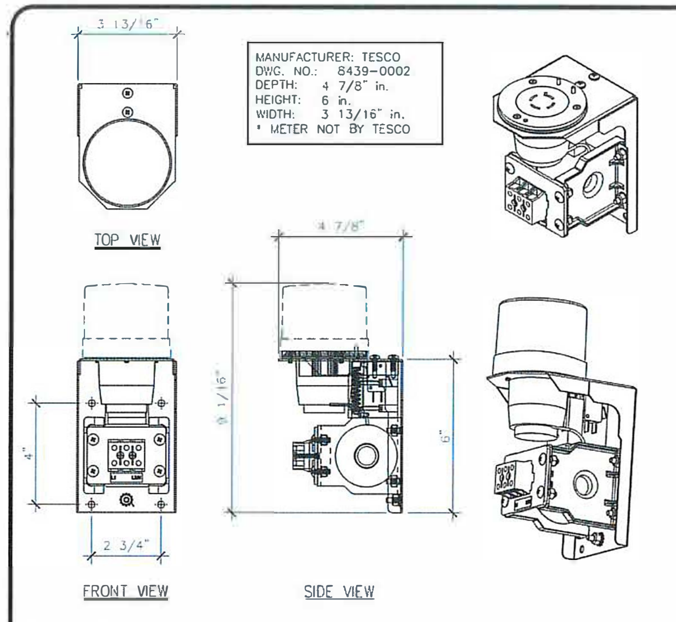
Sheet Title: PROPOSED FRONT VIEW ELEVATION

Sheet Number: A-5

MANUFACTURER: TESCO
DWG. NO.: 8439-0002
DEPTH: 4 7/8" in.
HEIGHT: 6 in.
WIDTH: 3 13/16" in.
* METER NOT BY TESCO



MOUNT FOR ELECTRICAL METER

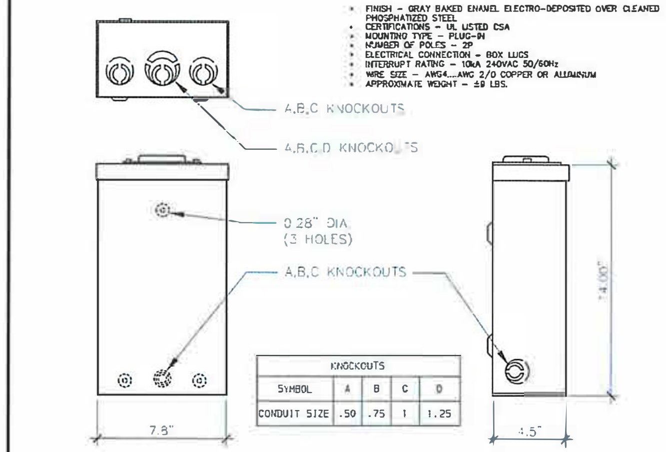
SCALE: N.T.S 12

SQUARE D COMPANY
GENERAL DUTY SAFETY SWITCHES
100 AMPERE
ENCLOSURE - NEMA TYPE 3R RAINPROOF

OR APPROVED EQUIVALENT

CATALOG NUMBER	VOLTAGE RATINGS	WIRING DIAG. NON-FUSIBLE	HORSEPOWER RATINGS 240VAC MAX. 1Ø	3Ø
QO2000NRB	240VAC		20	-

NOTES:
- FINISH - GRAY BAKED ENAMEL ELECTRO-DEPOSITED OVER CLEANED PHOSPHATIZED STEEL
- CERTIFICATIONS - UL LISTED CSA
- MOUNTING TYPE - PLUG-IN
- NUMBER OF POLES - 2P
- ELECTRICAL CONNECTION - BOX LUGS
- INTERRUPT RATING - 10kA 240VAC 50/60Hz
- WIRE SIZE - AWG4....AWG 2/0 COPPER OR ALUMINUM
- APPROXIMATE WEIGHT - ±9 LBS.



KNOCKOUTS				
SYMBOL	A	B	C	D
CONDUIT SIZE	.50	.75	1	1.25

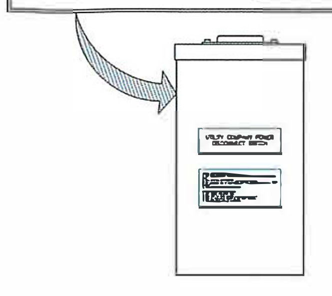
SHUTDOWN DISCONNECT SWITCH

SCALE: N.T.S 9

Normal Shut-Down Protocols:
1. Call 800-264-6620 24HRS prior to schedule a shut-down day and time.
2. Give NOC the Node number ____________
3. On scheduled day of shut-down, Pull the disconnect handle to "OFF" position.
4. Call NOC when work is completed.

Emergency Shut-Down Protocols:
1. Call (800) 264-6620 NOC.
2. Give NOC the Node number ____________
3. Pull the disconnect handle to the "OFF" position.
4. Call NOC when work is completed.

NOTE:
CONTRACTOR TO INPUT SIDE ID / SITE NAME / MARKET ID / PS LOCATION CODE



OUTSIDE PANEL DOOR SHOWING DISCONNECT SWITCH ID ON 2"X6" PLAQUE AND SHUT DOWN PROTOCOL ON 6"X7" LABEL

SHUTDOWN PROTOCOL PLAQUE

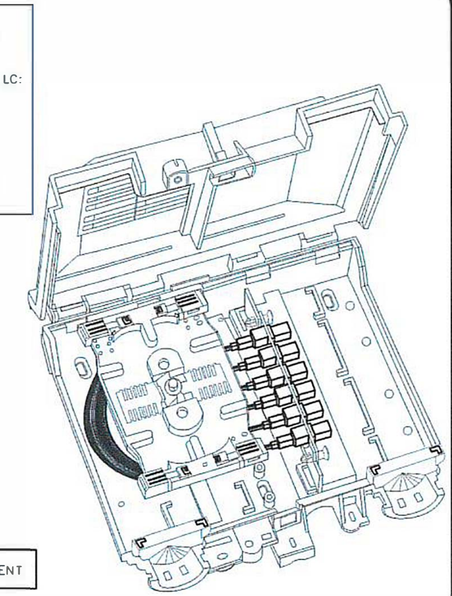
SCALE: N.T.S 6

DIMENSIONS:
8.54"x10"x2.88" (HxWxD)

CAPACITY:
6-PACK DUPLEX SC OR LC:
12 FIBERS

WEIGHT:
1.5 LBS. (EMPTY)

SPECIAL FEATURES:
AVAILABLE AS SINGLE OR DUAL DOOR ENCLOSURE

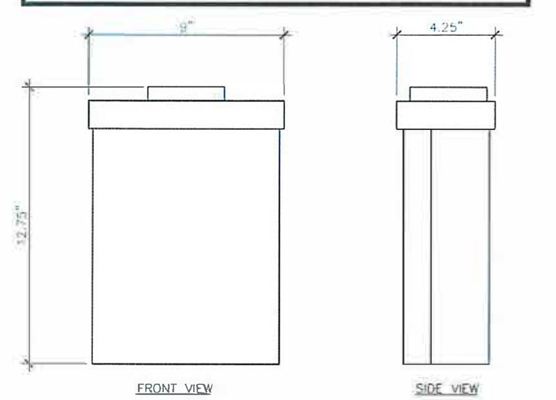


OR APPROVED EQUIVALENT

FIBER DEMARCATION BOX DETAIL

SCALE: N.T.S 3

MANUFACTURER: SQUARE D
MODEL: QO612L100RB
DIMENSIONS:
HEIGHT: 12.75"
WIDTH: 9"
DEPTH: 4.25"
ENCLOSURE NEMA RATING: 3R
ENCLOSURE MATERIAL: STEEL
AMPS: 100A
VOLTAGE: 120/240VAC
WEIGHT: 3.7 LBS.
NUMBER OF SPACES: 6



OR APPROVED EQUIVALENT

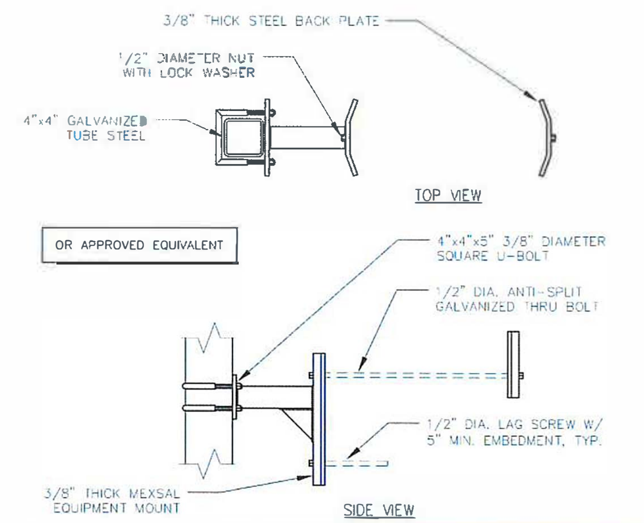
DISTRIBUTION PANEL DETAIL

SCALE: N.T.S 11

WEIGHT: 24LBS
PAINT: VALSPAR (6010-2 DEEP EARTH
LOAD CAPACITY: 1,500LBS

MEXSAL DESIGN GROUP
1990 NORTH CALIFORNIA BLVD.
WALNUT CREEK, CA 94596
(510) 500-9999

OR APPROVED EQUIVALENT

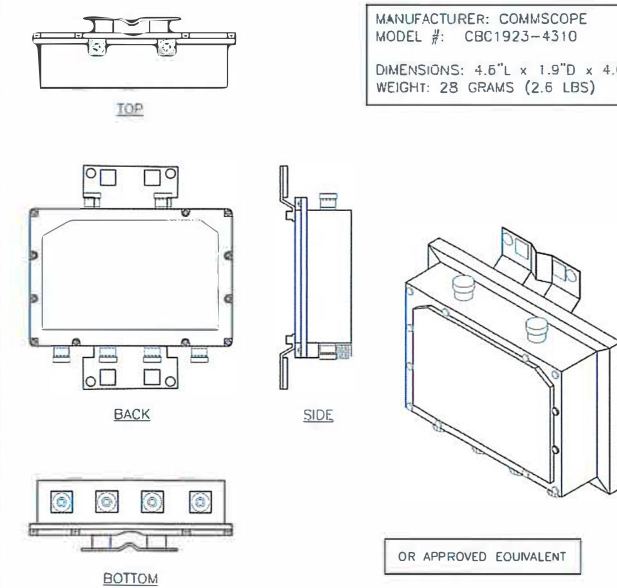


EQUIPMENT MOUNT DETAIL

SCALE: N.T.S 8

MANUFACTURER: COMMSCOPE
MODEL #: CBC1923-4310

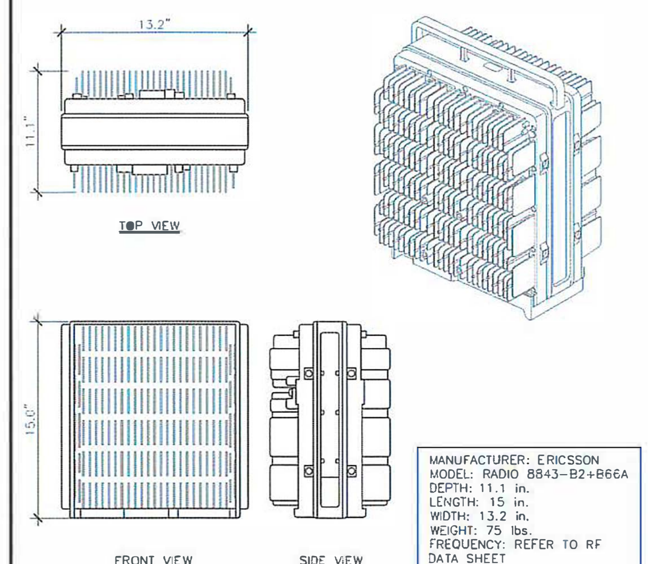
DIMENSIONS: 4.6"L x 1.9"D x 4.6"H
WEIGHT: 28 GRAMS (2.6 LBS)



OR APPROVED EQUIVALENT

DIPLEXER DETAIL

SCALE: N.T.S 5



MANUFACTURER: ERICSSON
MODEL: RADIO 8843-B2+B66A
DEPTH: 11.1 in.
LENGTH: 15 in.
WIDTH: 13.2 in.
WEIGHT: 75 lbs.
FREQUENCY: REFER TO RF DATA SHEET

RRUS-8843 DETAIL

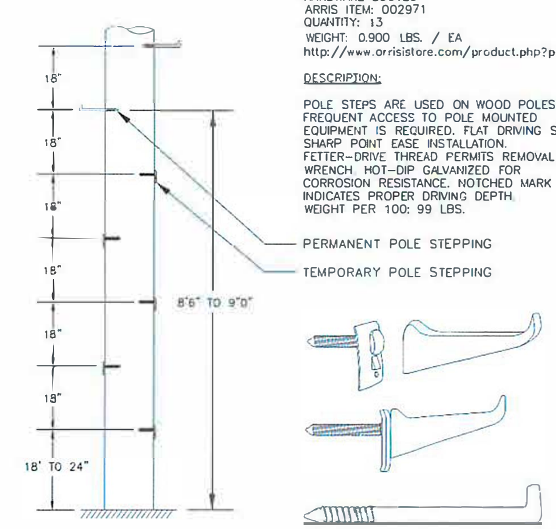
SCALE: N.T.S 2

STEP: POLE 5/8 X 10 INCH GALVANIZED

HARDWARE 506125
ARRIS ITEM: 002971
QUANTITY: 13
WEIGHT: 0.900 LBS. / EA
http://www.arrisistore.com/product.php?pid=002971

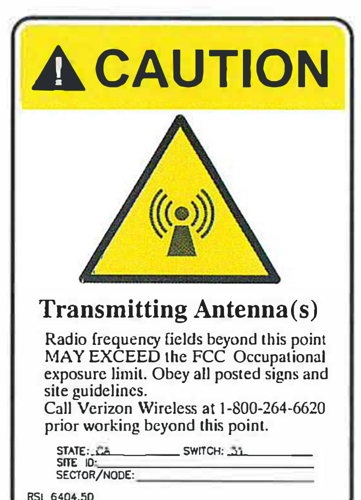
DESCRIPTION:

POLE STEPS ARE USED ON WOOD POLES WHERE FREQUENT ACCESS TO POLE MOUNTED EQUIPMENT IS REQUIRED. FLAT DRIVING SURFACE AND SHARP POINT EASE INSTALLATION. FETTER-DRIVE THREAD PERMITS REMOVAL WITH A WRENCH. HOT-DIP GALVANIZED FOR CORROSION RESISTANCE. NOTCHED MARK ON STEP INDICATES PROPER DRIVING DEPTH
WEIGHT PER 100: 99 LBS.



POLE STEPPING DETAIL

SCALE: N.T.S 10



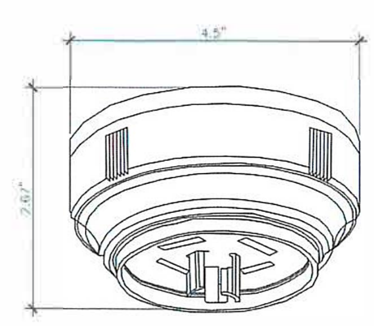
NOTE:
NEW VINYL SIGN TO PROVIDED BY OTHERS AND PLACED 3'-0" BELOW ANTENNA

CONTRACTOR TO INPUT SIDE ID / SITE NAME / MARKET ID / PS LOCATION CODE

FCC SIGN

SCALE: N.T.S 7

- UNIVERSAL AC INPUT 90V-305V, 50/60HZ
- AMPERE RATING: 100A MAX CONTINUOUS
- ADVANCED METERING INFRASTRUCTURE (AMI) NETWORK COMMUNICATION CARD REMOTELY SEND ENERGY USAGE BACK TO THE HEAD-END SYSTEM:
- DATE RATE: 50 TO 300 KBPS
- FREQUENCY RANGE: 902-928 MHZ
- SPREAD SPECTRUM: FREQUENCY HOPPING
- TRANSMITTER OUTPUT: -98DBM FOR 10% PER
- PROTOCOL: IEEE 802.15.4G

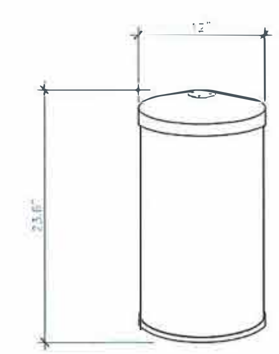


PG&E SMART METER DETAIL

SCALE: N.T.S 4

MANUFACTURER: COMMSCOPE
DIMENSIONS: 23.6" x 12"ø
WEIGHT: 26.7 LBS

OR APPROVED EQUIVALENT



ANTENNA DETAIL

SCALE: N.T.S 1

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP
2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www.TheCBRGroup.com

Vendor:

Site Number: 427814

Site Name: LOS ALTOS 001

Site Address: 155 ALMOND AVENUE
LOS ALTOS, CA 94022

County: SANTA CLARA COUNTY

Issued For: CONSTRUCTION

REV	DATE	DESCRIPTION	BY
C	10/22/19	DESIGN CHANGE	ALR
B	07/12/19	100% CD'S FOR REVIEW	JG
A	05/22/19	90% CD'S FOR REVIEW	JG

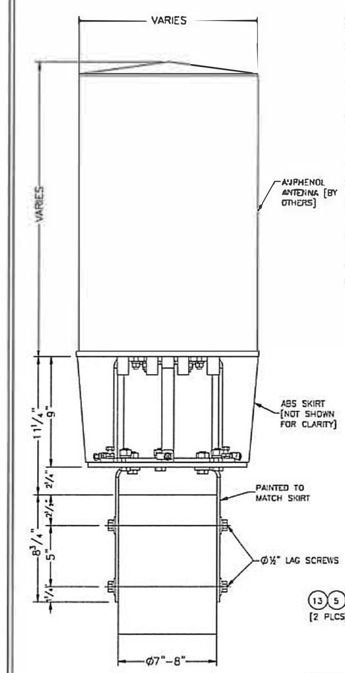
Licensor:

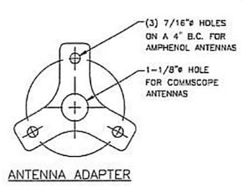
REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. FREEDMAN
No C-86844
Exp. 3/31/21
CIVIL
STATE OF CALIFORNIA

Sheet Title: EQUIPMENT AND CONSTRUCTION DETAILS

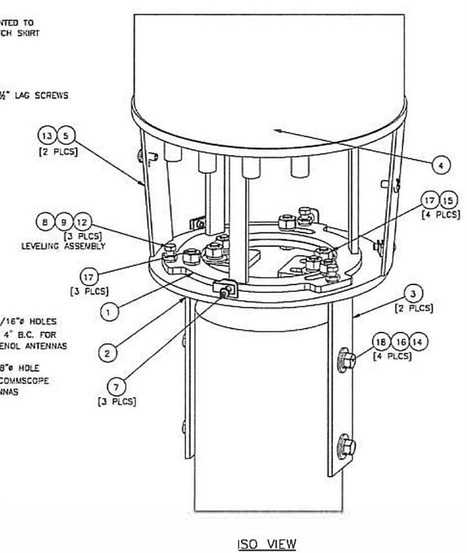
Sheet Number: A-6

OR APPROVED EQUIVALENT





ITEM #	PART #	DESCRIPTION	QTY	UNIT WT.(lbs)
1	WA-968	3/8"x11 5/8" O.D. A36, TOP CAP WLDMNT	1	7.4
2	WA-992	3/8" x Ø1'-1" A36, PLATE WLDMNT	1	9.9
3	PL-1240	1/4"x3"x12 15/16" A36, FORMED PLATE	2	2.5
4	PL-1879	1/4"x4 3/8"x5" A36, ANTENNA ADAPTER	1	0.6
5	PL-2313	14 3/4" TD x 13 3/8" BD x 8 1/2" TALL TAPERED SKIRT HALF	2	1.8
6	55500	1/4-20 U-STYLE SPEED NUT	3	0.02
7	70217	1/4"Ø x 1" SS FLGD BUTTON-HD SCKT CAP SCRW	3	0.02
8	43010	3/8"Ø LOCK WASHER, S.S.	6	0.01
9	51995	3/8"Ø JAM NUT, S.S.	3	0.02
10	56001	3/8"Ø HEX NUT, S.S.	3	0.02
11	70428	3/8"Ø x 1 1/4" S.S. COUNTERSUNK SCKT HD SCREW	3	0.01
12	71110	3/8"Ø x 1" BOLT, S.S.	3	0.05
13	91127	3/8"Ø x 3/4" NYLON SCREW	2	0.01
14	40020	1/2"Ø FLAT WASHER, GALV.	4	0.04
15	40024	1/2"Ø FLAT WASHER, S.S.	4	0.04
16	41020	1/2"Ø LOCK WASHER, GALV.	4	0.01
17	70011	1/2"Ø x 1 1/2" S.S. BOLT/NUT/LW	7	0.2
18	91117	1/2"Ø x 2 1/2" HEX LAG SCREW, GALV.	4	0.16
		TOTAL GALV. WT.	43	



WESTERN UTILITY / TELECOM, INC
5032 SALEM DALLAS HWY
SALEM, OR 97304
Ph: 503-587-0101
Fx: 503-316-1664
WesternUtilityTelecom.com

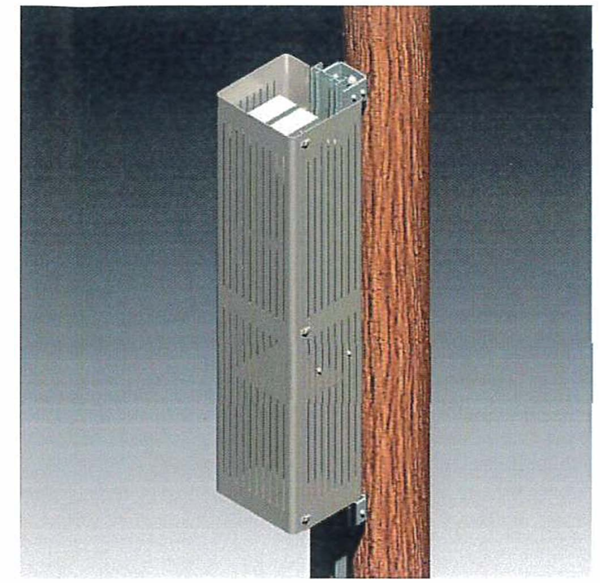
TOP MOUNT ANTENNA BRACKET
WITH SKIRT 7" - 8" O.D. WOOD POLE

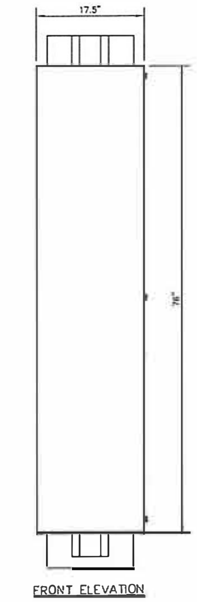
REV	DESCRIPTION	DATE	BY
A	ADDED DIMS TO MTG PL; SKIRT WAS 9" TALL	2AUG17	SG

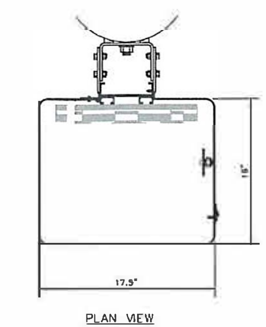
PROJECT NUMBER	DRAWN BY	DATE	DRAWING NUMBER	REV
STD.	TR	16JAN17	ID-618	-
	CHECKED BY: AM	SHEET: 1		

TOP MOUNT ANTENNA BRACKET WITH SKIRT DETAIL

SCALE: N.T.S — 7







MANUFACTURER: POLEWARE
HEIGHT: 76"
WIDTH: 17.5"
DEPTH: 16"
MATERIAL: CARBON STEEL

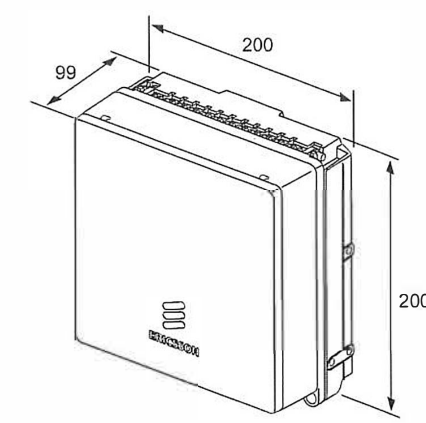
RADIO SHROUD DETAIL

SCALE: N.T.S — 3

NOT USED

SCALE: N.T.S — 5

MANUFACTURER: ERICSSON
MODEL: RRU-2205
DEPTH: 99 mm / 3.90 in.
HEIGHT: 200 mm / 7.87 in.
WIDTH: 200 mm / 7.87 in.
WEIGHT: 4.85 kg / 10.70 lb.
FREQUENCY: REFER TO RF DATA SHEET



RRU-2205 DETAIL

SCALE: N.T.S — 2

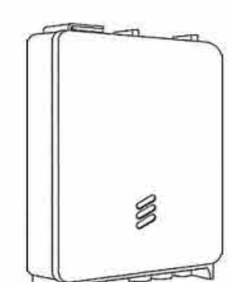
NOT USED

SCALE: N.T.S — 6

Total Power Output:	2300W
Number of Output port:	3
Max Power On One Output Port:	815W
Power Input:	200-250 V AC
Circuit Breaker and Fuse Recommendation:	20A Min, 50A Max
Heat Dissipation:	125W Max

Dimension (H x W x D):	13"x11.4"x3.9"
Heat Dissipation:	22 Lbs

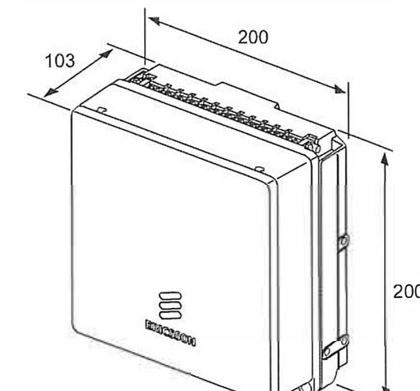
Operational Conditions:	-40 to +55 Degrees Celsius
IP Class:	IP 65
Supported Installations:	Pole/Wall/Rail



POWER 6302 DETAIL

SCALE: N.T.S — 4

MANUFACTURER: ERICSSON
MODEL: RRU-2208
DEPTH: 103 mm / 4.06 in.
HEIGHT: 200 mm / 7.87 in.
WIDTH: 200 mm / 7.87 in.
WEIGHT: 5 kg / 11.02 lb.
FREQUENCY: REFER TO RF DATA SHEET



RRU-2208 DETAIL

SCALE: N.T.S — 1

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www.TheCBRGroup.com

Vendor:

Site Number:
427814

Site Name:
LOS ALTOS 001

Site Address:
155 ALMOND AVENUE
LOS ALTOS, CA 94022

County:
SANTA CLARA COUNTY

Issued For:
CONSTRUCTION

REV	DATE	DESCRIPTION	BY
C	10/22/19	DESIGN CHANGE	ALR
B	07/12/19	100% CD'S FOR REVIEW	JG
A	05/22/19	90% CD'S FOR REVIEW	JG

Licensor:

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

Sheet Title:
EQUIPMENT AND CONSTRUCTION DETAILS

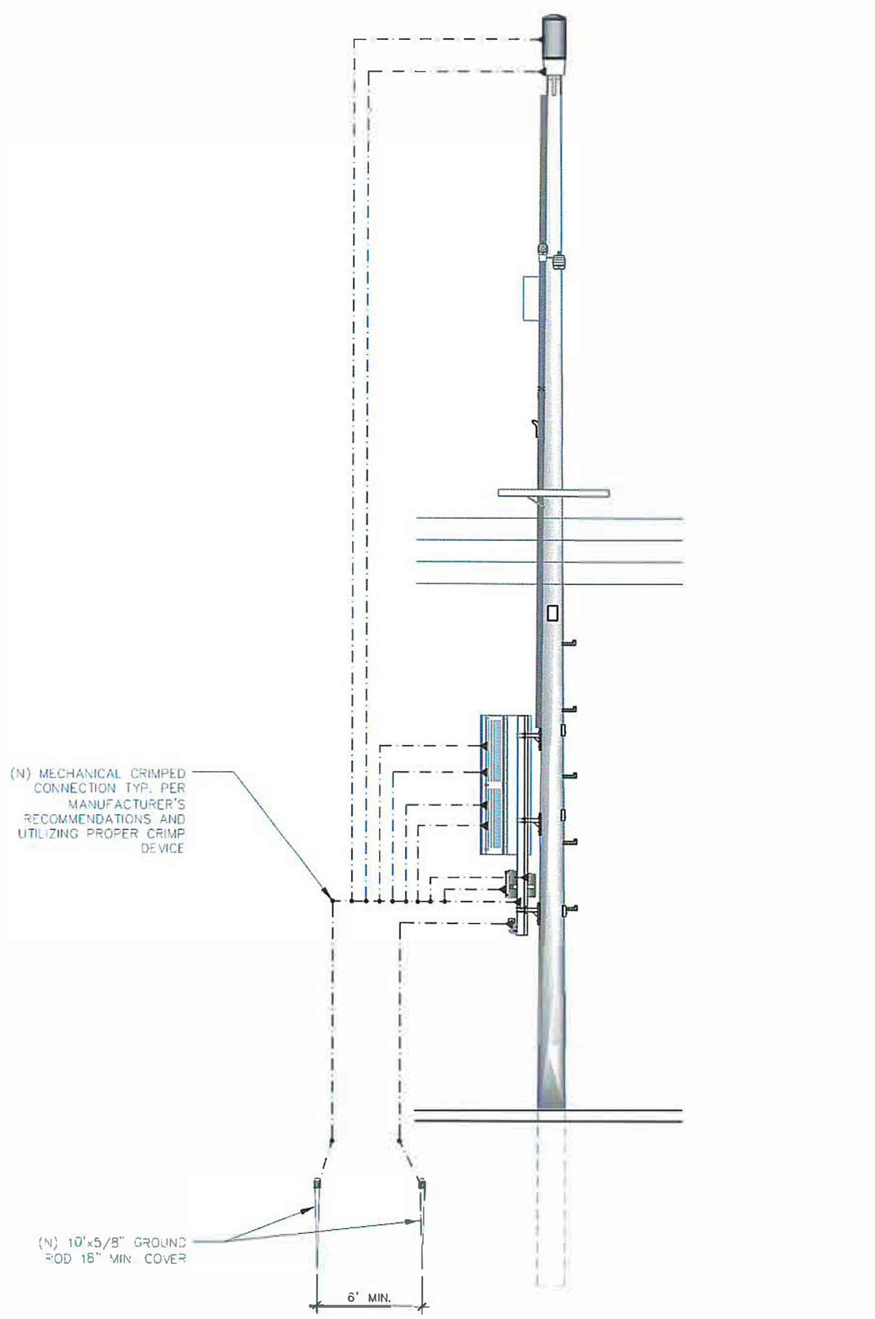
Sheet Number:
A-7

POWER AND TELCO CONNECTIONS:

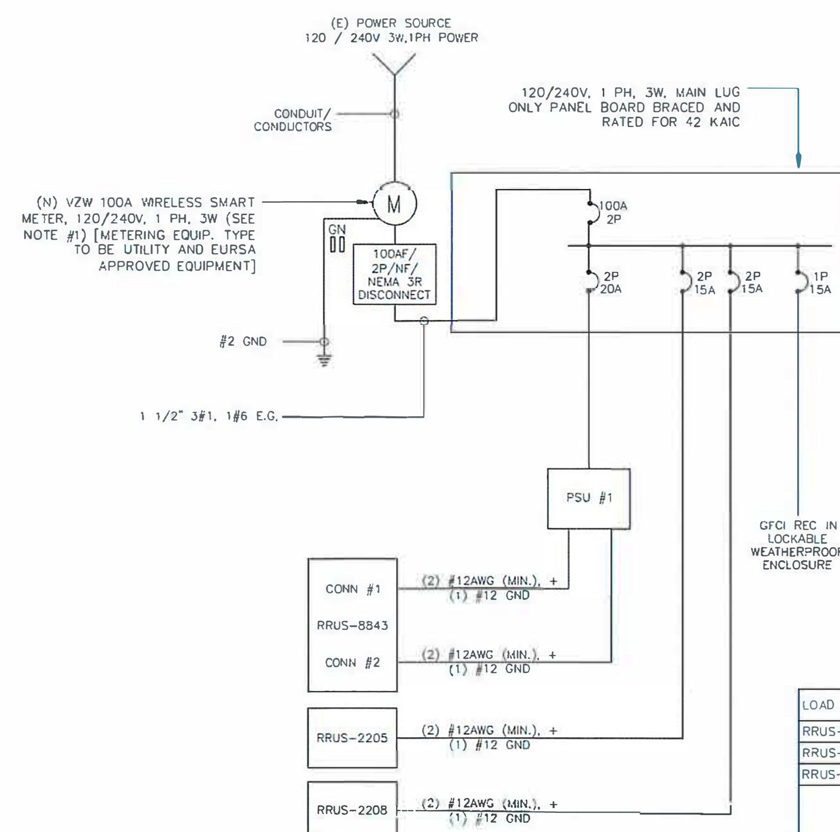
1. POWER AND TELCO POINT OF CONNECTION AND ROUTE ARE PRELIMINARY AND SUBJECT TO CHANGE TO CONFIRMATION BY THE UTILITY COMPANIES RESPECTIVELY.
2. CONTRACT SHALL COORDINATE WITH UTILITY COMPANY FOR FINAL AND EXACT WORK/MATERIALS REQUIREMENTS AND CONSTRUCT TO UTILITY ENGINEERING PLAN AND SPECIFICATIONS ONLY WHERE APPLICABLE PER PROJECT SCOPE OF WORK.
3. CONTRACT SHALL FURNISH AND INSTALL CONDUIT, PULL WIRES, CABLE PULL BOXES, CONCRETE ENCASEMENT OF CONDUIT, TRANSFORMER PAD, BARRIERS, RISER TRENCHING, BACK FILL AND UTILITY FEES, AND INCLUDE REQUIREMENTS IN THE SCOPE.
4. CONTRACTOR SHALL LABEL ALL MAIN DISCONNECT SWITCHES AS REQUIRED BY CODE.
5. SUBCONTRACTOR SHALL PROVIDE METER WITH DIST. PANEL AND BREAKERS FOR POWER TO THE BTS UNITS AND THE BTS/UTILITY CABINET.
6. ALL SERVICE EQUIPMENT AND INSTALLATIONS SHALL COMPLY WITH THE N.E.C. AND UTILITY COMPANY AND LOCAL CODE REQUIREMENTS.
7. SUBCONTRACTOR SHALL PROVIDE ELECTRICAL SERVICE ENTRANCE EQUIPMENT WITH FAULT CURRENT RATINGS GREATER THAN THE AVAILABLE FAULT CURRENT FROM THE POWER UTILITY.
8. FIELD ROUTE CONDUIT TO CABINET IS AS REQUIRED.
9. MAXIMUM ONE WAY CIRCUIT RUN NOT TO EXCEED 75 FEET.

GENERAL ELECTRICAL NOTES:

1. PROVIDE ALL ELECTRICAL WORK & MATERIALS AS SHOWN ON THE DWGS, AS CALLED FOR HEREIN, & AS IS NECESSARY TO FURNISH A COMPLETE INSTALLATION.
2. THE INSTALLATION SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ADOPTED CALIFORNIA ELECTRICAL CODE, STATE OF CALIFORNIA TITLE24, ALL OTHER APPLICABLE CODES AND ORDINANCES & THE REQUIREMENTS OF THE FIRE MARSHALL. ALL EQUIPMENT & WIRING SHALL BEAR THE APPROVAL STAMP OF UNDERWRITERS LABORATORY (UL) OR AN APPROVED TESTING LABORATORY. PAYMENT FOR ALL INSPECTION FEES AND PERMITS ARE PART OF THIS CONTRACT.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY AND GOOD CONDITION OF ALL MATERIALS & EQUIPMENT FOR THE ENTIRE INSTALLATION & UNIT COMPLETION OF WORK, ERECT & MAINTAIN APPROVED & SUITABLE BARRIERS, PROTECTIVE DEVICES & WARNING SIGNS, BE FULLY RESPONSIBLE FOR ANY LOSS OR INJURY TO PERSONS OR PROPERTY RESULTING FROM NEGLIGENCE AND/OR ENFORCEMENT OF ALL SAFETY PRECAUTIONS & WARNINGS.
4. COORDINATE THE ELECTRICAL INSTALLATION WITH ALL OTHER TRADES.
5. ALL SAW CUTTING, TRENCHING, BACK FILLING & PATCHING SHALL BE PART OF THIS CONTRACT.
6. FINALIZE ALL ELECTRICAL SERVICE ARRANGEMENTS, INCLUDING VERIFICATION OF LOCATIONS, DETAILS, COORDINATION OF THE INSTALLATION & PAYMENT OF ACCRUED CHARGES WITH LOCAL POWER COMPANY, VERIFY LOCATION FOR FACILITIES & DETAILS WITH POWER UTILITY. IN ADDITION TO THE REQUIREMENTS SHOWN IN THE CONTRACT DOCUMENTS, WORK SHALL COMPLY WITH CONSTRUCTION STANDARDS & SERVICE REQUIREMENTS OF THE RESPECTIVE UTILITIES, INCLUDING ANY SUPPLEMENTAL DWGS ISSUED & SHALL BE SUBJECT TO APPROVAL OF THESE UTILITIES.
7. ALL WIRING SHALL BE COPPER. INSULATION FOR BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE "THWN" CONDUCTORS LARGER AND #6 AWG MAY BE TYPE "THWN" OR "TWN".
8. PROVIDE CONDUIT SEALS FOR ALL CONDUITS PENETRATING WEATHERPROOFING OR WEATHERPROOF ENCLOSURE ENVELOPE. MASTIC SEAL ALL CONDUIT OPENING PENETRATIONS COMPLETELY WATERTIGHT.
9. UNLESS SHOWN OTHERWISE, FUSED DISCONNECT SWITCHES SHALL BE PROVIDED WITH LOW-PEAK, S\DUAL ELEMENT FUSES SIZED TO EQUIPMENT NAMEPLATE FUSE CURRENT RATING. MOTOR STARTERS SHALL BE PROVIDED WITH SIMILARLY SIZED FUSIBLE ELEMENTS. SWITCHES AND OTHER OUTDOOR EQUIPMENT SHALL BE RATED NEMA 3R AND/OR UL LISTED FOR WET ENVIRONMENT.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TESTING THE GROUNDING SYSTEM AND ENSURING A 5 OHM OR LESS GROUNDING PATH, ADDITIONAL GROUND RODS AND/OR CHEMICAL ROD SYSTEM SHALL BE USED TO ACHIEVE THIS REQUIREMENT.



1 POLE GROUNDING DIAGRAM



LOAD CALCULATIONS-VERIZON WIRELESS:

EXISTING LOAD: 0 AMPS
NEW LOAD: 10.0 AMPS MAX
NEW TOTAL LOAD: 10.0 AMPS MAX

POWER AND TELCO DESIGN IS BASED ON INITIAL SITE VISIT.

CONTRACTOR SHALL OBTAIN CURRENT UTILITY COORDINATOR PLANS PRIOR TO START OF CONSTRUCTION.

AVAILABLE FAULT CURRENT PER UTILITY.

NOTE: CONTRACTOR TO CHECK WITH UTILITY TO ENSURE ELEC. METER IS BRACED FOR ACTUAL FAULT CURRENT.

LOAD DESCRIPTION	MAX LOAD BREAKDOWN	LOAD
RRUS-2205	2 x 0.316W	0.632 W
RRUS-2208	2 x 10W	20 W
RRUS-8843	320W	320 W
	TOTAL WATTS	340.632 W
	SUBTOTAL VA w/ PF .8	425.79 VA
RECEPTACLE	180VA	180 VA
	TOTAL VA	605.79 VA
	TOTAL AMPS	2.524125 Amps at 240V
		5.04825 Amps at worst case 120V

2 SINGLE LINE DIAGRAM
N.T.S.

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www.TheCBRGroup.com

Vendor:

Site Number: 427814

Site Name: LOS ALTOS 001

Site Address: 155 ALMOND AVENUE LOS ALTOS, CA 94022

County: SANTA CLARA COUNTY

Issued For: CONSTRUCTION

REV	DATE	DESCRIPTION	BY
C	10/22/19	DESIGN CHANGE	ALR
B	07/12/19	100% CD'S FOR REVIEW	JG
A	05/22/19	90% CD'S FOR REVIEW	JG

Licensor:

REGISTERED PROFESSIONAL ENGINEER
JAMES DRUMMOND
No E-19043
Exp. 3/31/20
ELECTRICAL
STATE OF CALIFORNIA

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

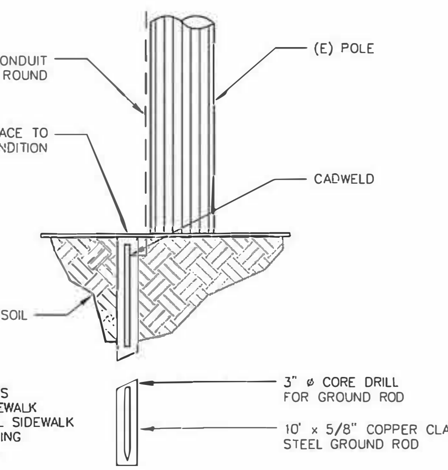
Sheet Title: ELECTRICAL GROUND DIAGRAMS

Sheet Number: E-1

NOT USED	SCALE: N.T.S	12

NOT USED	SCALE: N.T.S	9

NOT USED	SCALE: N.T.S	6



NOTES:

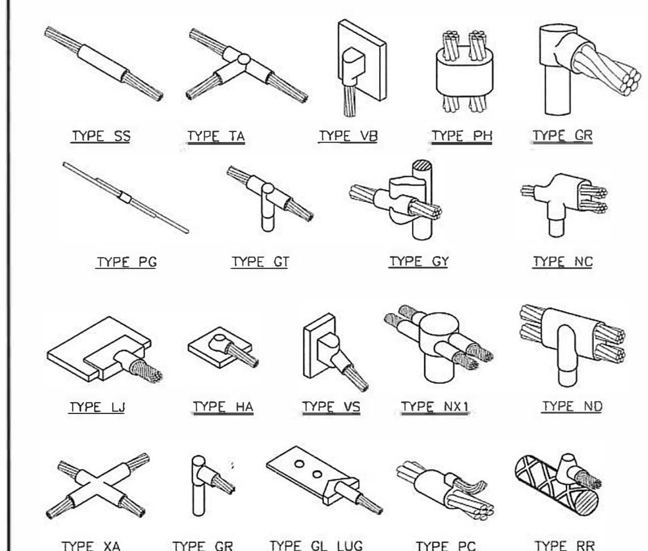
1. IF GROUND ROD IS INSTALLED IN SIDEWALK AREA, CORE DRILL SIDEWALK PRIOR TO INSTALLING INSPECTION WELL.
2. EXPOSED CONCRETE TO HAVE BROOM FINISH.

POLE GROUNDING ROD	SCALE: N.T.S	3

NOT USED	SCALE: N.T.S	11

NOT USED	SCALE: N.T.S	8

NOT USED	SCALE: N.T.S	5



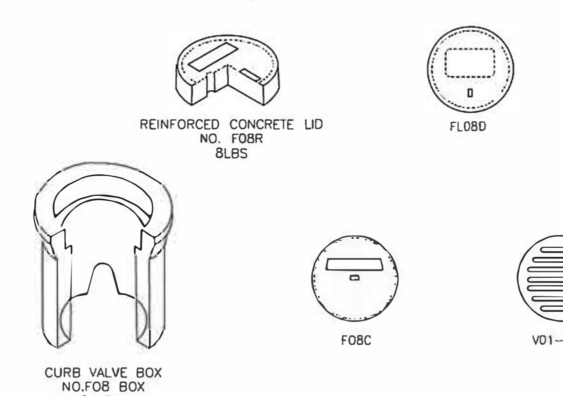
EXOTHERMIC WELD CONNECTION	SCALE: N.T.S	2

NOT USED	SCALE: N.T.S	10

NOT USED	SCALE: N.T.S	7

NOTES:

- ETCHED POLYPROPYLENE FACE
- FACE ANCHORED IN CONCRETE
- ULTRA-VIOLET INHIBITOR
- EXCEEDS ASTM-D1693 STANDARDS
- FOR ENVIRONMENTAL STRESS CRACKING RESISTANCE

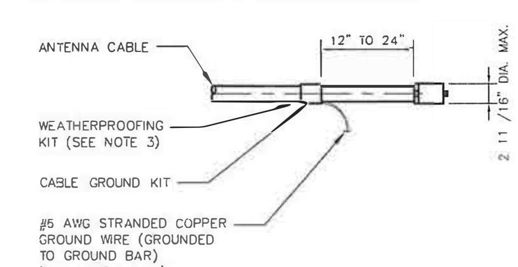


F08BOX	BOX	34LBS	F08 CURB VALVE BOX (8" I.D. X 12" HIGH) - 48 PER PALLET
F08BR	LID	8LBS	REINFORCED CONCRETE LID WITH PLASTIC RING
F08BC	LID	8LBS	CAST IRON LID.
FL08D	LID	2LBS	FIBRELYTE LID. NON-CONCRETE
V01-71C	LID	12LBS	COST IRON GRATE ADA COMPLIANT

F08 BOX GROUND WELL DETAIL	SCALE: N.T.S	4

NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
3. WEATHER PROOFING SHALL BE (TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.)



CONNECTION OF CABLE GND. KIT TO ANTENNA	SCALE: N.T.S	1

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP

2840 HOWE ROAD, SUITE E
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www. TheCBRGroup.com

Vendor:

Site Number: 427814

Site Name: LOS ALTOS 001

Site Address: 155 ALMOND AVENUE LOS ALTOS, CA 94022

County: SANTA CLARA COUNTY

Issued For: CONSTRUCTION

REV	DATE	DESCRIPTION	BY
C	10/22/19	DESIGN CHANGE	ALR
B	07/12/19	100% CD'S FOR REVIEW	JG
A	05/22/19	90% CD'S FOR REVIEW	JG

Licensor:

REGISTERED PROFESSIONAL ENGINEER JAMES DRUMMOND No E-19043 Exp. 3/31/20 ELECTRICAL STATE OF CALIFORNIA

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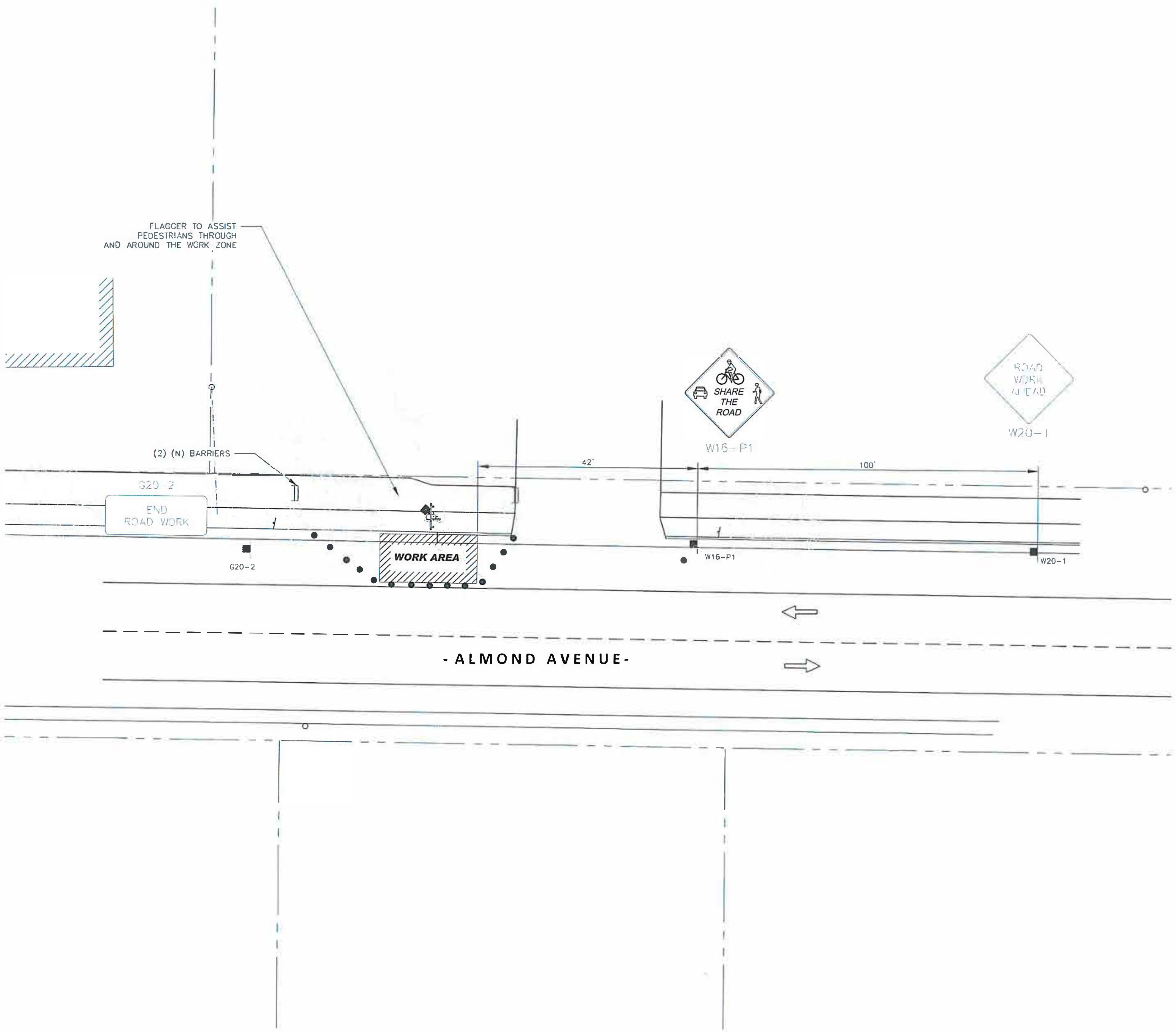
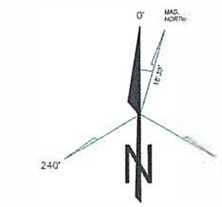
Sheet Title: ELECTRICAL DETAILS

Sheet Number: E-2





GENERAL TRAFFIC CONTROL NOTES
TRAFFIC SHALL CONFORM TO THE 2014 CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND THE 2012 WATCH HANDBOOK.
ACCESS TO DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES
ONE LANE OF TRAFFIC IN EACH DIRECTION AND ALL HIGH VOLUME TURNING LANES SHALL BE MAINTAINED AT ALL TIMES ON ALL STREETS AT A MINIMUM LANE WIDTH OF 10 FEET.
ANY CONFLICTING SIGNS, STRIPING AND PAVEMENT MARKINGS SHALL BE REMOVED OR COVERED BEFORE TRAFFIC CONTROL IS IN PLACE. ANY SIGN, STRIPING OR PAVEMENT MARKING REMOVED OR COVERED SHALL BE REPLACED WHEN TRAFFIC CONTROL IS NO LONGER NECESSARY.
SAFE PEDESTRIAN ACCESS SHALL BE MAINTAINED AT ALL TIMES.

NOTES:

- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. ACCESSIBILITY ACCESS AND REQUIREMENTS ARE NOT REQUIRED, IN ACCORDANCE WITH CALIFORNIA STATE ADMINISTRATIVE CODE, PART 2, TITLE 24, SECTION 1103B.1, EXCEPTION I & SECTION 1134B.2.1, EXCEPTION 4.

TABLE 6H-3 & 6H-4 - FROM THE 2014 CALIFORNIA MUTCD

POSTED SPEED LIMIT - MPH	MERGING TAPER LENGTH "L" - FEET	SHIFTING TAPER LENGTH "L/2" - FEET	SHOULDER TAPER LENGTH "L/3" - FEET	SIGN SPACING ADVANCE OF TAPER & BETWEEN SIGNS - FEET
20	80	40	27	100
25	125	63	42	100
30	180	90	60	250
35	245	123	82	250
40	320	160	107	250
45	540	270	180	350
50	600	300	200	350
55	660	330	220	350

MAINTAIN DRIVEWAY ACCESS
AT ALL TIME

LEGEND

- TYPE III BARRICADE W/ SIGN
- TYPE II BARRICADE W/ SIGN
- CHANNELIZING DEVICE
- TRAFFIC CONE WITH CLIP ON SIGN
- SIGN
- SIGNALIZED INTERSECTION
- ARROW PANEL (FLASHING ARROW) (WHERE REQUIRED)
- HIGH LEVEL WARNING DEVICE (FLAGTREE) (OPTIONAL)
- FLAGGER
- TANS — TOW AWAY NO STOPPING __ TO __ (SHOW HOURS)
- TANSAT — TOW AWAY NO STOPPING ANY TIME
- WORK ZONE (ACTIVITY AREA) LIMITS
- DIRECTION OF TRAFFIC (NOT PAVEMENT MARKING)
- (A) ROADWAY DESIGNATION (A THROUGH D)
- SITE

1 **TRAFFIC CONTROL PLAN**
N.T.S.

Prepared For:

verizon

2785 MITCHELL DRIVE, SUITE 9
WALNUT CREEK, CA 94598

Engineer:

THE CBR GROUP
2840 HOWE ROAD, SUITE E
MARTINEZ, CA 94553
www.TheCBRGroup.com

Vendor:

Site Number:
427814

Site Name:
LOS ALTOS 001

Site Address:
155 ALMOND AVENUE
LOS ALTOS, CA 94022

County:
SANTA CLARA COUNTY

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CONSTRUCTION

C	10/22/19	DESIGN CHANGE	ALR
B	07/12/19	100% CD'S FOR REVIEW	JG
A	05/22/19	90% CD'S FOR REVIEW	JG
REV	DATE	DESCRIPTION	BY

Licensor:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. FREEDMAN
No C-86844
Exp. 3/31/21
CIVIL
STATE OF CALIFORNIA

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Sheet Title:
TRAFFIC CONTROL PLAN

Sheet Number:
TCP

Small Cell Noise Study

Los Altos 001
155 Almond Avenue
Los Altos, California 94022
Santa Clara County
37.385059; -122.110730 NAD83

EBI Project No. 6219005379
October 11, 2019

Prepared for:

Verizon
c/o The CBR Group
2840 Howe Road, Suite E
Martinez, CA 94553

Prepared by:

EBI Consulting
environmental | engineering | due diligence

EXECUTIVE SUMMARY

Purpose of Report

EnviroBusiness Inc. (dba EBI Consulting) has been contracted by The CBR Group and Verizon to evaluate potential environmental noise impacts for modeling for Verizon Site Los Altos 001 located at 155 Almond Avenue in Los Altos, California.

This report summarizes the results of EBI's technical review of equipment specifications in relation to the Exterior Noise Limits as outlined in the Los Altos Municipal Code, Section 6.16.050. Theoretical results included in this report are based on equipment shown in site drawings dated July 12, 2019. Subsequent changes to the site design may yield changes in the projected post construction noise levels or compliance with applicable regulations and guidelines.

Statement of Compliance

Based on the results of this study, EBI concludes that the noise produced from operation of the proposed remote radio units (RRUs) and associated wireless telecommunication equipment will comply with the Exterior Noise Limits as outlined in the Los Altos Municipal Code, Section 6.16.050 at the nearest residential property line.

1.0 REGULATORY REQUIREMENTS

City of Los Altos, California Municipal Code 16.16.050 – Exterior Noise Limits.

The City of Los Altos limits sound pressure levels generated by any use of combination of uses to the decibel levels specified in Table 1, below. These limits are applicable at the property line.

TABLE 1 – Table of Applicable Los Altos Exterior Noise Level Limits

Receiving Land Use Category	Maximum Noise Level in dBA at Property Line
All R1 Zoning Districts	45 (nighttime) 55 (daytime)
All R3 and PCF Zoning Districts	50 (nighttime) 55 (daytime)
All OA Zoning Districts	55 (nighttime) 60 (daytime)
All C Zoning Districts	60 (nighttime) 65 (daytime)

Where nighttime is defined as the period between 10:00 p.m. and 7:00 a.m. and daytime is defined as the period between 7:00 a.m. and 10:00 p.m.

2.0 PROJECT DESCRIPTION

The Site Los Altos 001 includes a proposed Small Cell Wireless Facility on a proposed pole at an existing right of way located in Los Altos, California. The proposed site design does not include installation of emergency back-up generators, equipment cabinets or other noise-generating equipment typically associated with traditional wireless telecommunications sites. The following equipment is proposed for installation at this site:

Table 2 – Proposed Equipment

Quantity	Description	Manufacturer	Model Number	Sound Pressure Level (dBA)	Distance (m)
1	Remote Radio Head	Ericsson	Radio 8843	30	2
1	Remote Radio Head	Ericsson	Radio 2205 (single radio)	38	2
1	Remote Radio Head	Ericsson	RRU 2208	4.8	2
1	Remote Radio Head	Ericsson	Power 6302	None measureable	n/a
1	Omnidirectional Antenna	Amphenol	CUUS070X12FX0Z0-T00-1900	None measureable	n/a
n/a	RF Coaxial Cables	n/a	n/a	None measureable	n/a
n/a	Power Conductors	n/a	n/a	None measureable	n/a

An ambient temperatures were assumed to reach up to 40° Celsius / 104° Farenheit to approximate the acoustic properties of the RRU-2208 and 2205. No acoustic specifications were available for the Power 6302 unit, as is passively cooled via air flanges.

6.0 RESULTS AND CONCLUSIONS

Projected noise levels from the equipment installation at 155 Almond Avenue were calculated using the calculation methodology shown in Appendix B, using the equipment data provided by the manufacturer (see Appendix A). Antenna and RRU specifications for the proposed antenna are provided in Appendix A for the purposes of this study. The proposed installations will not utilize any external alarms.

Sound level propagation calculations were performed to determine the minimum distance at which the worst-case modeled equipment sound levels will comply with the most restrictive noise level limit. Equipment sound levels at or above the City's most restrictive noise limit of 45 dBA were calculated to extend less than 0.97 meters (3.18 feet) away from the equipment. All nodes with this equipment configuration located farther away from any property line, dwelling, or other noise-sensitive receiver will be in compliance Exterior Noise Limits as outlined in the Los Altos Municipal Code, Section 6.16.050.

This minimum compliance distance, and the worst-case modeled equipment noise level at that distance is shown in Table 3. The sources and receiver were assumed to be at the same reference height in order to account for balconies, open windows and changes in elevation at adjacent properties in the site vicinity. All calculations shown in Table 3 assume a free-field environment with no ground absorption, reflecting surfaces, barriers, or other obstructions. Actual results may vary due to field and environmental conditions.

TABLE 3 – CALCULATED SOUND LEVEL RESULTS AND APPLICABLE LIMITS

Source	**Distance from Receiver at which site Complies with Applicable Limit**
	3.18 feet / 0.97 meters
Equipment (See Table 2)	44.9 dBA
Applicable Limit	45 dBA

According to the construction drawings and aerial photographs, the nearest residential property is located approximately 14 feet to the west of the proposed equipment. This nearest residential property would experience a noise impact of approximately 32 dBA at the property line. Since the distance between the proposed equipment and the receivers is considerably greater than the minimum compliance distance, the proposed Los Altos 001 Small Cell installation located at 155 Almond Avenue in Los Altos, California will comply with the Exterior Noise Limits as outlined in the Los Altos Municipal Code, Section 6.16.050.

7.0 LIMITATIONS

This report was prepared for the use of The CBR Group and Verizon. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by EBI are based solely on the information provided by the client. The observations in this report are valid on the date of the investigation. Calculations contained in this report should be considered accurate to within one decibel. Any additional information that becomes available concerning the site should be provided to EBI so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

8.0 CERTIFICATION

This report has been reviewed and approved by:

sealed 14oct2019

Michael McGuire PE
Professional Electrical Engineer
California License# E18898
mike@h2dc.com

Note that EBI's scope of work is limited to an evaluation of the Sound Properties of the equipment noted in this report. The engineering and design of the building and related structures, as well as the impact of the antennas and broadcast equipment on the structural integrity of the building, are specifically excluded from EBI's scope of work.

Appendix A

Equipment Specifications

ERICSSON

Radio Description

Radio 8843

Description

98/1551-LZA 701 6001/1 Uen G

Contents

1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.

2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

An optic cable connects the radio to the Radio System main unit or an expanded macro Radio System. The radios can be connected in a star configuration or in a cascade configuration with optical cable links. An overview of different radio installations is shown in Figure 1.

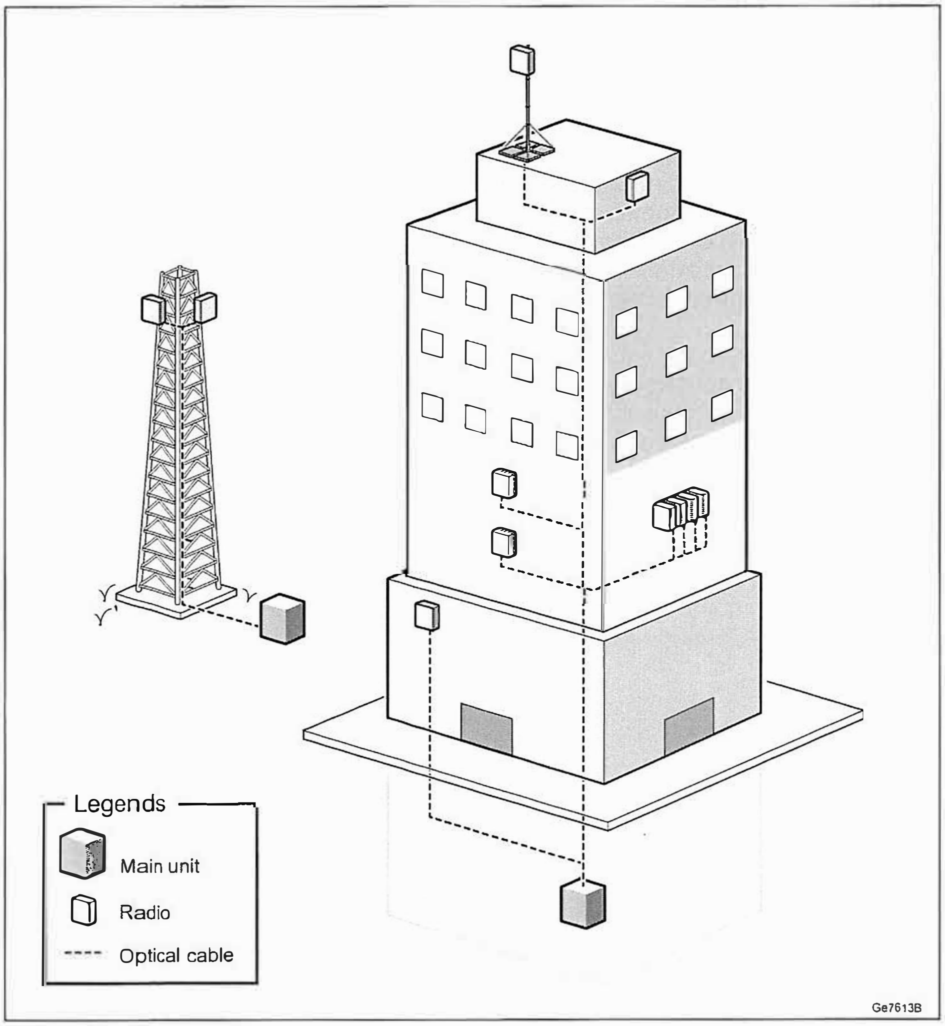


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- Two-wire (DC-C) and three-wire (DC-I) power connections. For two-wire (DC-C) power solutions, a DC adapter is used.
- LTE FDD.
- Dual band: B2 and B66A
- Duplex transmitter/receiver branches, for each frequency band (8TX/8RX).

- Up to 10.1 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range and Wide Area. For a list of relevant standards, see Radio Standards Compliance on page 25.

3 Technical Data

Table 1 Radio 8843 Technical Data

Description	Value
Maximum nominal output power(1) (2)	4×40 W (B2) + 4×40 W (B66A) or 2×60 W (B2) + 2×80 W (B66A) or 4×20 W (B2) + 4×60 W (B66A) (License key is required for total power over 4×5 W.)
Number of carriers per branch	Maximum 3 per port
Number of carriers per radio	Up to 24 per radio over both bands
Frequency(3)	1850–1910 MHz uplink 1930–1990 MHz downlink B2
	1710–1780 MHz uplink 2110–2180 MHz downlink B66A
Dimensions	
Height	380 mm
Width	335 mm
Depth	277 mm
Weight	
Radio 8843	32.6 kg
Color	
Body	NCS S 1002-B
Front	NCS S 6502-B

(1) For detailed information about LTE licenses and HWAC, see Manage Licenses and Hardware Activation Codes in the Radio Node libraries.

(2) For detailed information about output power, see the applicable Output Power feature description.

(3) For information about IBW, see RBS Configurations.

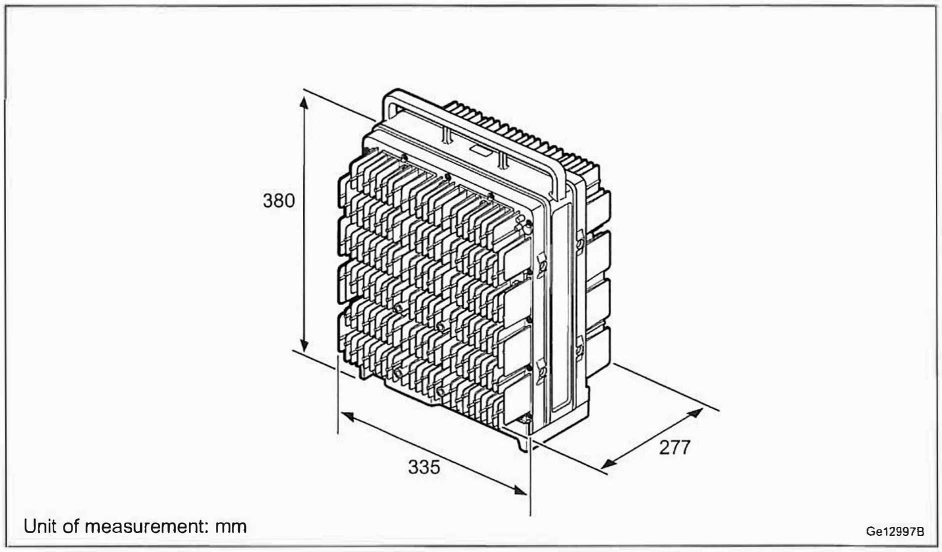


Figure 2 Radio 8843 Height, Width, and Depth

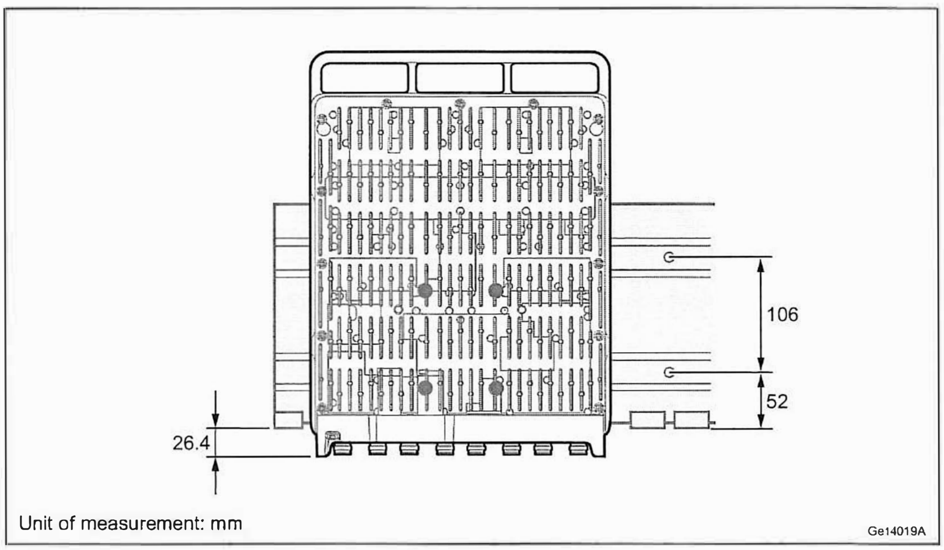


Figure 3 Radio 8843 to Rail Measurement

3.1 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples of these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

— Near the exhaust of building ventilation system.

— Near the exhaust of the chimney.

— Opposite large surfaces made of glass or new concrete.

— Near overhanging structures such as roof overhangs.

3.1.3 Painting Disclaimer

Ericsson recommends to not paint the product as it can affect performance of the product.

Ericsson applies limitations to the warranty and service contract if the product is painted.

If the product is painted, the following commercial limitations apply:

— Failure modes directly related to overheating because of painting are not valid for repair within the scope of the warranty or standard service contract.

— Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.

- When a painted unit is repaired, it might be restored to the standard color before being returned to the market. It is not possible to guarantee that the same unit is sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer is charged the additional costs for replacing all painted parts of the unit or the complete unit.

If adaptations are required, contact Ericsson for information.

3.2 Installation Alternatives

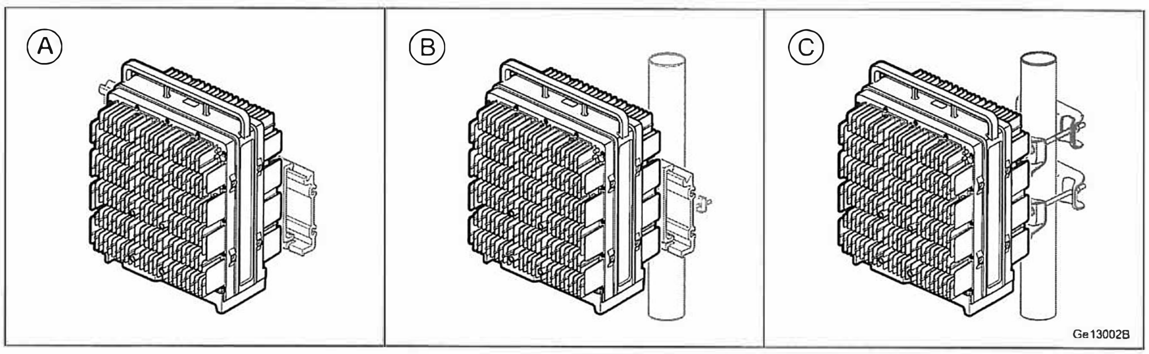


Figure 4 Installation Alternatives

Table 2 Key to Installation Alternatives

Installation Method	Description
A	Wall installation
B	Pole installation
C	Pole installation with pole clamp

3.3 Space Requirements

3.3.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of it its own antenna, or antennas belonging to other services or operators using the same site.

3.3.2 Pole or Mast Installation

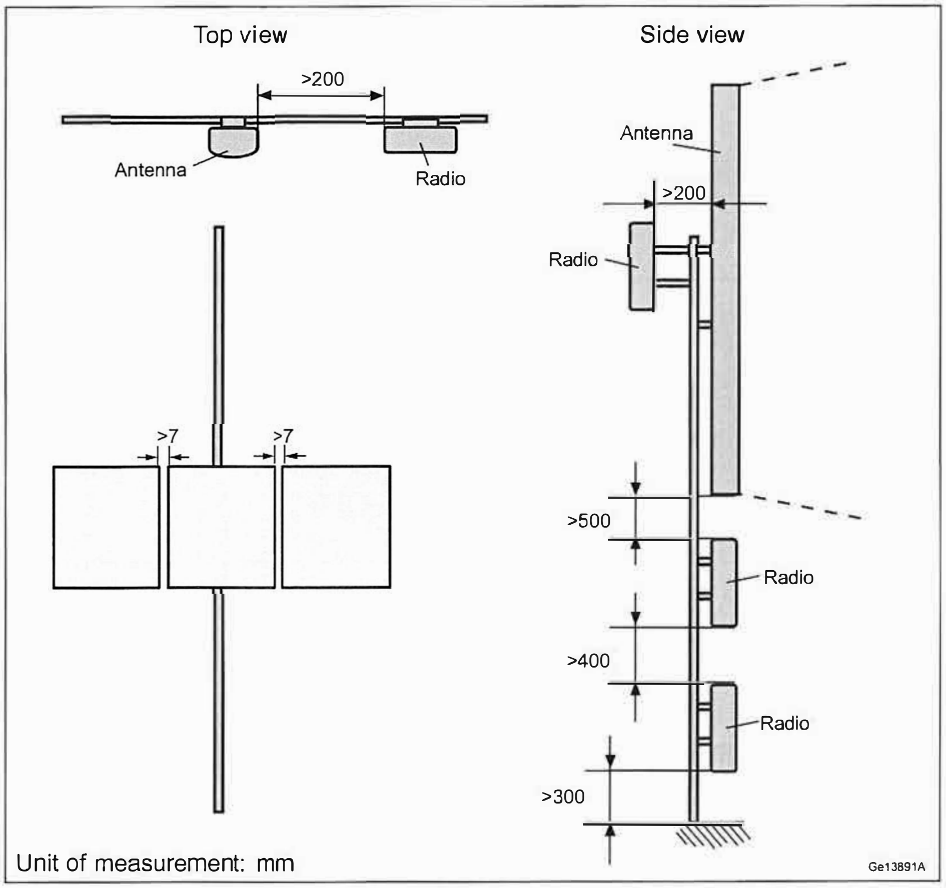


Figure 5 Radio Pole Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a single pole, or a dual pole installation. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail, when ambient temperature is below +45°C.

Allow a minimum of 200 mm free space between radios installed side by side on the rail, when ambient temperature is expected to be above +45°C.

Note: A radio cannot be installed in the uppermost position of a pole or mast.

3.3.3 Rail Installation on Wall

This section describes the installation requirements when installing the radio on a wall.

3.3.3.1 Radio Installation on Outdoor Wall

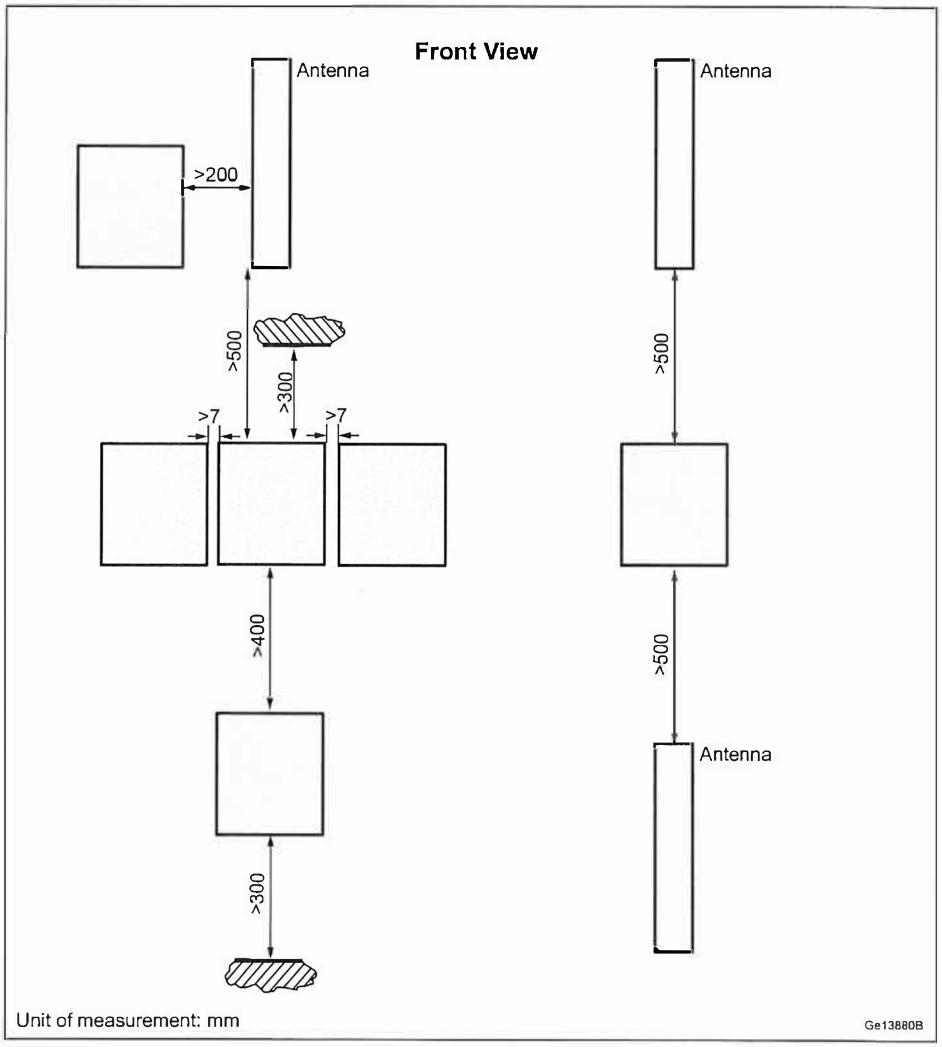


Figure 6 Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 300 mm free space to any overhanging roof or other structure that may obstruct airflow and create a heat trap.

Allow a minimum of 7 mm free space between radios installed side by side on the rail, when ambient temperature is below +45°C.

Allow a minimum of 200 mm free space between radios installed side by side on the rail, when ambient temperature is expected to be above +45°C.

3.3.3.2 Radio Installation on Indoor Wall

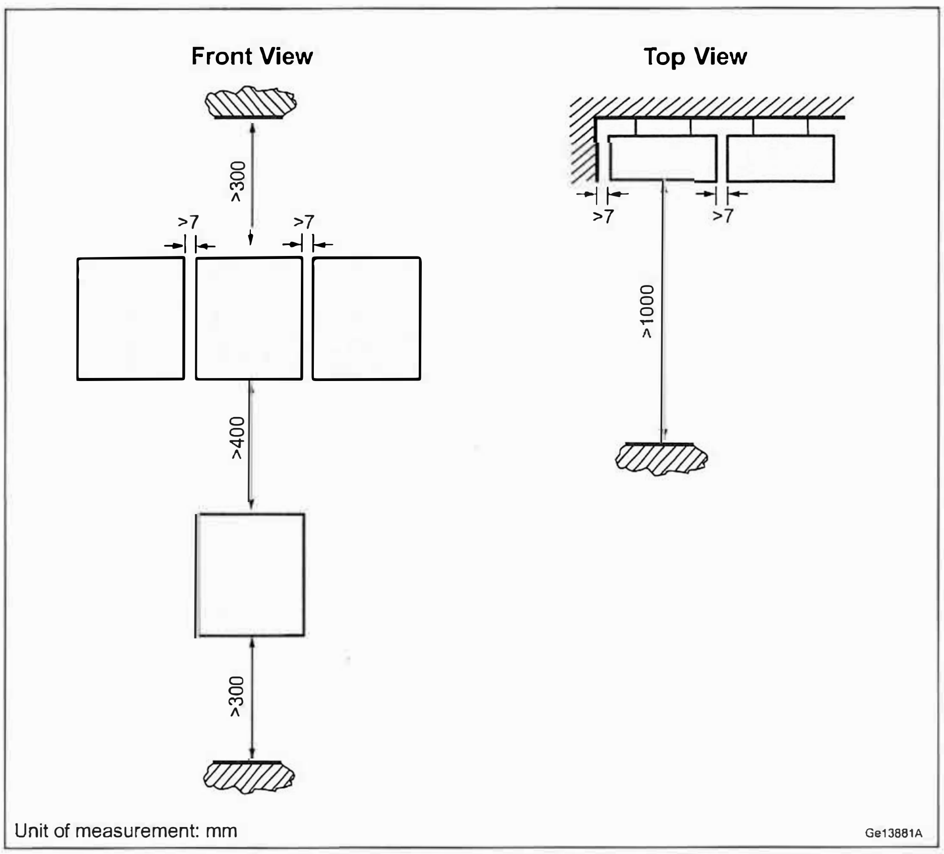


Figure 7 Radio Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 300 mm free space to the ceiling or any overhanging structure that may obstruct airflow and create a heat trap.

Allow a minimum of 7 mm free space between radios installed side by side on the rail, when ambient temperature is below +45°C.

Allow a minimum of 200 mm free space between radios installed side by side on the rail, when ambient temperature is expected to be above +45°C.

3.4 Acoustic Noise

The radio may emit low levels of acoustic noise when operating.

The sound pressure level for the radio can be 30 dBA.

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature(1)	-40 to +55 °C
Solar radiation	≤ 1,120 W/m²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m³
Maximum temperature change	1.0 °C/min
Maximum wind load at 50 m/s (pole installed single case)	260 N (front)

(1) Depending on installation scenario, traffic load, and configuration, the product can, in the highest 10 °C temperature range, temporarily reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

Table 3 Radio Heat Dissipation

Unit	Output Power	Maximum Heat Dissipation
Radio 8843	4×40 W (B2) + 4×40 W (B66A)	1.2 kW
	2×60 W (B2) + 2×80 W (B66A)	1.1 kW
	4×20 W (B2) + 4×60 W (B66A)	1.2 kW

3.5.3 Vibration

This section describes the radio tolerance to vibrations. The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh

Random vibration, normal operation	0.3 m^2/s^3

3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is −48 V DC. The radio has two DC plugs.

Table 4 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	−48 V DC
Operating voltage range(1)	−40 to −58.5 V DC
Non-destructive range	0 to −60 V DC

(1) The operating voltage range refers to the voltage at the radio power input port.

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation. The radio is designed for three-wire (DC-I) power connections. For two-wire (DC-C) power solutions, a DC adapter is used.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) SPD to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating can be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 5 External Radio Fuse and Circuit Breaker Recommendations per DC Input

Unit (DC Powered)	Output Power	Minimum Fuse Rating (1)	Fuse Rating Recommended for Reliable Operation (2)	Maximum Allowed Fuse Rating(3)
Radio 8843	4×40 W (B2) + 4×40 W (B66A)	26 A	28 A	32 A
	2×60 W (B2) + 2×80 W (B66A)	26 A	28 A	32 A
	4×20 W (B2) + 4×60 W (B66A)	26 A	28 A	32 A

(1) The radio is designed for three-wire power connections. For two-wire power solutions, a DC adapter is used. These fuse ratings can only be used if it is acceptable that fuses trip because of lightning or network transients.

(2) The recommended fuse rating takes into account that external fuses are not to trip because of lightning or network transients.

(3) The absolute maximum fuse class in accordance with radio design restrictions.

Note: If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules must be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met, see –48 V DC Power Supply Interface on page 21.

3.6.2 AC Power Characteristics

The radio installation accepts 100–250 V AC when used together with an optional PSU. For more information about the PSU, see PSU Description.

3.6.3 Power Consumption

For information on power consumption, see Power Consumption Calculations.

3.7 System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1 RF Electromagnetic Exposure

For general information about RF EMFs, see Radio Frequency Electromagnetic Fields.

For information about radio access specific compliance boundaries for electromagnetic exposure, see Radio Frequency Electromagnetic Exposure.

3.7.2 Software

For information on software dependencies, see Radio Software Support.

3.7.3 Radio Configurations

For information about available radio configurations, see RBS Configurations.

4 Hardware Architecture

For a description of the supported radio configurations, refer to RBS Configurations.

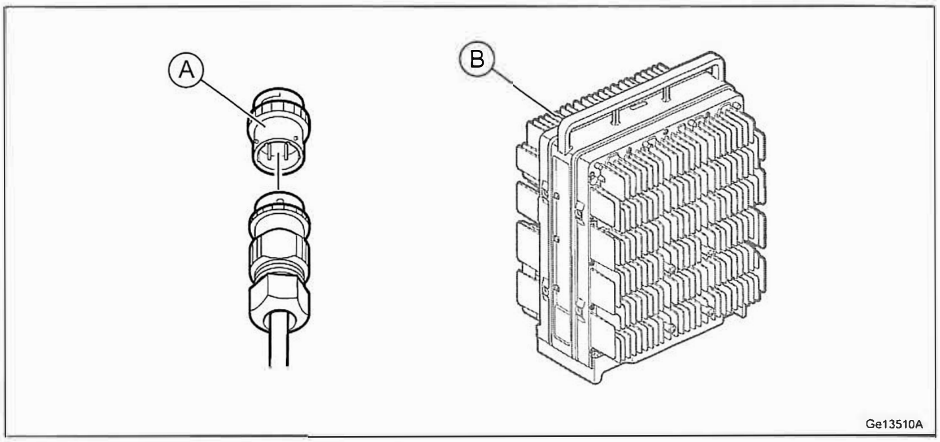


Figure 8 DC Adapter and Radio Components

Table 6 Key to DC Adapter and Radio Components

Position	Component
A	DC adapter for 2-wire connector
B	Radio

4.1 Radio Overview

The radio contains most of the radio processing hardware. The following sections describe the components inside the radio.

4.1.1 TRX

The Transmitter and Receiver (TRX) provides the following:

— Analog/Digital (A/D), Digital/Analog (D/A) conversion

— Channel filtering

— Delay and gain adjustment

— Digital predistortion

- RF modulation and demodulation
- Optical cable interface termination
- Two receivers for RX diversity
- RET modem (the antenna system communication link)

4.1.2 Power Amplifier

The MCPA is the linear power amplifier for the RF carriers. The radio has eight MCPAs, one for each RF port.

4.1.3 Filter Unit

The Filter Unit consists of band-pass filters.

In the radio, the Filter Unit also provides the following:

- Power and supervision for the TMA, or the RIU
- VSWR supervision
- TX and RX combining and power splitting

4.1.4 DC SPD

The DC SPD board protects the DC power input from lightning currents.

4.1.5 ALD (RET) SPD

An SPD provides overvoltage or overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD

An SPD provides overvoltage or overcurrent protection for the external alarm ports.

4.2 Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status. The radio optical indicators are located under the maintenance cover. The fan unit optical indicators are located under a cover.

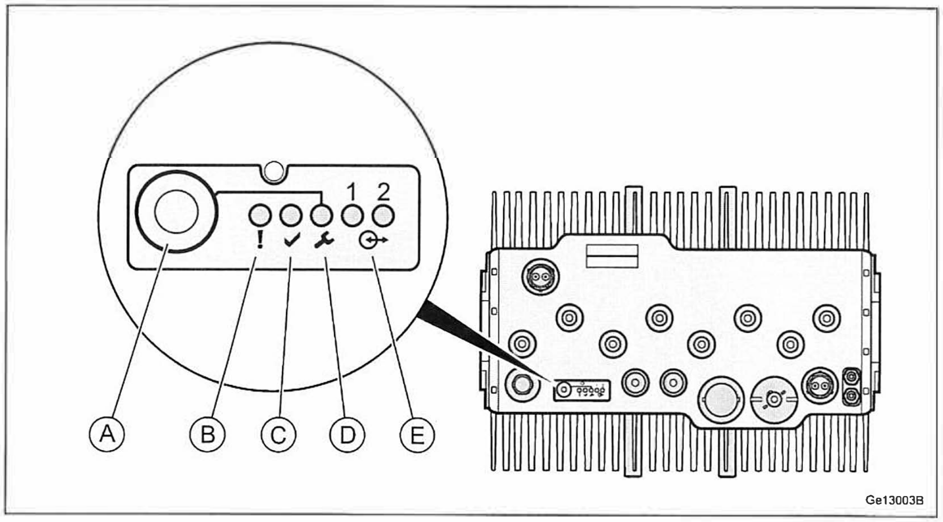


Figure 9 Radio Optical Indicators and Buttons for Radio 8843

Table 7 Description of Radio Optical Indicators and Buttons

Position	Name	Marking
A	Maintenance button	–
B	Fault	!
C	Operational	✔
D	Maintenance	🔧
E	Interface 1 Interface 2	

For more information about the behavior of the optical indicators and the maintenance button, refer to Indicators, Buttons, and Switches.

5 Connection Interfaces

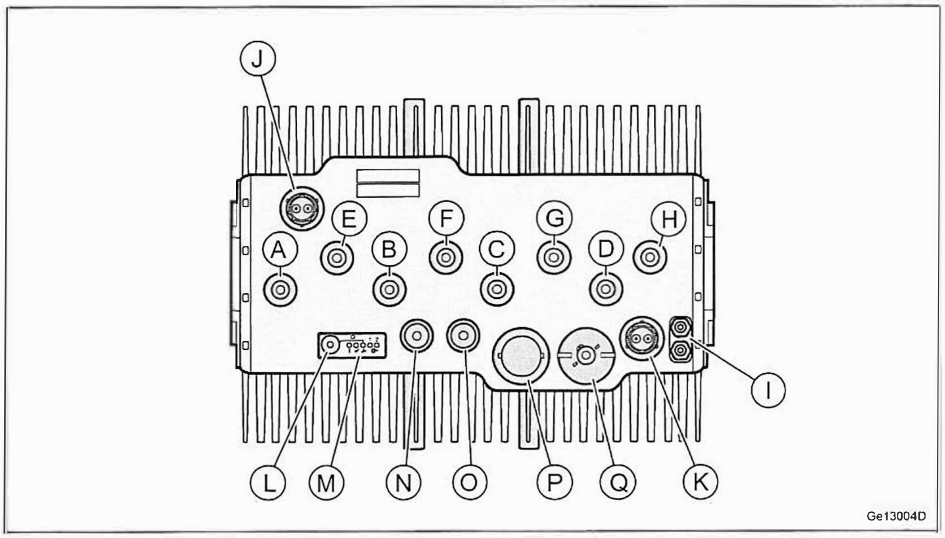
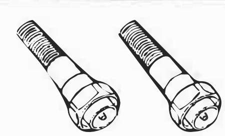
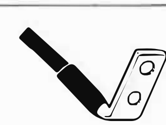
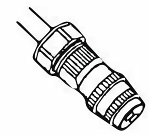
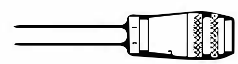
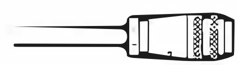
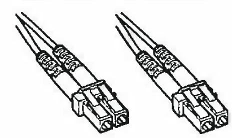
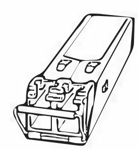


Figure 10 Radio 8843 Connection Interfaces

Table 8 Radio Connection Interfaces

Position	Description	Marking	Connector Types	Connector Illustration
A	Antenna A(1)	A	4.3-10 Plus	
B	Antenna B	B		
C	Antenna C	C		
D	Antenna D	D		
E	Antenna E(1)	E		
F	Antenna F	F		
G	Antenna G	G		
H	Antenna H	H		
I	Grounding	⏚	2 x M6 bolt	

Position	Description	Marking	Connector Types	Connector Illustration
J	-48 V DC power supply	-48 V	Power connector	
K	-48 V DC power supply	-48 V		
L	Maintenance button	–	–	–
M	Optical indicators	1, 2	–	–
N	External alarm and fan unit power supply and control		Mini-DIN connector, 14 pin	
O	ALD (used for a RET unit for example)	ALD		
P	Optical cable 1	1	LC (On SFP) with support for FullAXS	 
Q	Optical cable 2	2		

(1) Antenna A and E can be used for connecting RET or TMA.

5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. RF cables connect the radio to the antenna.

Table 9 Radio Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type
4.3-10 Plus, insert-receiver type	50 Ω coaxial	4.3-10 type

Table 10 Radio Antenna Cable Connectors

Radio Connectors	Frequency Band	Antenna Connectors
A (Antenna A)	B2	TX/RX, High Power, AISG(1)
B (Antenna B)	B2	TX/RX
C (Antenna C)	B2	TX/RX
D (Antenna D)	B2	TX/RX, High Power
E (Antenna E)	B66A	TX/RX, High Power, AISG(1)
F (Antenna F)	B66A	TX/RX
G (Antenna G)	B66A	TX/RX
H (Antenna H)	B66A	TX/RX, High Power

(1) Antenna A and Antenna E can be used for connecting RET or TMA

When configured for 2×60W (B2) + 2×80W (B66A), the following ports are used.

Table 11 2×60W + 2×80W Configuration

Radio Connectors	Configured Band
Antenna A	B2
Antenna D	
Antenna E	B66A
Antenna H	

5.2 Grounding Interface

The radio must be grounded to protect it from overvoltage and lightning strikes. The grounding interface on the radio accepts an M6 dual cable lug on a coated cable.

For more information about grounding principles, see Grounding Guidelines for RBS Sites.

5.3 −48 V DC Power Supply Interface

Note: This product has two power connectors. Both power cables must be connected.

The −48 V DC power connector for incoming power accepts cables with various cross-sectional areas, depending on the cable length and the radio maximum power consumption. For more information on −48 V DC power cable dimensions, refer to Main-Remote Installation Products Overview.

The power cable conductor has a wire for the 0 V DC conductor, and a wire for the −48 V DC conductor. The color codes are market-dependent for both wires.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding interface in the power supply equipment, otherwise the radio overvoltage and lightning protection does not function properly.

5.4 Maintenance Button

The maintenance button is at the left of the ! symbol.

For more information about the maintenance button, see Indicators, Buttons, and Switches.

5.5 Optical Indicators

Optical indicators show the system status.

For more information about the optical indicators, see Indicators, Buttons, and Switches.

5.6 Ext Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.7 ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the radio for antenna system communication.

5.8 Interface for Optical Cable to Main Unit

The 1 and 2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. An SFP+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:

— Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.

— Certification according to general safety requirements defined in standard IEC/EN 62368-1.

— Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, see SFP Module Selector Guide and Main-Remote Installation Products Overview.

6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity.

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

— North American market requirements.

6.1.1 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

North America

— UL 62368-1

— CSA-C22.2 No. 62328-1

6.1.1.1 Outdoor Specific Requirements

The Radio complies with the following outdoor specific requirements:

North America

— UL 50E

— UL 60950-22

— CAN/CSA-C22.2 No. 60950-22

6.1.2 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

North America

— FCC CFR 47 Part 15 B

6.1.3 Radio Standards Compliance

The Radio System complies with the following radio standards:

North America

- FCC CFR 47 Part: 2, 22, 24, 27, 30, 90 (US Band/Frequency Specific)

6.1.4 Marking

To show compliance with legal requirements, the product is marked with the following labels:

North America

- cETLus
- FCC CFR 47 Part 15 Statement
- FCC ID

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory requirements.

6.2.1 Spare Parts

This radio complies with the Ericsson Serviceability and Spare Parts Strategy.

6.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3.

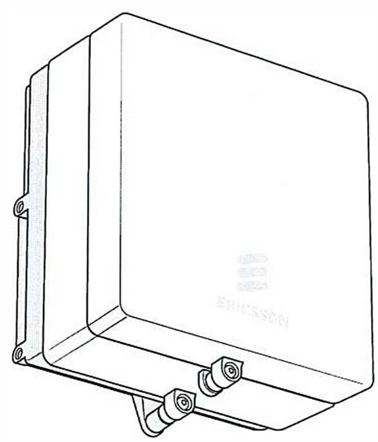
6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

Radio Description

Radio 2205

Description



Ge220502

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Contents

1 Introduction

This document describes Radio 2205.

1.1 Warranty Seal

The unit is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.

2 Product Overview

The radio expands coverage and performance in denser urban areas, where the use of small handheld devices demand high capacity on the operators networks. It is designed to be located in cities and in demanding radio environments.

The radio is part of a modular radio building concept that enables a variety of installation alternatives that is also easy to expand. Flexible mounting solutions are provided using rails and pole clamps. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

The radio can be connected in a star or cascade configuration using optical cable links. An optic cable connects the radio to the main unit, or to an expanded Radio System. An overview of different radio installations is shown in Figure 1.

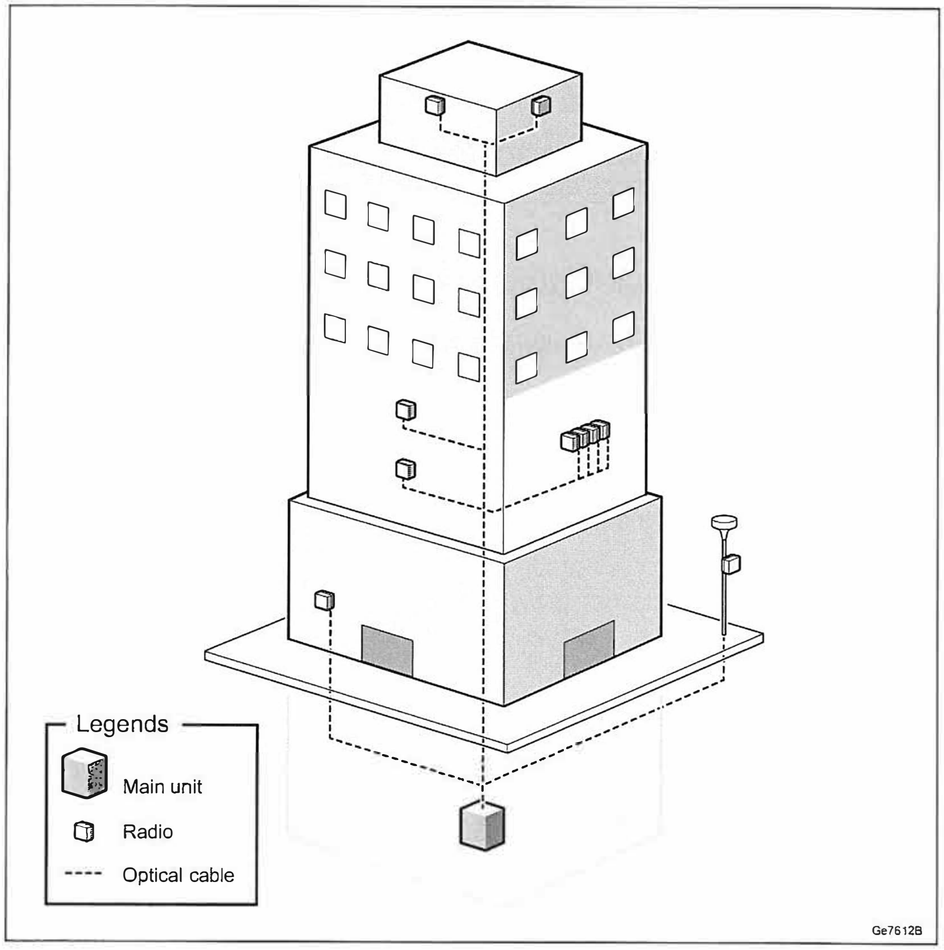


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- Supports:
  - LTE
- Supports:
  - LTE Time Division Duplex (LTE TDD)
  - LTE Listen Before Talk (LTE LBT)
- Supports:

  - Duplex transmitter/receiver (2TX/2RX) branches with 0.5 W per branch

- Supports up to 9.8 Gbps CPRI (optical)

- Complies with 3GPP base station classes Medium Range (MR); relevant standards are listed in *Radio Standards Compliance* on page 32.

2.2 Optional Equipment

The optional equipment for the radio is the following:

- External omnidirectional antenna

- Integrated directional antenna

- Rail installation equipment

3 Technical Data

This section contains the radio physical characteristics, environmental data, and the power information of the Radio System.

3.1 Technical Data Summary

This section contains a technical data summary for Radio 2205 and the antennas.

3.1.1 Radio 2205

Note: Table 1 lists regulatory approved configurations. The listed standards on a specific frequency band may not be generally available on all markets. Contact the local Ericsson responsible for details.

Table 1 Radio 2205 Technical Data

Description	Value
Maximum nominal output power(1)(2)	2 x 0.316 W
Number of carriers(1)	three carriers
Frequency(3)	B46A: 5155.8–5250 MHz for uplink and downlink B46D: 5725–5875 MHz for uplink and downlink
Dimensions with Cover	
Height	200 mm
Width	200 mm
Depth	103 mm
Dimensions with Antenna	
Height	200 mm
Width	200 mm
Depth	123 mm
Weight with Cover	
Radio 2205	4.85 kg
Weight with Antenna	
Radio 2205	5.55 kg

Description	Value
Color	
Body	NCS S 1002-B

(1) *Detailed information about licenses and hardware activations codes (HWAC) can be found in:*

GSM: User Description, RAN handling of software licenses and hardware activation codes and MCPA Guideline in the GSM RAN CPI library.

WCDMA: Licenses and Hardware Activation Codes in the WCDMA RAN CPI library.

LTE: Manage Licenses in the Radio Nodes libraries.

(2) *FCC Limits*

Maximum nominal output power: 0.223W(23.5dBm) for integrated directional antenna(maximum gain is 10.5dB) and 0.630W(28dBm) for external omnidirectional antenna(maximum gain is 6dB).

EU Limits

Maximum nominal output power: 0.014W(11.5dBm) for integrated directional antenna(maximum gain is 10.5dB).

(3) *Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.*

The Radio height, width, and depth with Antenna are shown in Figure 2.

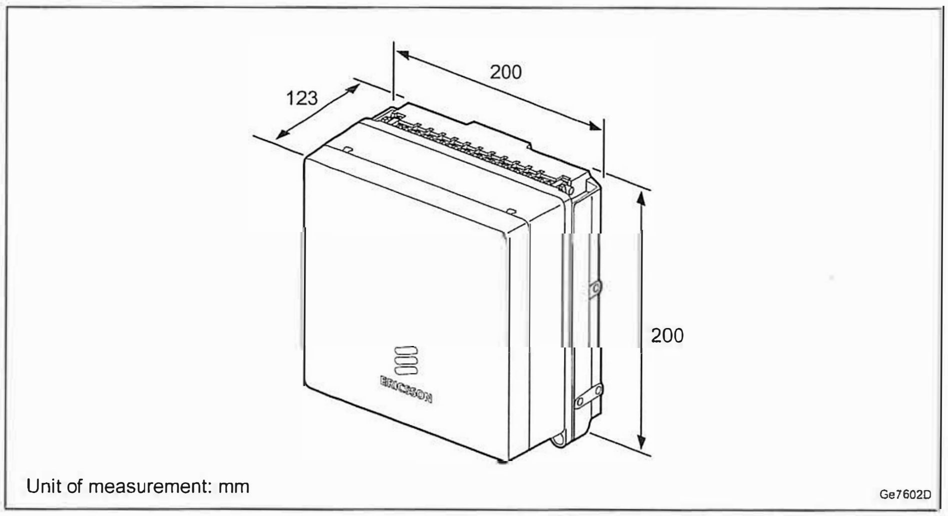


Figure 2 Radio 2205 Dimensions with Antenna

The Radio height, width, and depth with Cover are shown in Figure 3.

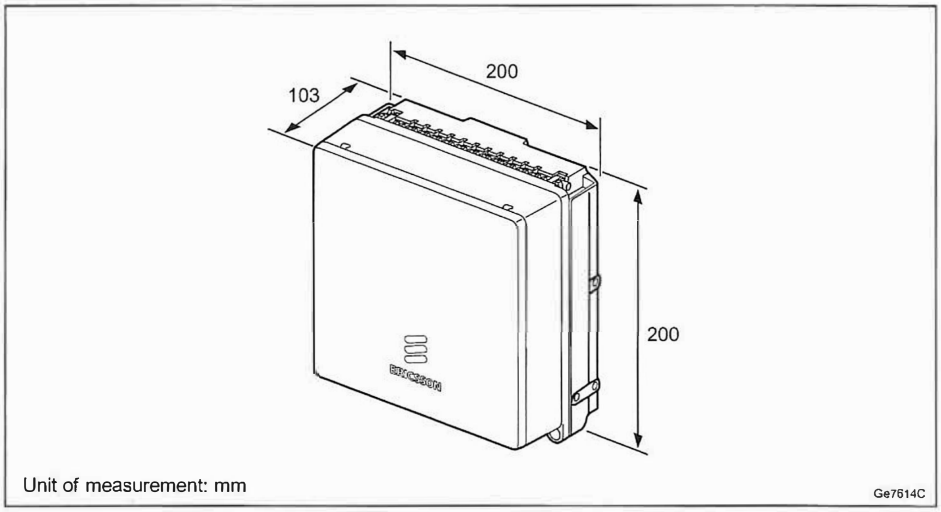


Figure 3 Radio 2205 Dimensions with Cover

3.1.2 Antennas

The technical data for the antennas are listed in Table 2.

Table 2 Antennas Data

Antenna	Frequency Band	Frequency Mhz
Directional	B46	5155-5875

3.2 Installation Recommendations

To ensure reliable operation and maximum performance, an appropriate installation location must be chosen.

When using the optional integrated directional antenna make sure the radio is not pointing at any elements that can disturb the radio signals.

3.2.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can be used indoors. For indoor locations Ericsson recommends to operate according to ETSI EN 300 19-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance, avoid installing the unit in a potential microclimate location, for example, places with unventilated lofts, with heat traps, or where the product is exposed to direct sunlight through windows. Avoid installing the equipment under glass covers or skylight windows without proper ventilation.

3.2.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for outdoor environments, avoid installing the unit in a potential microclimate location. Typical examples of microclimate locations are sites where the product is not only exposed to the actual surrounding temperature, but additional temperature as heat coming from dark colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation systems
- Near the exhaust of chimneys
- Opposite large surfaces made of glass or new concrete

If the unit is to be placed in an environment subjected to lightning strike, an external Surge Protection Device (SPD) is needed.

3.2.3 Other Considerations

Installing the radio close to other electronic equipment can cause interferences.

For sites with risk of ground fire, the recommended minimum installation height is 3 m.

3.2.4 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.2.4.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal commercially available one or two component paints.
- Never use metallic paint or paint containing metallic particles.
- Ensure that ventilation and drainage holes are free from paint.

- Ensure proper adhesion of the paint.

3.2.4.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.3 Space Requirements

The radio can be installed in one of the following ways:

- Single unit on a wall (A)
- Single unit on a wall (B) using a tilt installation kit
- Single unit on a pole (C)
- Single unit on a pole (D) using a tilt installation kit
- Rail installation on a wall (E)
- Single unit on a ceiling (F), indoor
- Single unit lying horizontally (G), indoor

The installation alternatives described in this section are the primary installation scenarios for the radio. Flexible installation alternatives are available for radios installed indoors.

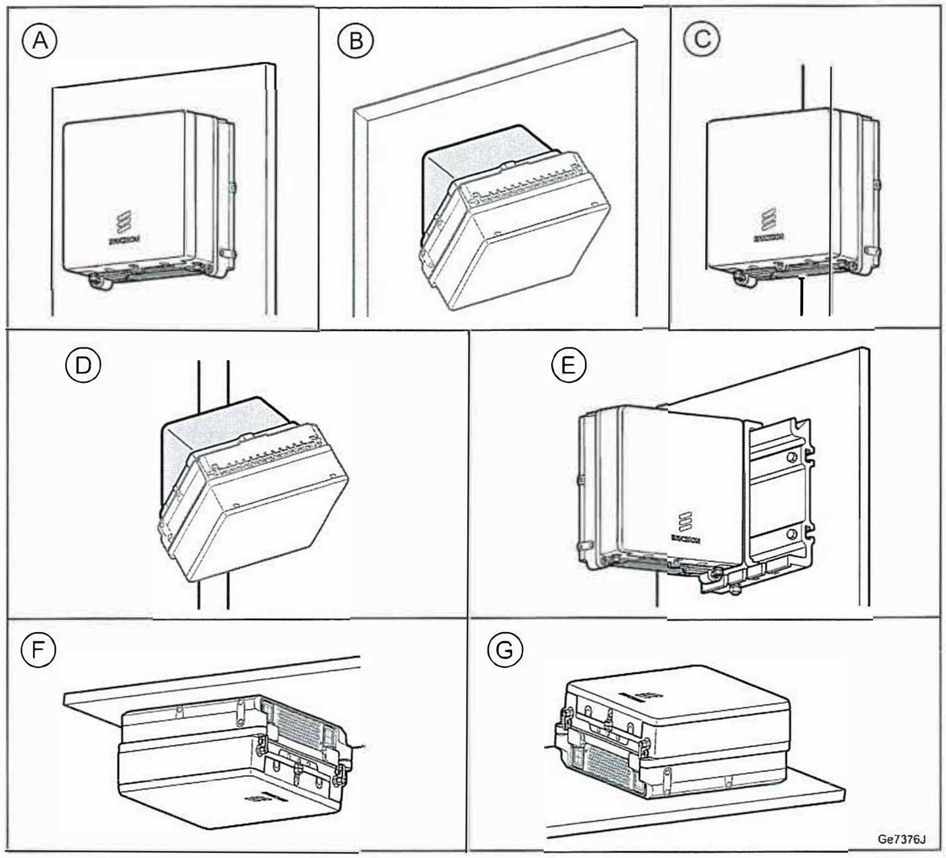


Figure 4 Installation Method Alternatives

3.3.1 Generic Requirements

The radios can be placed directly against each other side by side. To ensure sufficient working space, allow adequate free space in front of the radio.

3.3.2 Wall Installation

The installation requirements if installing the radio on a wall are shown in Figure 5.

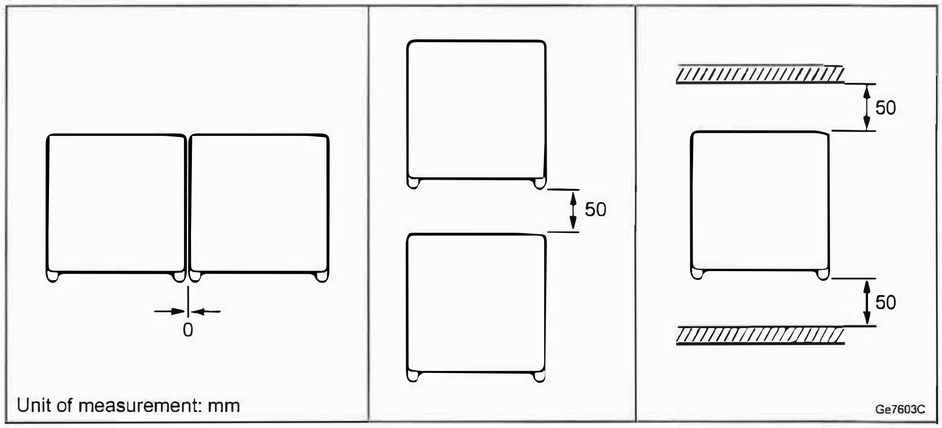


Figure 5 Wall Installation

3.3.2.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and 50 mm between radios installed on a wall, on top of one another. Refer to *Wall Installation* on page 10

3.3.3 Wall or Pole Installation Using a Tilt Installation Kit

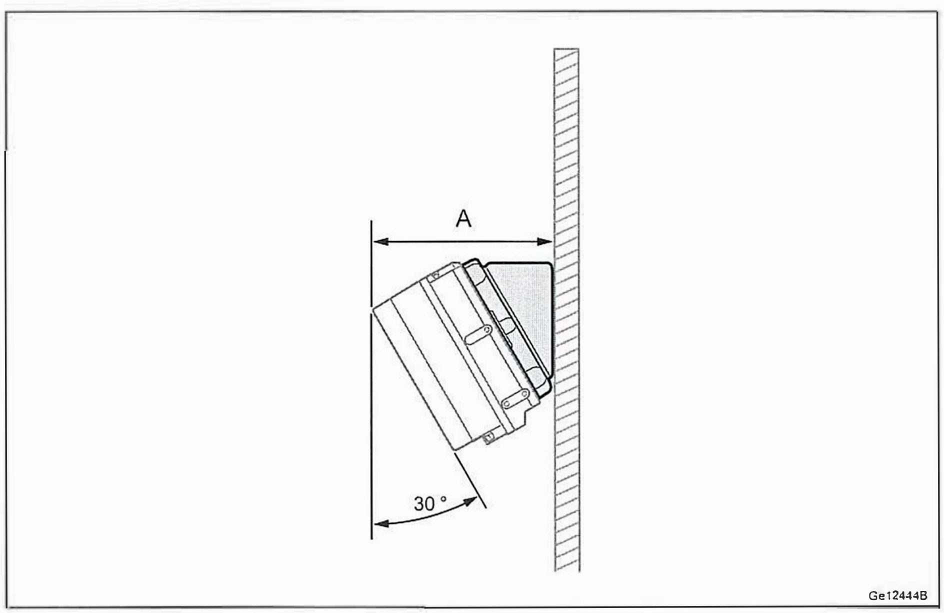


Figure 6 Tilt Installation Kit

Table 3 Tilt Installation Kit

Description	Value A (mm)
Distance with cover	198
Distance with HB antenna	216
Distance with LB antenna	224

3.3.4 Pole Installation

The pole installation is shown in Figure 7, and the dimensions are described in Table 4.

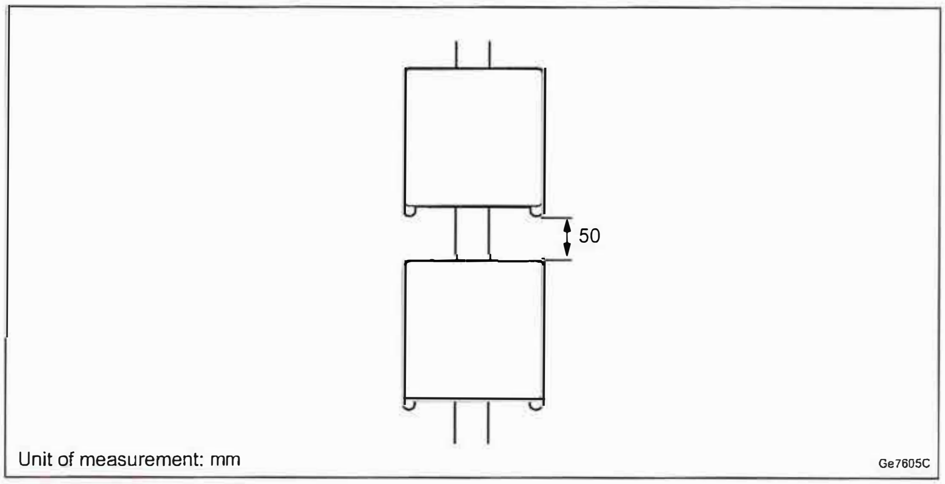


Figure 7 Pole Installation

Table 4 Pole Dimensions

Type	Minimum Dimension (mm)	Maximum Dimension (mm)
Pole Clamp	Ø40	Ø150
	Ø140	Ø300
	Ø250	Ø500

3.3.4.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio. Refer to *Pole Installation* on page 12

3.3.5 Rail Installation

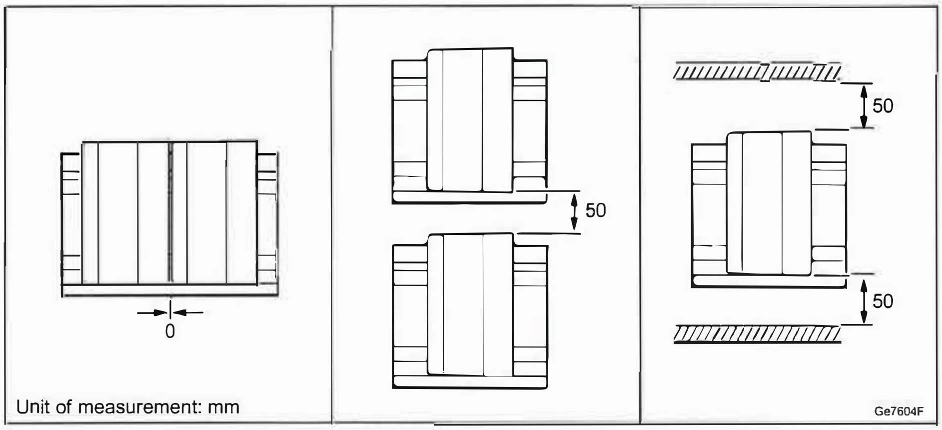


Figure 8 Rail Installation

3.3.6 Ceiling Installation

The installation requirements if installing the radio on a ceiling are shown in Figure 9.

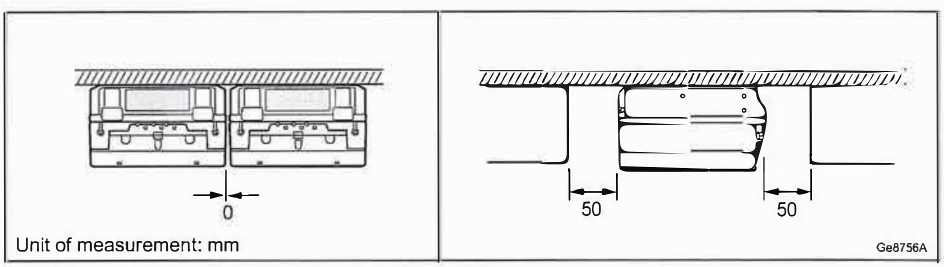


Figure 9 Ceiling Installation

3.3.6.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the wall, and 50 mm between radios installed on a roof beside one another. Refer to *Ceiling Installation* on page 13

3.3.7 Horizontal Installation (Indoor)

The installation requirements if installing the radio horizontally are shown in Figure 10.

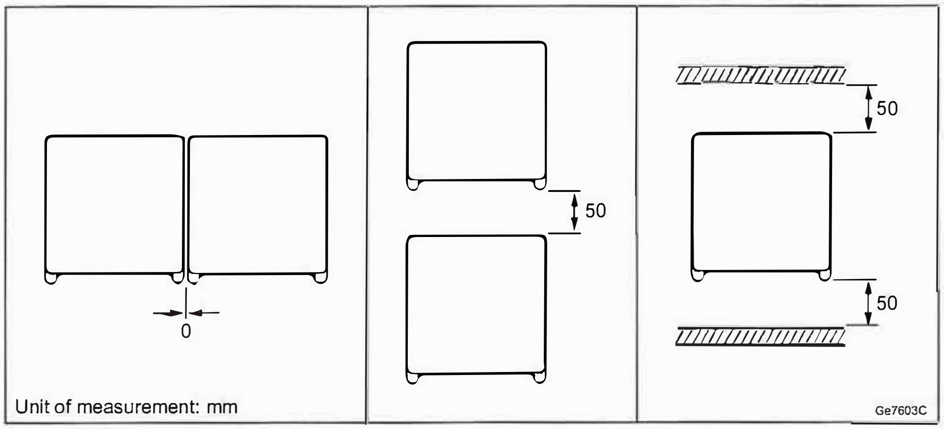


Figure 10 Horizontal Installation

3.3.7.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and 50 mm between radios installed on a wall, on top of one another. Refer to *Horizontal Installation (Indoor)* on page 13

3.4 Acoustic Noise

Table 5 Maximum Sound Pressure Level

Temperature (°C)	Sound Pressure, L_{eqA} 2m distance (dBA)
+20	28
+30	34
+40	38
+55	43

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature[1]	−40°C to +55°C
Solar radiation	≤ 1,120 W/m²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m^3
Maximum temperature change	0.5°C/min
Maximum wind load at 50 m/s (pole installed single case)	70 N (front)

(1) Depending on product variant, installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is designed for outdoor installation. Table 6 shows the radio output power and maximum heat dissipation. Indoor installation in a room without adequate ventilation and cooling must be avoided.

Table 6 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (W)
Radio 2205 B46	2 x 0.316 W	96

3.5.3 Vibration

The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	0.3–50 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh method 1

Random vibration, normal operation	+12 m^2/s^3	0.3 m^2/s^3	−12 m^2/s^3
Frequency range	5–10 Hz	10–50 Hz	50–150 Hz

3.5.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

The power for the radios can be provided from an AC or a DC power supply.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is −48 V DC. The power supply requirements are listed in Table 7.

Table 7 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	−48 V DC
Normal voltage range at radio input connector	+35 to +37 V DC
Non-destructive range	0 to −60 V DC

Fuse and Circuit Breaker Recommendations

The external fuse and circuit breaker capabilities for the radio are shown in Table 8.

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

Table 8 Radio Fuse or Circuit Breaker Recommendations

Unit (DC powered)	Output Power	Minimum Fuse Rating	Maximum Allowed Fuse Rating(1)
Radio 2205 B46	2 x 0.316 W	6 A	32 A

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.2 AC Power Characteristics

The normal voltage range for the radio is 100 to 250 V AC. The power supply requirements are listed in Table 9.

Table 9 Radio AC Power Supply Requirements

Normal Voltage Range	Tolerance Range
100–250 V	85–275 V AC
Connection	Phase-neutral, phase-phase
Frequency range	45–65 Hz
Voltage harmonics	≤ 10%
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 10 A
Inrush current duration	100 ms
AC system	TN, TT and IT

Fuse and Circuit Breaker Recommendations

The external fuse and circuit breaker capabilities for the radio are shown in Table 10.

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

When the radio is connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

Table 10 Radio Fuse or Circuit Breaker Recommendations

Unit (AC powered)	Output Power	Minimum Fuse Rating	Maximum Allowed Fuse Rating (1)
Radio 2205 B46	2 x 0.316 W	6 A	16 A

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.6.3 Power Consumption

For information on power consumption, refer to *Power Consumption Guideline for RBS 6000*.

3.7 System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1 RF Electromagnetic Exposure

For general information on RF Electromagnetic Fields (EMF) for radios connected to a Radio System from the 6000 family, refer to *Radio Frequency Electromagnetic Fields*.

For information about radio access-specific compliance boundaries for electromagnetic exposure, refer to *Radio Frequency Electromagnetic Exposure*. Use of all other antennas are subject to Site Licensing terms according to national or regional regulations.

3.7.2 Software

Information on software dependencies can be found in *Compatibilities for Hardware and Software*.

3.7.3 Radio Configurations

For information about available radio configurations, refer to *RBS Configurations*.

4 Hardware Architecture

This section describes the radio hardware structure. The radio components are shown in Figure 11 and listed in Table 11.

For a description of the supported radio configurations, refer to *RBS Configurations*.

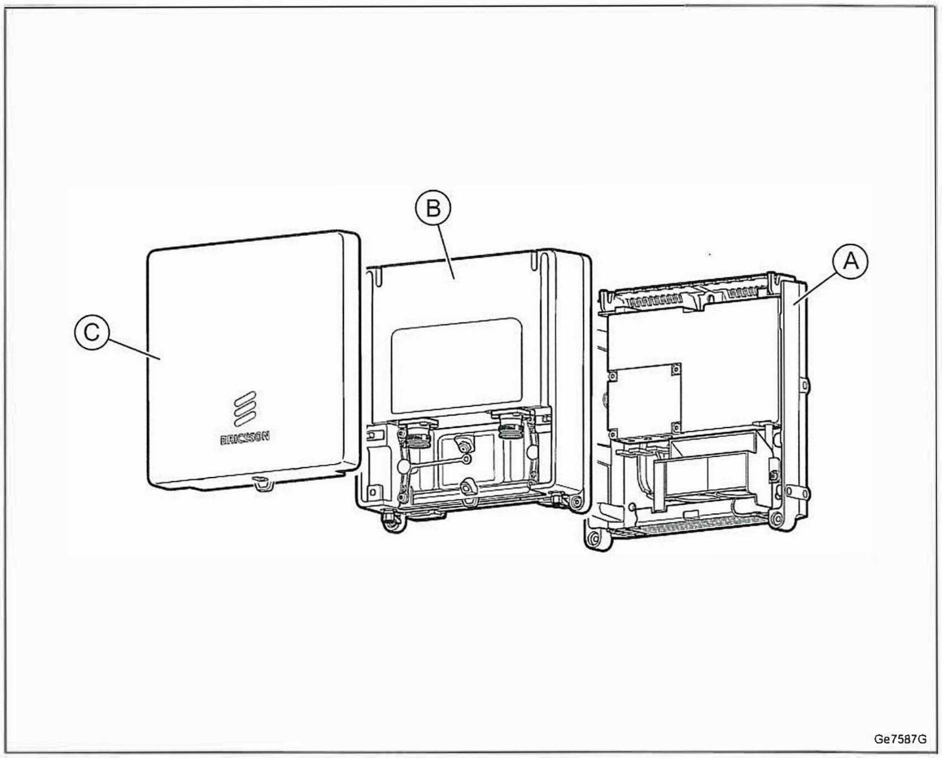


Figure 11 Radio Components

Table 11 Key to Radio Components

Position	Component
A	Support
B	Radio Core
C	Antenna or Cover

4.1 Support

The Support provides the Radio Core with integrated mechanical attachment, power conversion and cooling. It consists of a mounting bracket, a fan unit, and a PSU.

4.1.1 Mounting Bracket

The mounting bracket provides integrated mechanical attachment for wall and pole mounting, and attachment points for the rail bracket.

4.1.2 Fan Unit

The fan unit operates autonomously against ambient temperature to cool the Radio Core.

4.1.3 PSU

The PSU provides power to the Radio Core and the fan unit.

The PSU is available in two variants to support AC input and DC −48 V input. The DC variant handles both 2-wire and 3-wire connections.

Included in the PSU is also the external alarm interface and communication between PSU and Radio Core.

4.2 Radio Core

The Radio Core handles the radio communication in the unit and consists of a thermal radiator, TRX, and the FU.

4.2.1 Thermal Radiator

The thermal radiator provides cooling to the radio.

4.2.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment

- RF modulation and demodulation
- Optical cable interface termination
- Control and surveillance

4.2.3 FU

The Filter Unit (FU) consists of band-pass filters.

The coupling factor for TX monitor is 40 dB.

Table 12 shows whether the units provide TX monitoring or not.

Table 12 Units with or without TX Monitor

Unit	TX monitor
Radio 2205 B46	Yes

4.3 Antenna

The optional integrated directional Antenna provides directional RF coverage for the radio, and protects the Radio Core.

4.4 Cover

The esthetic Cover protects the Radio Core when the radio is connected to an external antenna.

4.5 Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status. The optical indicators are shown in Figure 12 and explained in Table 13.

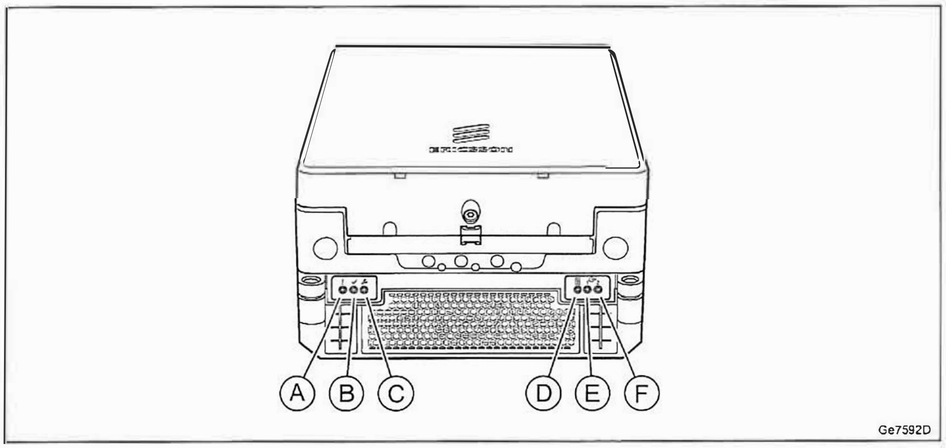


Figure 12 Radio Optical Indicators and Buttons

Table 13 Description of Radio Optical Indicators and Buttons

Position	Name	Marking
A	Fault	!
B	Operational	✓
C	Maintenance	
D	Support System Status	
E, F	Interface 1 Interface 2	

For more information about the behavior of the optical indicators and the maintenance button, refer to *Indicators, Buttons, and Switches*.

5 Connection Interfaces

This section contains information about the radio connection interfaces.

5.1 Support

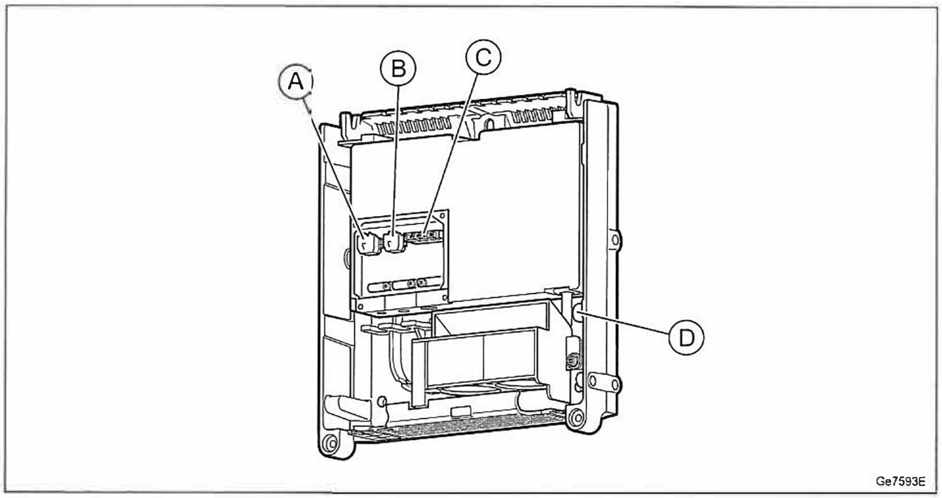
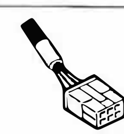
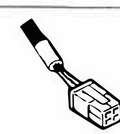


Figure 13 Support Connection Interfaces

Table 14 Support Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Fan unit		PCB connector	
B	External alarm		PCB connector	
C	–48 V DC power supply	–48V ⎓	Screw terminal block	–
C	AC power supply	∼		

Position	Description	Marking	Connector Types	Cable Types
D	Grounding (With DC power supply)	⏚	M8 bolt	
D	Grounding (With AC power supply)	⏚		

5.1.1 Position A, Fan Unit Interface

The fan unit provides cooling to the Radio Core.

5.1.2 Position B, External Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.1.3 Position C, AC/−48 V DC Power Interface

Depending on the version of the product, the power supply for the radio can be AC or DC.

5.1.3.1 AC Power Interface

The AC power connection is made through a screw terminal. The screw terminal accepts cables with the limiting values listed in Table 15.

Table 15 AC Power Supply Cable Diameter Tolerances

Cable Length	Cross-Sectional Area of Each Conductor	Outer Diameter over Sheath
0–100 m	2.5 mm^2	8–9 mm

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage does not function properly.

The AC cable temperature rating must be at least 70 °C.

5.1.3.2 DC Power Interface

The −48 V DC power connection is made through a screw terminal. The screw terminal accepts cables with the limiting values listed in Table 16.

Table 16 −48 V DC Power Supply Cable Diameter Tolerances

Cable Length	Cross-Sectional Area of Each Conductor	Outer Diameter over Sheath
0–60 m	2.5 mm^2	8–9 mm

For 3-wire power system, the power cable screw terminal has a wire for −48 V conductors, a wire for 0 V, and one wire for FE (Functional Earth). For 2-wire power system, the power cable screw terminal has a wire for −48 V conductors, and a wire for 0 V. The wire color code is market dependent.

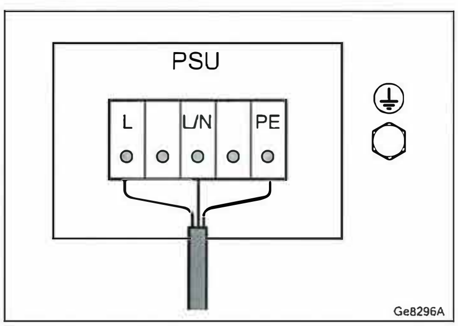
All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage does not function properly.

The DC cable temperature rating must be at least 70 °C.

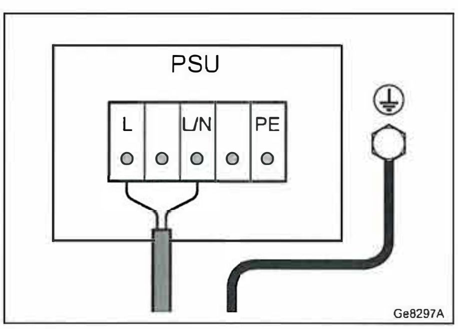
5.1.4 Position D, Grounding Interface

The possible grounding interface solutions for the radio are as follows:

AC Grounding

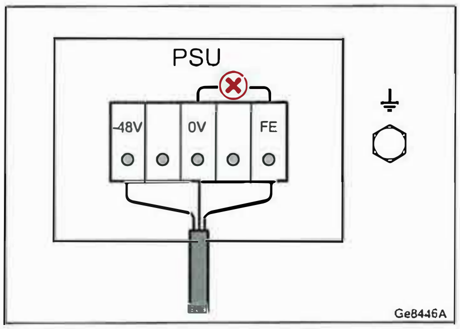


AC power with PE in PSU input terminal.

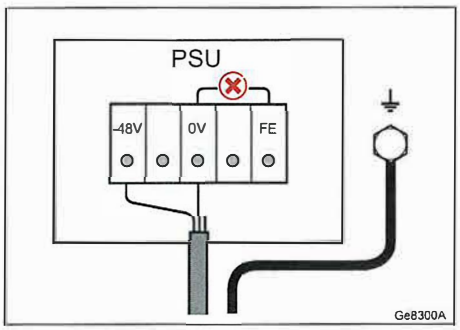


AC power with PE in the grounding interface on the mounting bracket.

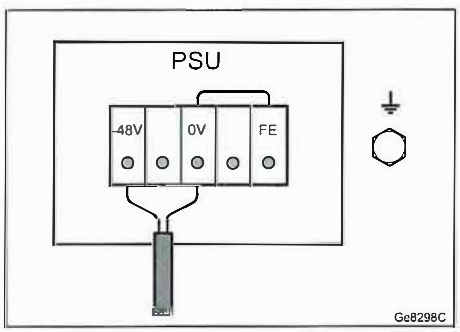
DC Grounding



3-wire power system with FE in PSU input terminal. Remove the jumper between 0V and FE.



3-wire power system with FE in the grounding interface on the mounting bracket. Remove the jumper between 0V and FE.



2-wire power system with FE in PSU input terminal.

For more information about grounding principles, refer to *Grounding Guidelines for RBS Sites*.

5.2 Radio Core

The Radio Core connection interfaces are shown in Figure 14 and listed in Table 17.

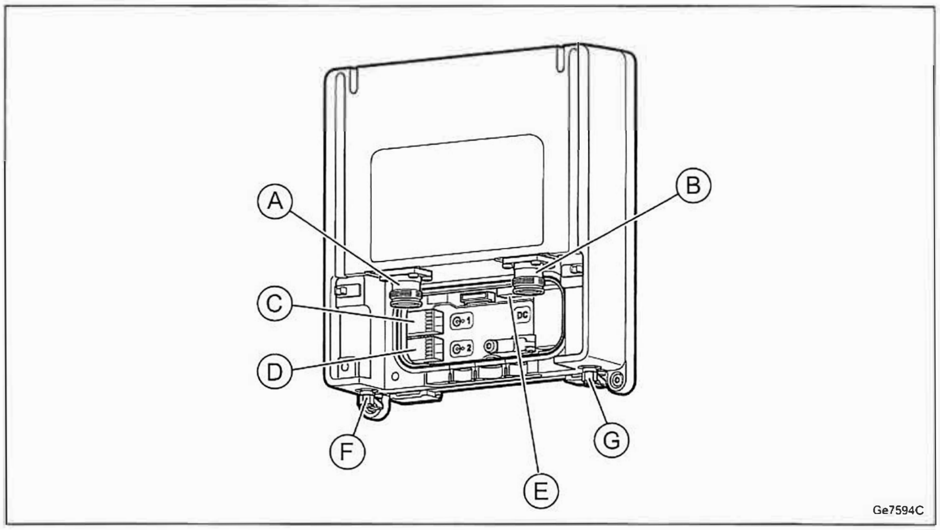


Figure 14 Radio Core Connection Interfaces

Table 17 Connection Interfaces

Position	Description	Marking
A	Antenna A	A
B	Antenna B	B
C	Optical cable 1	1
D	Optical cable 2	2
E	DC power supply and internal communication	DC
F	TX monitor A	TX MON A
G	TX monitor B	TX MON B

5.2.1 Position A and B, Antenna Interface

The antenna interfaces provide connections for the radio to the antennas. RF cables connect the radio to the antenna.

Table 18 Radio Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type
4.3-10, insert-receiver type	50 Ω coaxial	4.3-10 type

Table 19 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
A (Antenna A)	TX/RX
B (Antenna B)	TX/RX

5.2.2 Position C and D, Interface for Optical Cable to Main Unit

The 1 and 2 interfaces provide connections to optical cables (with outer diameter 4.5–5.5 mm, and complies with standard G657A2) for traffic and timing signals between the radio and the main unit. A Small Form-Factor Pluggable (SFP+) is used to connect the optical cable to the radio.

Note: The radio uses SFP modules for optical transmission and optical radio interfaces on Data 1 and Data 2.

Only SFP+ modules approved and supplied by Ericsson are to be used. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1
- Certification according to general safety requirements defined in standard IEC 60950-1
- Functional and performance verified to comply with Radio System specifications

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP+ modules, refer to *Spare Parts Catalog* and *Main-Remote Installation Products Overview*.

5.2.3 Position E, DC Power Interface

The radio DC power connector supplies the radio with +36 V DC, and internal communication from the PSU.

5.2.4 Position F and G, TX Monitor Interface

The TX monitor interfaces provide the monitoring for the output power and are shown in Table 20.

Table 20 TX Monitor Cable Connectors

Radio Connectors	TX Monitor Connectors
TX Monitor A	SMA Connector
TX Monitor B	SMA Connector

6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity.

Declaration of Conformity

"*Hereby, Ericsson AB, declares that this Product is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU and 2011/65/EU.*"

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- EC (European Community) market requirements, Radio Equipment Directive 2014/53/EU and Directive 2011/65/EU.
- The apparatus may include radio Transceivers with support for frequency bands not allowed or not harmonized within the EC.
- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).
- North American market requirements.
- Products containing radio Equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- EN 50 581 (RoHS)

6.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 62 368-1

Europe

- EN 50 385
- EN 62 368-1

North America

- FCC CFR 47 Part 1.1310
- FCC CFR 47 Part 2.1091
- UL 62 368-1
- CSA C22.2 No. 62368-1-14

6.1.3 Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65, IP55 for Directional antenna)
- IEC 60950-22

Europe

- EN 60 529 (IP65, IP55 for Directional antenna)
- EN 60 950-22

North America

- CSA-C22.2 No. 60950-22-07
- UL 50E
- UL 60950-22

6.1.4 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

Europe

- ETSI EN 301 489-1
- ETSI EN 301 489-17

North America

- FCC CFR 47 Part 15B, 15C and 15E

6.1.5 Radio Standards Compliance

The Radio System complies with the following radio standards:

Europe

- ETSI EN 301 893

North America

- FCC CFR 47 Part 15 E

6.1.6 Marking

To show compliance with legal requirements, the product is marked with the following labels:

Europe

- CE mark

North America

- usETL/cETL
- FCC CFR 47 Part 15 Statement
- FCC ID

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

Remote Radio Unit Description

RRU 2208

Description

191/1551-LZA 701 6001/1 Uen V

Contents

1 Introduction

This document describes Remote Radio Unit 2208 (RRU 2208).

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.

2 Product Overview

The radio expands coverage and performance in denser urban areas, where the use of small handheld devices demand high capacity on the operators networks. It is designed to be located in cities and in demanding radio environments.

The radio is part of a modular radio building concept that enables a variety of installation alternatives that is also easy to expand. Flexible mounting solutions are provided using rails and pole clamps. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

The radio can be connected in a star or cascade configuration using optical cable links. An optic cable connects the radio to the main unit, or to an expanded Radio System.

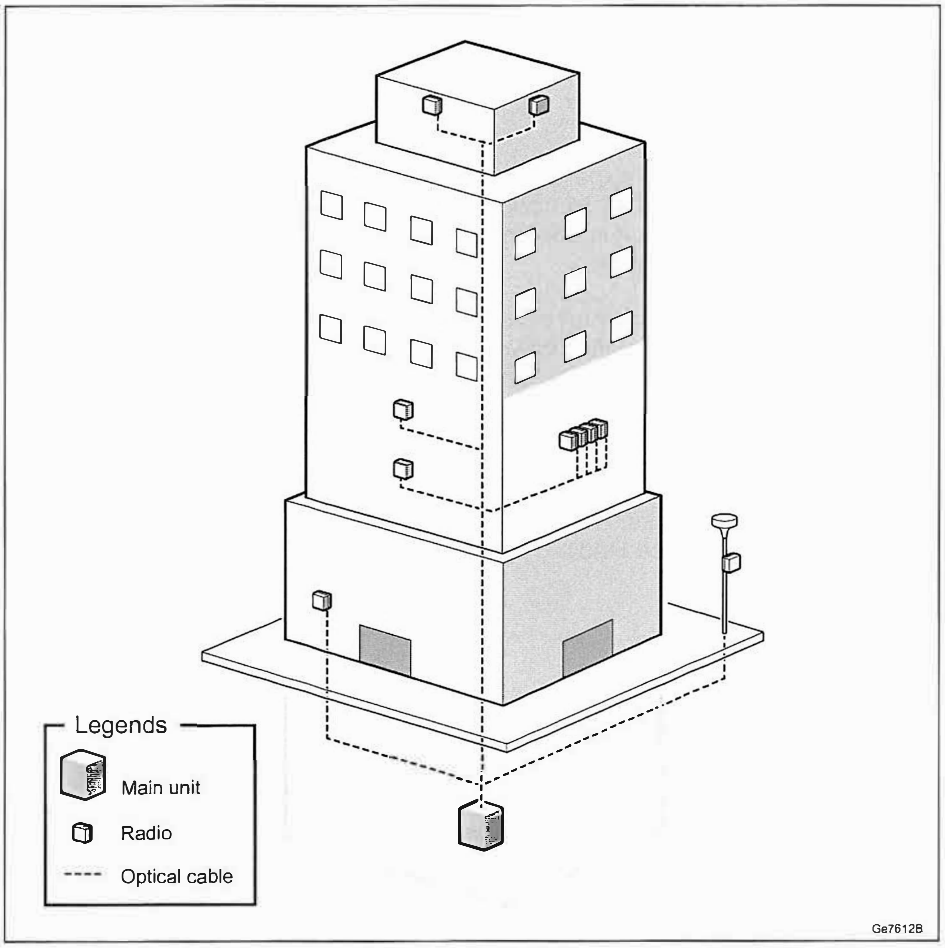


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- Supports:
  - LTE
- Supports:
  - LTE Time Division Duplex (LTE TDD)
- Supports:
  - Duplex transmitter/receiver (2TX/2RX) branches with 10 W per branch

- Supports up to 9.8 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range (MR); relevant standards are listed in *RRU Standards Compliance* on page 30 (RRU 2208)

2.2 Optional Equipment

The optional equipment for the radio is the following:

- External antenna equipment
- Integrated directional antenna
- Omnidirectional antennas
- Rail installation equipment

3 Technical Data

Table 1 RRU 2208 Technical Data

Description	Value
Maximum nominal output power(1)	2 x 10 W
Number of carriers(1)	LTE: One to two carriers
Frequency(2)	2575–2635 MHz uplink 2575–2635 MHz downlink B41E for LTE.
Dimensions with Cover	
Height	200 mm
Width	200 mm
Depth	103 mm
Dimensions with Antenna	
Height	200 mm
Width	200 mm
Depth	123 mm
Weight with Cover	
RRU 2208	4.6 kg
Weight with Antenna	
RRU 2208	5.0 kg
Color	
Body	NCS S 1002-B

(1) Detailed information about licenses and hardware activations codes (HWAC) can be found in:

Manage Licenses in the Radio Nodes libraries.

(2) Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.

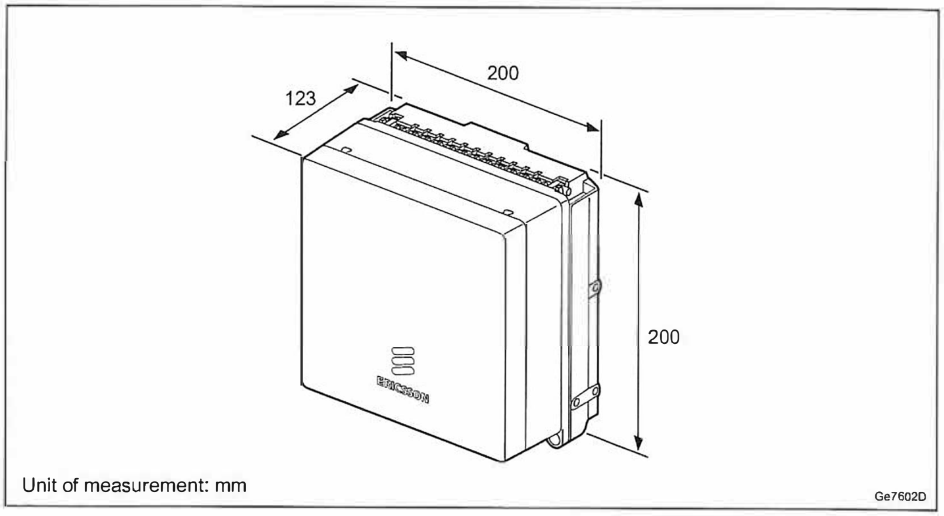


Figure 2 RRU 2208 Dimensions with Antenna

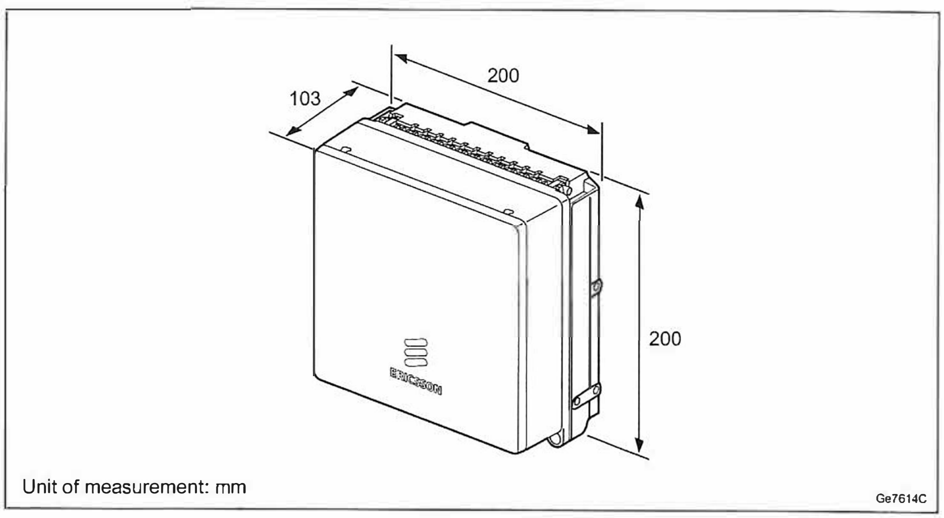


Figure 3 RRU 2208 Dimensions with Cover

Table 2 Antenna Data

Antenna	Frequency Band	Frequency Mhz
6503 Directional	B1, B2/B25, B3, B3C, B66A	1710–2200
6504 Directional	B7	2300–2690
6507 Omnidirectional	B1, B2/B25, B3, B3C, B7, B66A	1710–2700

3.1 Installation Recommendations

To ensure reliable operation and maximum performance, an appropriate installation location must be chosen.

When using the optional integrated directional antenna make sure the radio is not pointing at any elements that can disturb the radio signals.

3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can be used indoors. For indoor locations Ericsson recommends to operate according to ETSI EN 300 19-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance, avoid installing the unit in a potential microclimate location, for example, places with unventilated lofts, with heat traps, or where the product is exposed to direct sunlight through windows. Avoid installing the equipment under glass covers or skylight windows without proper ventilation.

3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for outdoor environments, avoid installing the unit in a potential microclimate location. Typical examples of microclimate locations are sites where the product is not only exposed to the actual surrounding temperature, but additional temperature as heat coming from dark colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10°C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation systems
- Near the exhaust of chimneys
- Opposite large surfaces made of glass or new concrete

If the unit is to be placed in an environment subjected to lightning strike, an external Surge Protection Device (SPD) is needed.

3.1.3 Other Considerations

Installing the radio close to other electronic equipment can cause interferences.

For sites with risk of ground fire, the recommended minimum installation height is 3 m.

3.1.4 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.1.4.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal, commercially available one- or two-component paints.
- Never use metallic paint or paint containing metallic particles.
- Ensure that ventilation and drainage holes are free from paint.
- Ensure proper adhesion of the paint.

3.1.4.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.2 Space Requirements

The radio can be installed in one of the following ways:

- Single unit on a wall (A)

- Single unit on a wall (B) using a tilt installation kit
- Single unit on a pole (C)
- Single unit on a pole (D) using a tilt installation kit
- Rail installation on a wall (E)
- Single unit on a ceiling (F), indoor
- Single unit lying horizontally (G), indoor

The installation alternatives described in this section are the primary installation scenarios for the radio. Flexible installation alternatives are available for radios installed indoors.

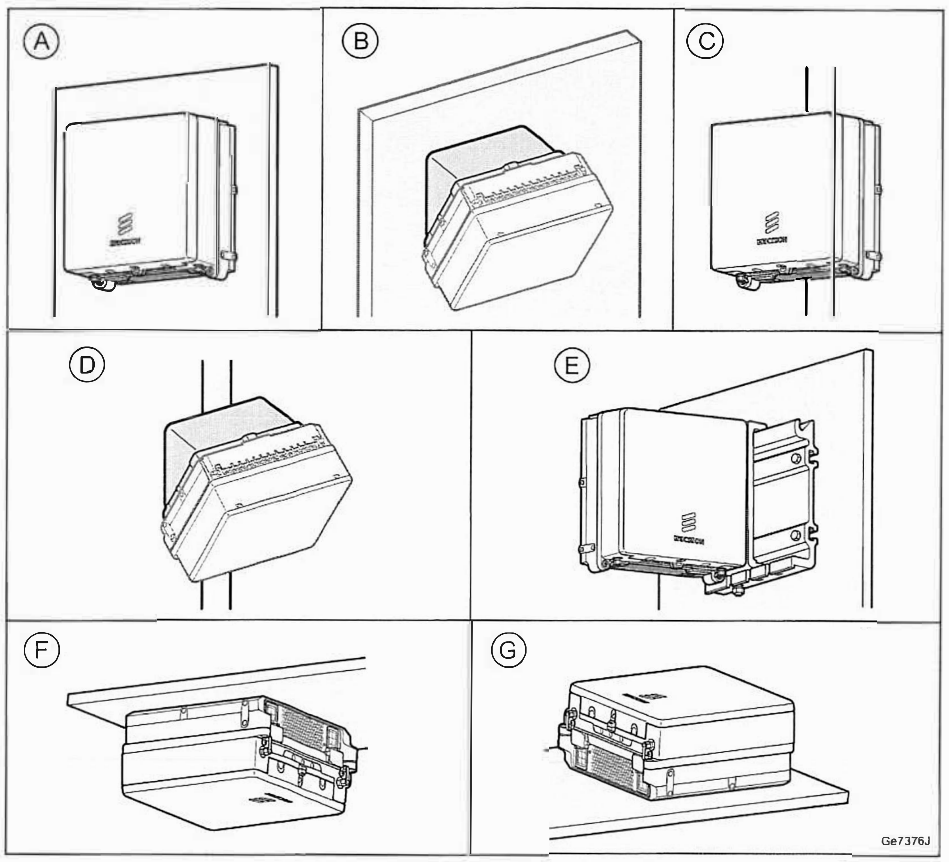


Figure 4 Installation Method Alternatives

3.2.1 Generic Requirements

The radios can be placed directly against each other side by side. To ensure sufficient working space, allow adequate free space in front of the radio.

3.2.2 Wall Installation

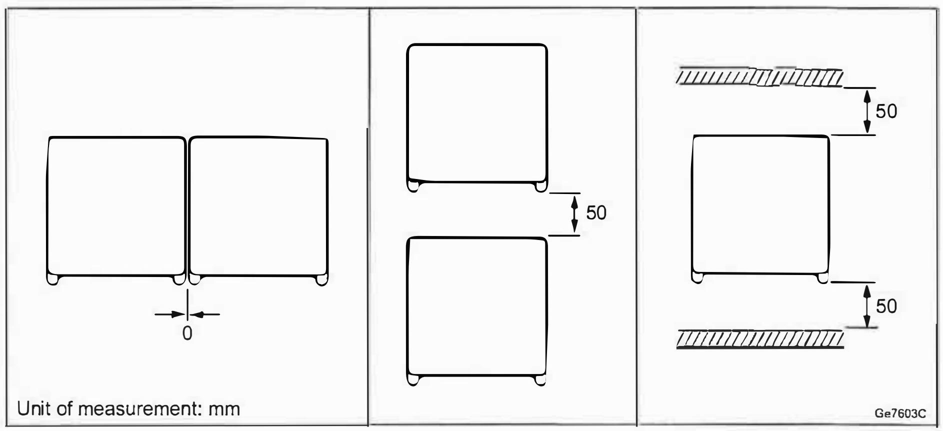


Figure 5 Wall Installation Requirements

3.2.2.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and 50 mm between radios installed on a wall, on top of one another.

3.2.3 Wall or Pole Installation Using a Tilt Installation Kit

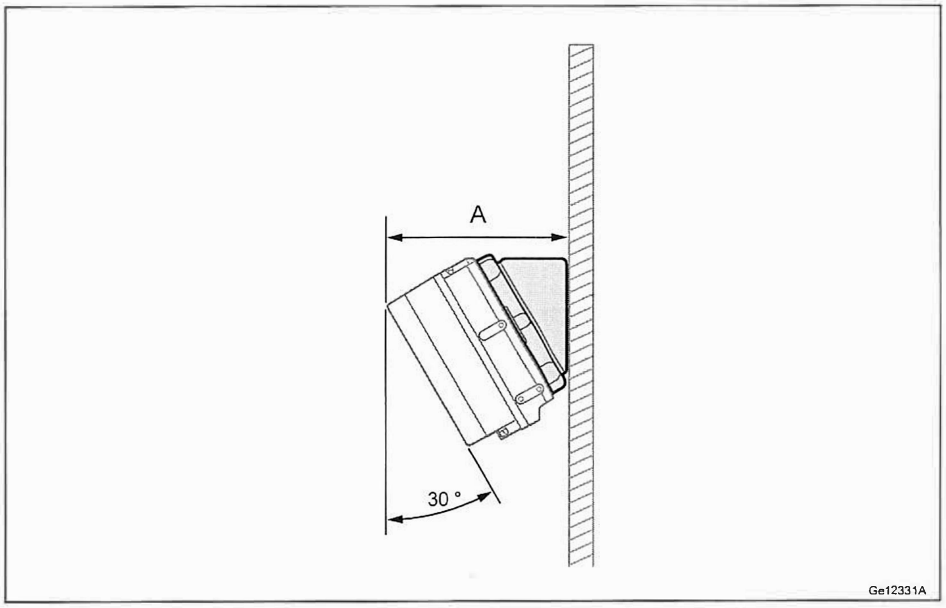


Figure 6 Tilt Installation Kit

Table 3 Tilt Installation Kit

Description	Value A (mm)
Distance with cover	198
Distance with HB antenna	216
Distance with LB antenna	224

3.2.4 Pole Installation

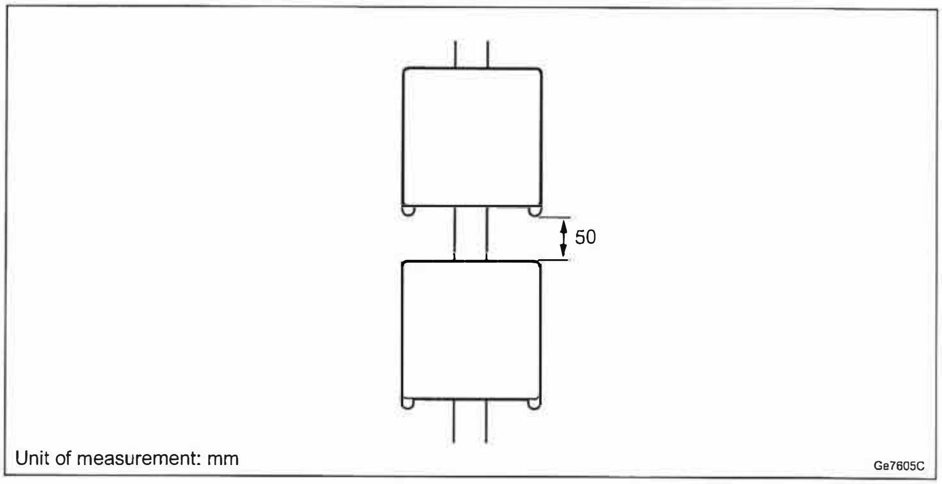


Figure 7 Pole Installation

Table 4 Pole Dimensions

Type	Minimum Dimension (mm)	Maximum Dimension (mm)
Pole Clamp	Ø40	Ø150
	Ø140	Ø300
	Ø250	Ø500

3.2.4.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space above and below each radio.

3.2.5 Rail Installation

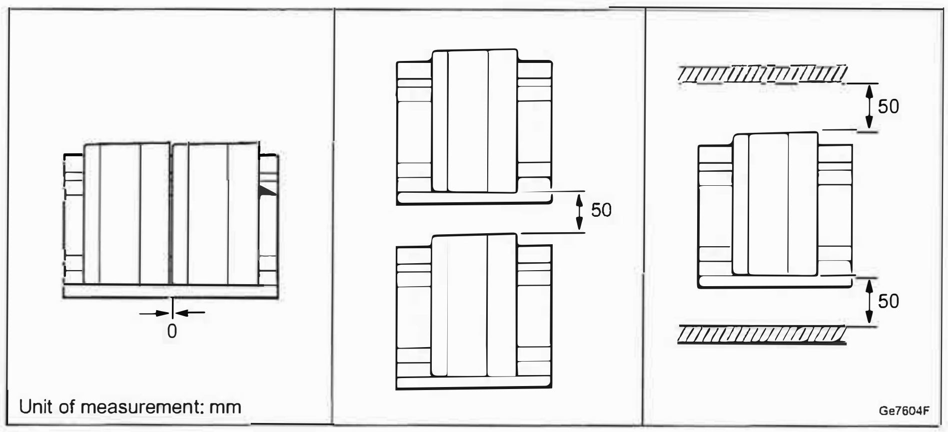


Figure 8 Rail Installation

3.2.6 Ceiling Installation

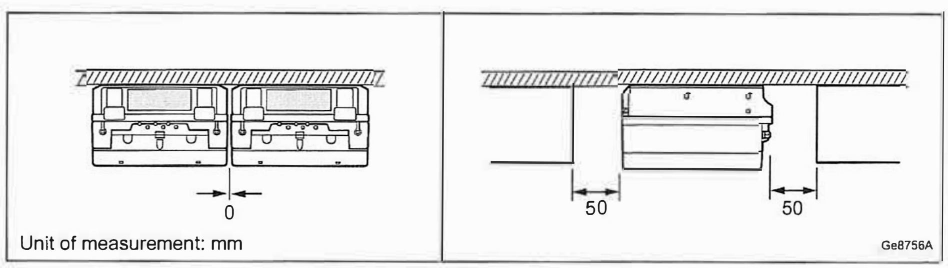


Figure 9 Ceiling Installation

3.2.6.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the wall, and 50 mm between radios installed on a roof beside one another.

3.2.7 Horizontal Installation (Indoor)

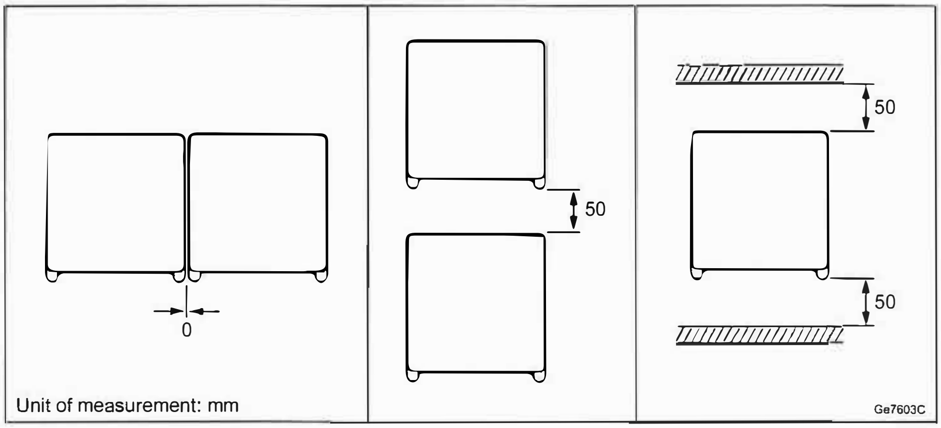


Figure 10 Horizontal Installation Requirements

3.2.7.1 Site Layout

To ensure adequate airflow between the units, allow a minimum of 50 mm free space between the radio and the roof, and 50 mm between radios installed on a wall, on top of one another.

3.3 Acoustic Noise

Table 5 Maximum Sound Pressure Level

Temperature (°C)	Sound Pressure, L_{eqA} 2m distance (dBA)
+20	4.2
+30	4.2
+40	4.8
+55	5.7

3.4 Environmental Characteristics

This section contains operating environment data for the radio.

3.4.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature(1)	−40°C to +55°C
Solar radiation	≤ 1,120 W/m²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m³
Maximum temperature change	0.5°C/min
Maximum wind load at 50 m/s (pole installed single case)	70 N (front)

(1) Depending on product variant, installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

3.4.2 Heat Dissipation

The radio is designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

Table 6 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (W)
RRU 2208 B41E	2 x 10 W	130 W

Table 7 Support Heat Dissipation

Unit	Heat Dissipation (W)
Support 6501 Support 6502	10 W

3.4.3 Vibration

The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s² within 2–5 Hz for DR=2%
Frequency range	0.3–50 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh method 1

Random vibration, normal operation	+12 m^2/s^3	0.3 m^2/s^3	−12 m^2/s^3
Frequency range	5–10 Hz	10–50 Hz	50–150 Hz

3.4.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.5 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

The power for the radios can be provided from an AC or a DC power supply.

3.5.1 DC Power Characteristics

The power supply voltage for the radio is −48 V DC.

Table 8 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	−48 V DC
Normal voltage range at radio input connector	−36.0 to −58.5 V DC
Non-destructive range	0 to −60 V DC

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

Table 9 Radio Fuse or Circuit Breaker Recommendations

Unit (DC powered)	Output Power	Minimum Fuse Rating	Maximum Allowed Fuse Rating(1)
RRU 2208 B41E	2 x 10 W	6 A	32 A

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.5.2 AC Power Characteristics

The normal voltage range for the radio is 100 to 250 V AC.

Table 10 Radio AC Power Supply Requirements

Normal Voltage Range	Tolerance Range
100–250 V	85–275 V AC
Connection	Phase-neutral, phase-phase
Frequency range	50–60 Hz
Voltage harmonics	< 10% at full load (1)
Shut-off allowance	At undervoltage or overvoltage
Inrush current peak	< 4 A
Inrush current duration	< 100 ms
AC system	TN, TT and IT

(1) Must comply with IEC 61000-3-2

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and do not provide information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

When the radio is connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when the radio is used in an IT system.

Table 11 Radio Fuse or Circuit Breaker Recommendations

Unit (AC powered)	Output Power	Minimum Fuse Rating	Maximum Allowed Fuse Rating (1)
RRU 2208 B41E	2 x 10 W	6 A (100–127 V AC) 6 A (200–250 V AC)	16 A

(1) The absolute maximum fuse class in accordance with radio design restrictions.

3.5.3 Power Consumption

For information on power consumption, refer to *Power Consumption Guideline for RBS 6000*.

3.6 System Characteristics

This section describes the system characteristics of the Radio System.

3.6.1 RF Electromagnetic Exposure

For general information on RF Electromagnetic Fields (EMF) for radios connected to a Radio System from the 6000 family, refer to *Radio Frequency Electromagnetic Fields*.

For information about radio access-specific compliance boundaries for electromagnetic exposure, refer to *Radio Frequency Electromagnetic Exposure*. Use of all other antennas are subject to Site Licensing terms according to national or regional regulations.

3.6.2 Software

Information on software dependencies can be found in *Compatibilities for Hardware and Software*.

3.6.3 Radio Configurations

For information about available radio configurations, refer to *RBS Configurations*.

4 Hardware Architecture

For a description of the supported radio configurations, refer to *RBS Configurations*.

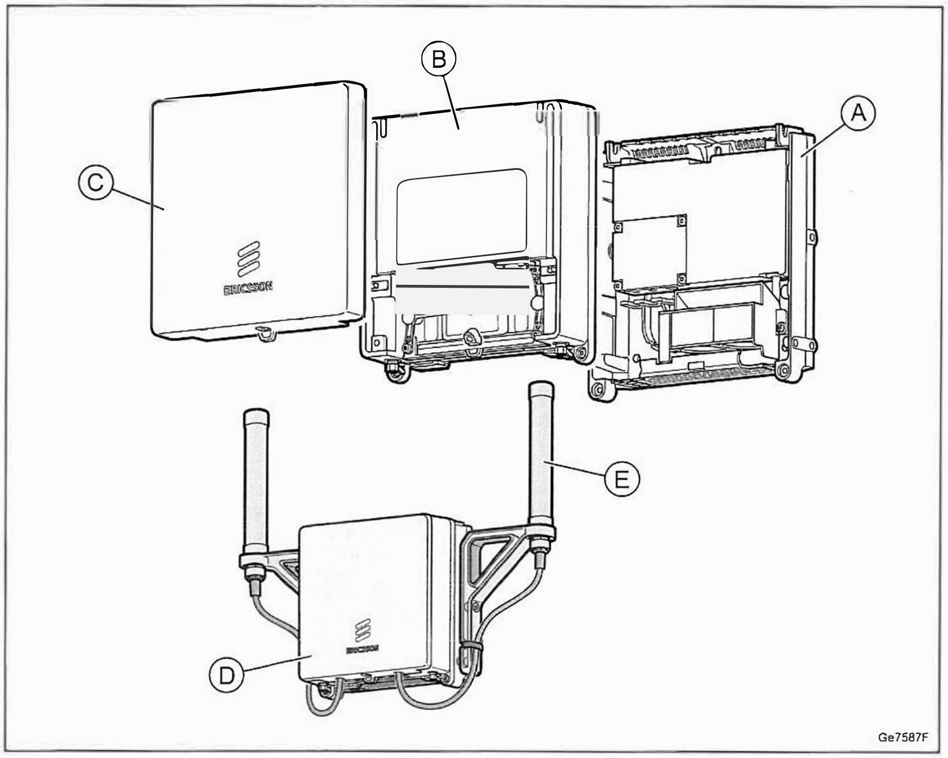


Figure 11 Radio Components

Table 12 Key to Radio Components

Position	Component
A	Support
B	Radio Core
C	Antenna or Cover
D	Cover
E	Omnidirectional antennas

4.1 Support

The Support provides the Radio Core with integrated mechanical attachment, power conversion and cooling. It consists of a mounting bracket, a fan unit, and a PSU.

4.1.1 Mounting Bracket

The mounting bracket provides integrated mechanical attachment for wall and pole mounting, and attachment points for the rail bracket.

4.1.2 Fan Unit

The fan unit operates autonomous against ambient temperature to cool the Radio Core.

The fan unit can be removed when all the following cases applies:

- The radio is installed on a single support.
- The radio is installed in an indoor environment.
- Maximum configured power is 2x3 W.
- The ambient temperature is maximum 30° C.
- The radio is installed vertically.

Note: Radios with removed fan units must not be installed above each other. It is important that the fan unit is removed physically to ensure cooling.

4.1.3 PSU

The PSU provides power to the Radio Core and the fan unit.

The PSU is available in two variants to support AC input and DC −48 V input. The DC variant handles both 2-wire and 3-wire connections.

Included in the PSU is also the external alarm interface and communication between PSU and Radio Core.

4.2 Radio Core

The Radio Core handles the radio communication in the unit and consists of a thermal radiator, TRX, and the FU.

4.2.1 Thermal Radiator

The thermal radiator provides cooling to the radio.

4.2.2 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- RF modulation and demodulation
- Optical cable interface termination
- Control and surveillance

4.2.3 FU

The Filter Unit (FU) consists of band-pass filters.

The coupling factor for TX monitor is 40 dB.

[unresolved external reference] shows whether the units provide TX monitoring or not.

Table 13 Units with or without TX Monitor

Unit	TX monitor
RRU 2208 B41E	No

4.3 Antenna

The optional integrated directional Antenna provides directional RF coverage for the radio, and protects the Radio Core.

4.4 Omnidirectional Antennas

The integrated omnidirectional antennas provides RF coverage for the radio in a 360° angle around the radio. The omnidirectional antennas are used together with the esthetic Cover.

4.5 Cover

The esthetic Cover protects the Radio Core when the radio is connected to an external antenna.

4.6 Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status.

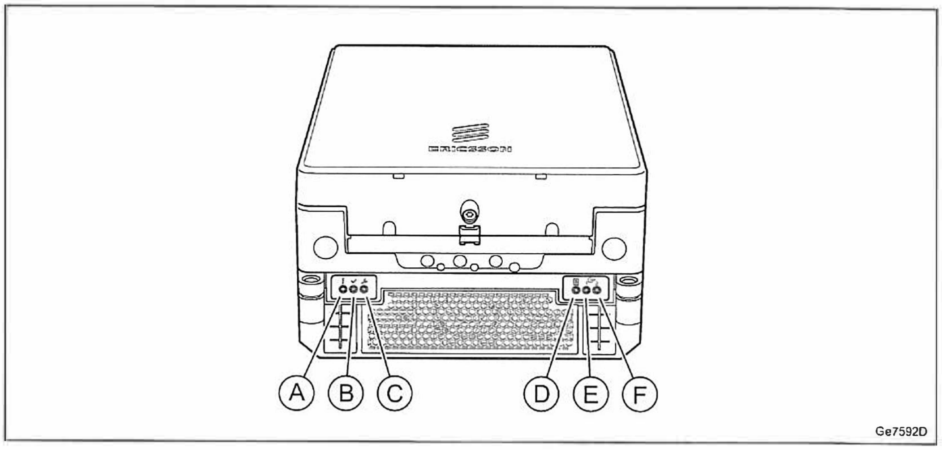


Figure 12 Radio Optical Indicators and Buttons

Table 14 Description of Radio Optical Indicators and Buttons

Position	**Name**	**Marking**
A	Fault	!
B	Operational	✔
C	Maintenance	
D	Support System Status	
E, F	Interface 1 Interface 2	

For more information about the behavior of the optical indicators and the maintenance button, refer to *Indicators, Buttons, and Switches*.

5 Connection Interfaces

This section contains information about the radio connection interfaces.

5.1 Support

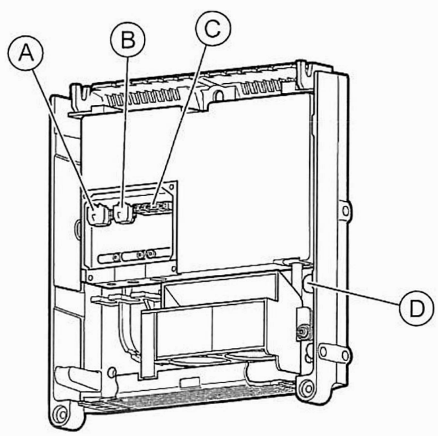
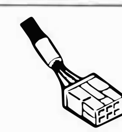
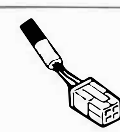
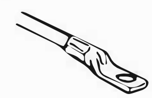


Figure 13 Support Connection Interfaces

Table 15 Support Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Fan unit		PCB connector	
B	External alarm		PCB connector	
C	−48 V DC power supply	-48V ⎓	Screw terminal block	–
C	AC power supply	∼		

Position	Description	Marking	Connector Types	Cable Types
D	Grounding (With DC power supply)	⏚	M8 bolt	
D	Grounding (With AC power supply)	⏚		

5.1.1 Position A, Fan Unit Interface

The fan unit provides cooling to the Radio Core.

5.1.2 Position B, External Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.1.3 Position C, AC/−48 V DC Power Interface

Depending on the version of the product, the power supply for the radio can be AC or DC.

5.1.3.1 AC Power Interface

The AC power connection is made through a screw terminal.

Table 16 AC Power Supply Cable Diameter Tolerances

Cable Length	Cross-Sectional Area of Each Conductor	Outer Diameter over Sheath
0–100 m	2.5 mm^2	8–9 mm

The power cable has a wire for Line (L), a wire for Line/Neutral (L/N), and a wire for Protective Earth (PE) conductors. The wire color code for wires is market dependent.

All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage does not function properly.

The AC cable temperature rating must be at least 70 °C.

5.1.3.2 DC Power Interface

The −48 V DC power connection is made through a screw terminal.

Table 17 −48 V DC Power Supply Cable Diameter Tolerances

Cable Length	Cross-Sectional Area of Each Conductor	Outer Diameter over Sheath
0–60 m	2.5 mm^2	8–9 mm

For 3-wire power system, the power cable screw terminal has a wire for −48 V conductors, a wire for 0 V, and one wire for FE (Functional Earth). For 2-wire power system, the power cable screw terminal has a wire for −48 V conductors, and a wire for 0 V. The wire color code is market dependent.

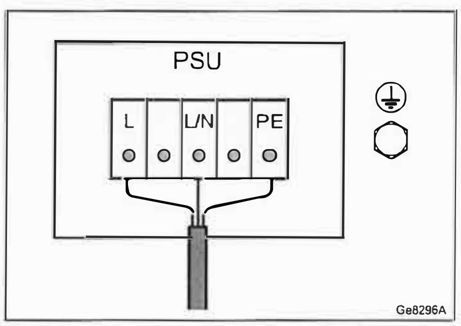
All cables must be shielded. The shield must be folded back over the outer jacket of the cable and properly connected to the PSU chassis in the PSU strain relief, otherwise the radio overvoltage does not function properly.

The DC cable temperature rating must be at least 70 °C.

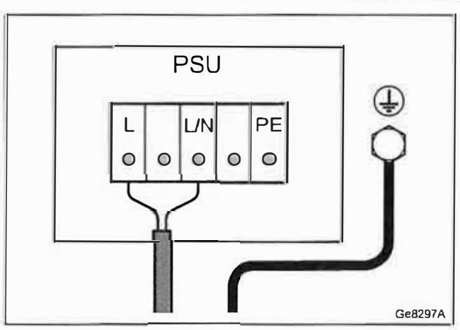
5.1.4 Position D, Grounding Interface

The possible grounding interface solutions for the radio are as follows:

AC Grounding

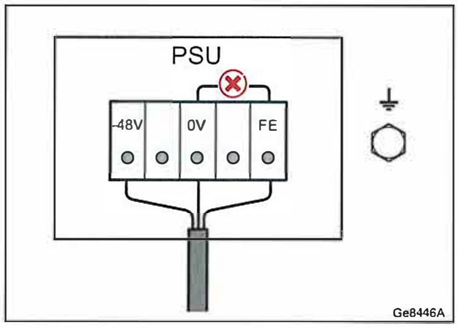


AC power with PE in PSU input terminal.

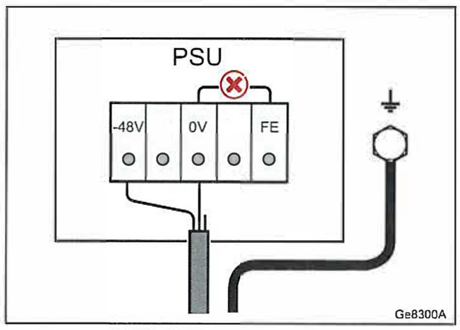


AC power with PE in the grounding interface on the mounting bracket.

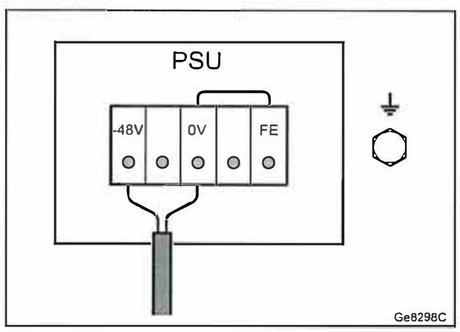
DC Grounding



3-wire power system with FE in PSU input terminal. Remove the jumper between 0V and FE.



3-wire power system with FE in the grounding interface on the mounting bracket. Remove the jumper between 0V and FE.



2-wire power system with FE in PSU input terminal.

For more information about grounding principles, refer to *Grounding Guidelines for RBS Sites*.

5.2 Radio Core

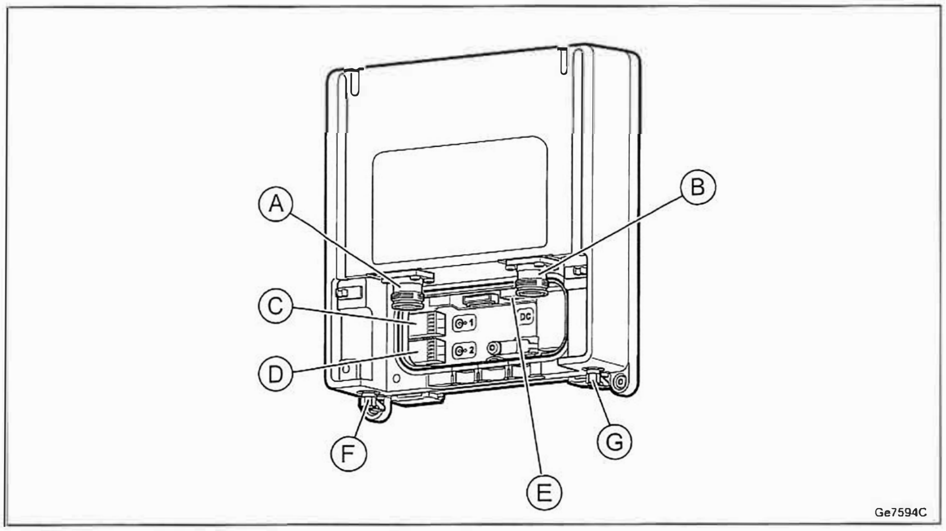


Figure 14 Radio Core Connection Interfaces

Table 18 Radio Core Connection Interfaces

Position	Description	Marking
A	Antenna A	A
B	Antenna B	B
C	Optical cable 1	1
D	Optical cable 2	2
E	DC power supply and internal communication	DC

5.2.1 Position A and B, Antenna Interface

The antenna interfaces provide connections for the radio to the antennas. RF cables connect the radio to the antenna.

Table 19 Radio Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type
4.3-10, insert-receiver type	50 Ω coaxial	4.3-10 type

Table 20 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
A (Antenna A)	TX/RX
B (Antenna B)	TX/RX

5.2.2 Position C and D, Interface for Optical Cable to Main Unit

The 1 and 2 interfaces provide connections to optical cables (with outer diameter 4.5–5.5 mm, and complies with standard G657A2) for traffic and timing signals between the radio and the main unit. A Small Form-Factor Pluggable (SFP+) is used to connect the optical cable to the radio.

Note: The radio uses SFP modules for optical transmission and optical radio interfaces on Data 1 and Data 2.

Only SFP+ modules approved and supplied by Ericsson are to be used. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1
- Certification according to general safety requirements defined in standard IEC 60950-1
- Functional and performance verified to comply with Radio System specifications

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP+ modules, refer to *Spare Parts Catalog* and *Main-Remote Installation Products Overview*.

5.2.3 Position E, DC Power Interface

The radio DC power connector supplies the radio with +36 V DC, and internal communication from the PSU.

6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for RRU 2208.

6.1 Regulatory Approval

The RRU System complies with the China market requirements:

6.1.1 Safety Standards Compliance

In accordance with market requirements, the RRU System complies with the following product safety standards and directives:

International

- IEC 60950-1

Europe

- EN 50 385
- EN 60 950-1

6.1.1.1 Outdoor Specific Requirements

The RRU System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65, IP55 for Directional antenna, IP64 for Omnidirectional antennas)
- IEC 60950-22

Europe

- EN 60 529 (IP65, IP55 for Directional antenna, IP64 for Omnidirectional antennas)
- EN 60 950-22

6.1.2 EMC Standards Compliance

The RRU System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS37.113

Europe

- ETSI EN 301 489-1
- ETSI EN 301 489-50

6.1.3 RRU Standards Compliance

The RRU System complies with the following RRU standards:

International

- 3GPP TS37.141

Europe

- ETSI EN 301 908-1
- ETSI EN 301 908-18

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

6.2.1 Spare Parts

The product adheres to the Ericsson Serviceability and Spare Part Strategy.

6.2.2 Surface Quality

The surface quality of the RRU is in accordance with Ericsson standard class A3.

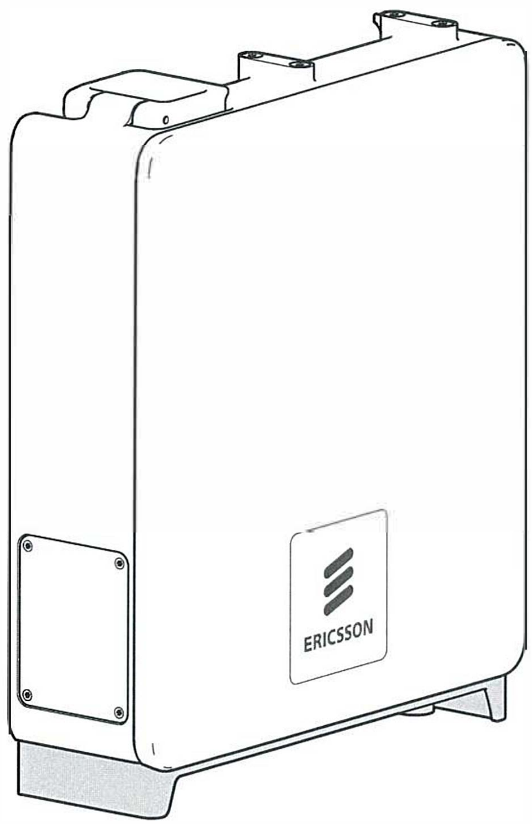
6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

Power Description

Power 6302

Description



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Contents

1 Introduction

This document describes Power 6302.

2 Product Overview

Power 6302 converts AC power to –48 V DC power. It is part of a modular building concept that enables a variety of installation alternatives that are possible to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets. The small size together with the flexible mounting solutions reduce the site volume. The low weight also provides easy handling.

2.1 Main Features

The main features of Power 6302 are the following:

- Converts AC mains (200-250 V AC) to -48 V DC voltage, to feed remote radio products
- A total output power of 2.3 kW
- Has the same appearance as a Radio 2217 and uses the same type of handle and rail mounting bracket
- Has an IP65 and Nema 3 enclosure
- Provides protection against power line disturbances and lightning
- Able to handle a current ripple load of 80% of full output power and limit the voltage ripple to a level suitable for the Radio
- It uses Support Unit (SU) communication to the Radio

3 Technical Data

This section describes the physical characteristics, environmental data, and the power characteristics of Power 6302.

3.1 Technical Data Summary

Figure 1 shows the dimensions of the unit, and Table 1 provides a summary of the technical data.

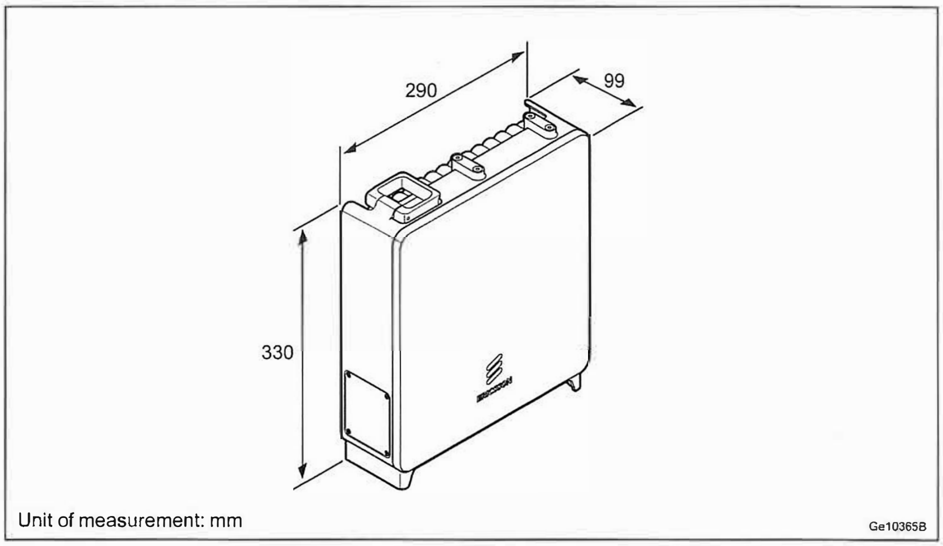


Figure 1 Unit Dimensions

Table 1 Technical Data

Description	**Value**
Power input	200–250 V AC (Line-Neutral or Line-Line)(1)
Total power output	2300 W
Maximum power on one output port	815 W
Dimensions	**Value**
Height	330 mm
Width	290 mm

Dimensions	Value
Depth	99 mm

Weight	Value
Power 6302	10 kg

Color	Value
Gray	NCS S 1002-B

(1) When connecting Power 6302 Line-Line the N/L2 connector pin is not allowed to be connected to the High Leg Delta.

3.2 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.2.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.2.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples for these microclimate locations are sites where the product is not only exposed to the actual temperature, but also additional heat generated from dark-colored planes, for example, reflections from the ground or walls. The additional temperature can generate heat traps with temperatures up to 10° C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation system.
- Near the exhaust of a chimney.

- Opposite large surfaces made of glass or new concrete.

3.2.3 Painting Limitations

Ericsson does not recommend painting the unit as it may affect the performance of the unit. If the unit is painted limitations to the warranty and service contract will apply.

3.2.3.1 Technical Limitations

If the unit is painted, be aware of the following technical limitations:

- Sunlight on dark paint may increase the temperature of the unit, causing it to shut down.
- Never use metallic paint or paint containing metallic particles.
- Ensure that ventilation and drainage holes are free from paint.
- Ensure proper adhesion of the paint.

3.2.3.2 Commercial Limitations

If the unit is painted, the following commercial limitations apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.3 Installation Requirements

3.3.1 Mounting Direction Alternatives

The installation alternatives for Power 6302 are shown in Figure 2.

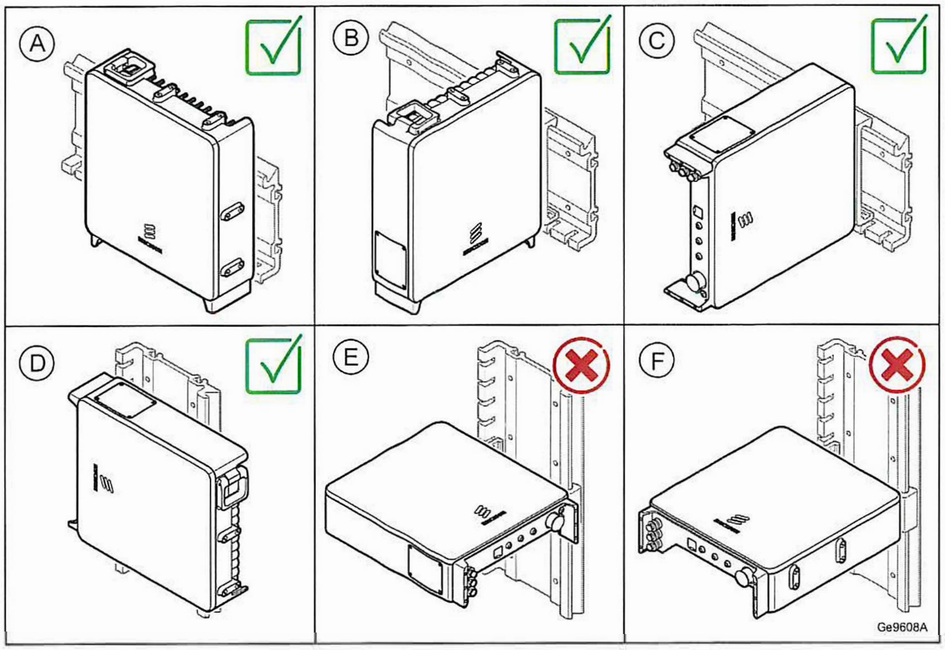


Figure 2   Installation Alternatives

Figure 3 shows where to install the mounting bracket on the unit, based on the selected mounting direction.

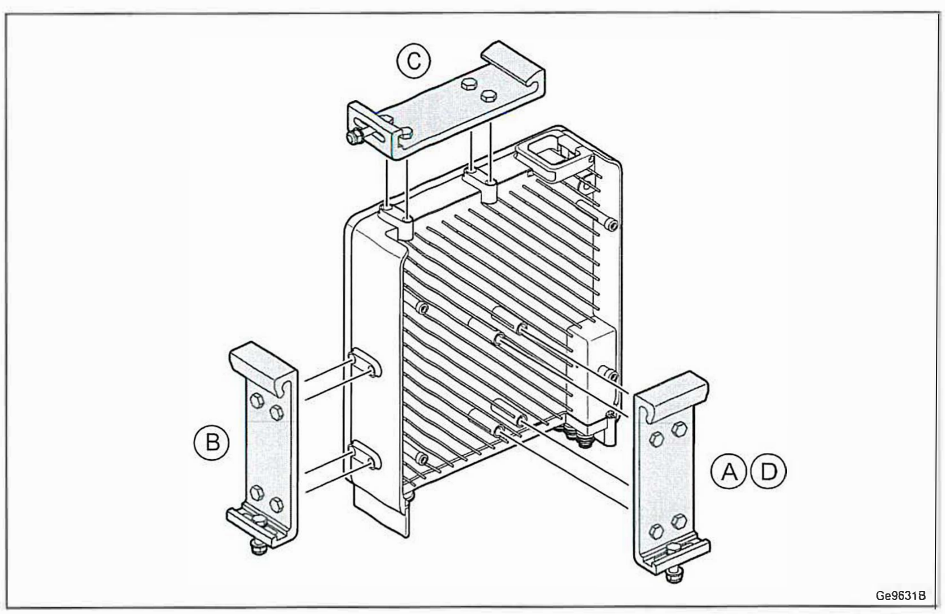


Figure 3   Mounting Bracket Positions

Do not strain the outgoing DC power cables when routing upwards from mounting direction C or D, as this can compromise the water protection. Rather create a dip with the cable in front of Power 6302, as shown in Figure 4.

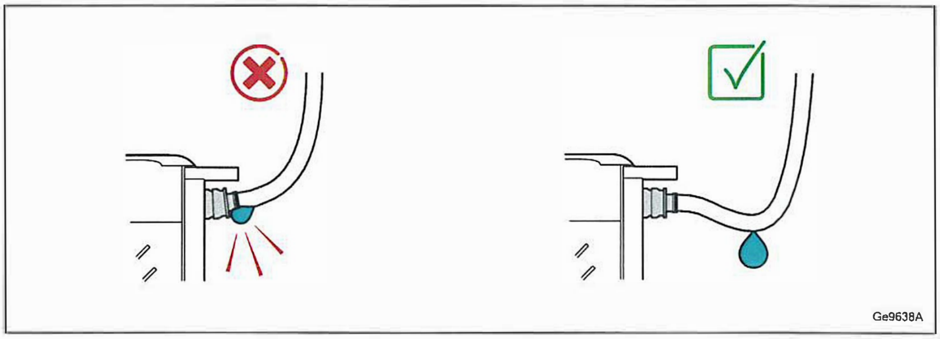
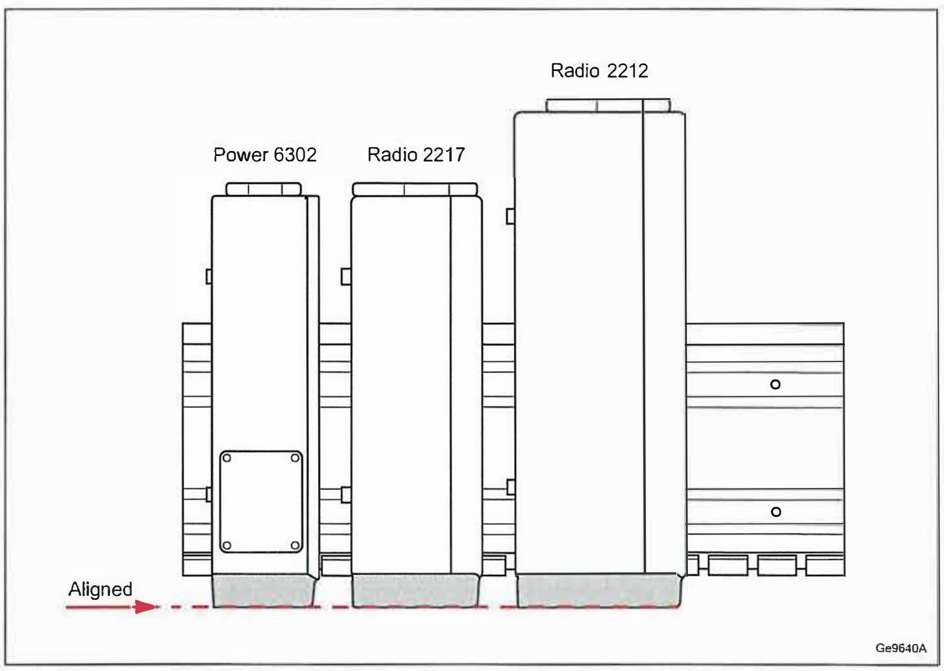


Figure 4 Routing Cables Upwards

3.3.2 Rail Mounting

The units are designed so that the bottom parts are aligned at the same height. It is recommended to install Power 6302 furthest to the left on the rail.



3.3.3 Generic Installation Requirements

Parts of Power 6302 can attain high temperatures during normal operation. Therefore Power 6302 must be installed in a classified service access area. Exception applies when Power 6302 is installed at a height that is not reachable from ground level.

Power 6302 is installed on the rail together with rail mounted Radios.

Allow a minimum of 7 mm free space (using distance blocks) between Power 6302 and the Radio installed side by side on the rail.

The minimum distance to the antenna is 200 mm, see Figure 5.

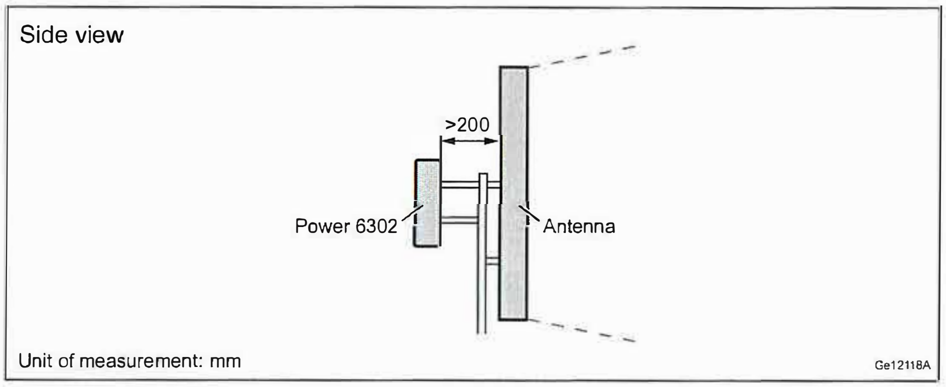


Figure 5 Minimum Distance to Antenna

Allow a sufficient working space in front of the unit.

3.4 Environmental Characteristics

This section contains operating environment data for Power 6302.

3.4.1 Operating Environment

Table 2 shows the values for the normal operating environment of Power 6302.

Table 2 Operating Environment Parameters

Parameter	Value
Temperature	–40 to +55 °C(1)
Solar radiation	≤ 1,120 W/m²

Parameter	Value
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m3
Maximum temperature change	6.0° C/min
Maximum wind load at 50 m/s (pole installed single case)	260 N (front)

(1) For high ambient temperature, > 50 °C, an inherent movement of air is expected. The unit must therefore be installed in such a way that free movement of air is allowed around it.

3.4.2 Heat Dissipation

The maximum heat dissipation for Power 6302 is 125 W.

3.4.3 Vibration

This section describes the unit's tolerance to vibrations.

The unit operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff, see Table 3.

Table 3 Vibration Data

Environmental parameter	Value
Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II

The unit operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh, see Table 4.

Table 4 Random Vibration

Environmental parameter	Value
Random vibration, normal operation	0.3 m^2/s^3

3.4.4 Materials

This section contains information about materials.

All Ericsson products fulfill the legal and market requirements regarding the following:

- Material declaration
- Materials' fire resistance, components, wires, and cables
- Recycling
- Restricted and banned material use

3.5 Power Characteristics

This section describes the power supply, power consumption, and circuit breaker recommendations for Power 6302.

3.5.1 AC Input Characteristics

The AC input characteristics of the unit are shown in Table 5.

Table 5 AC Input Characteristics

Description	Value
AC system	TN, TT, and IT
Input voltage	Nominal: 200–250 V AC (Range: 172–275 V AC)
Line frequency	45–65 Hz
Non-destructive voltage	≤325 V AC
Efficiency	95% at 20–100% load
Lightning protection level	4 kA 10/350μs

3.5.2 DC Output Characteristics

The DC output characteristics of the unit are shown in Table 6.

Table 6 DC Output Characteristics

Descriptions	Value
Output voltage	–54.5 ±0.5 V DC
Maximum output power per output port	815 W

Descriptions	Value
Maximum output power (3 output ports)	2.3 kW
Surge protection on output port	2 kV 1.2/50µs

3.5.3 Circuit Breaker or Fuse Recommendations

The unit's external AC power circuit breaker or fuse must meet the following characteristics:

- Fuse, type gL-gG-gD, in accordance with IEC/EN 60 269-1
- Circuit breaker in accordance with IEC 60 947-2 Curve C or similar
- When Power 6302 is connected Line-Line a 2-pole circuit breaker or dual fuses are required for interruption of both lines. This is also valid when Power 6302 is used in an IT system.

The circuit breaker and fuse recommendations are shown in Table 7.

Table 7 Circuit Breaker and Fuse Recommendation

AC Load	Circuit Breaker and Fuse Recommendation
Nominal: 200–250 V AC	Minimum 20 A Maximum 50 A

4 Hardware Architecture

This section gives an overview of the Power 6302 hardware architecture and interfaces.

4.1 Overview

Figure 6 and Table 8 show Power 6302.

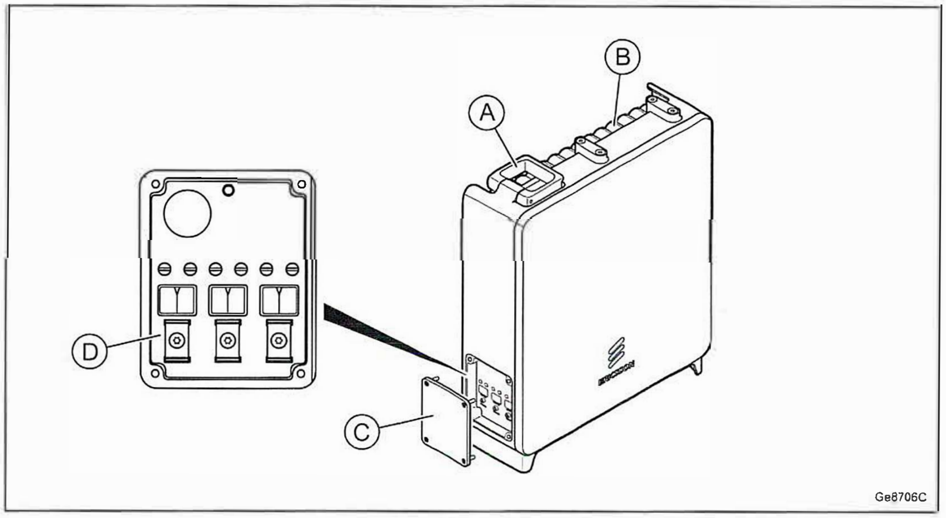


Figure 6 Power 6302

Table 8 Power 6302

Position	Component
A	Handle
B	Cooling flanges
C	Hatch
D	DC output cables installation interface

4.2 Optical Indicators and Buttons

Figure 7 shows and Table 9 lists the optical indicators of Power 6302.

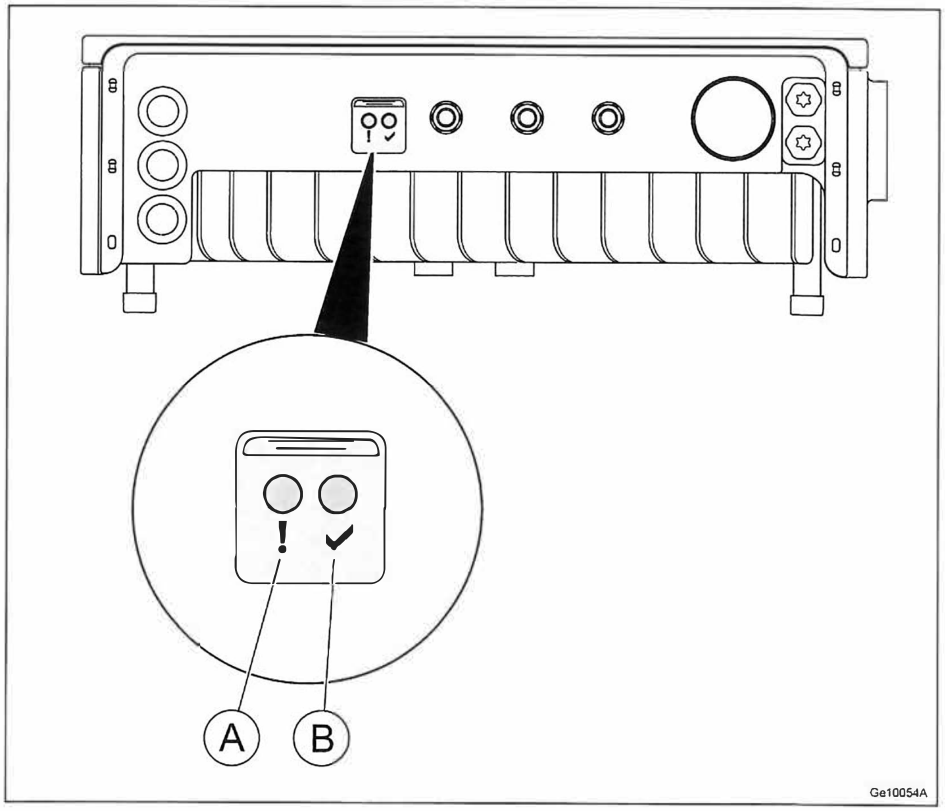


Figure 7 Optical Indicators

Table 9

Position	Name	Marking
A	Fault	!
B	Operational	✔

5 Connection Interfaces

This section contains information about the unit connection interfaces. The connection interfaces are shown in Figure 8 and listed in Table 10.

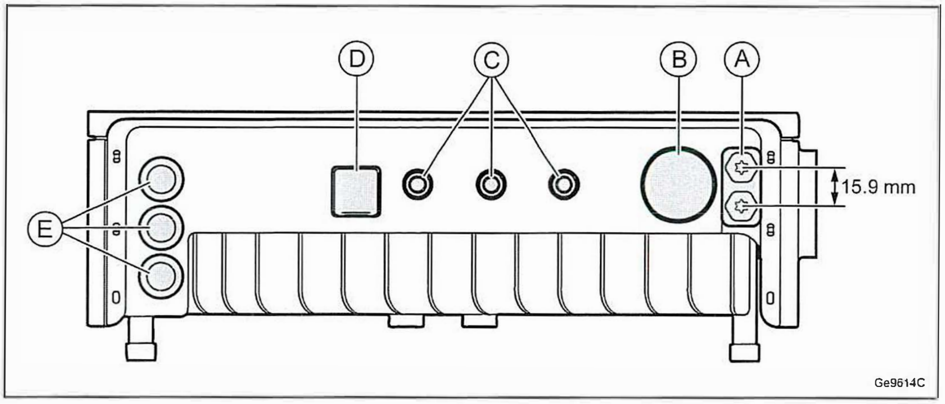
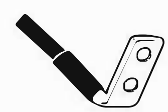
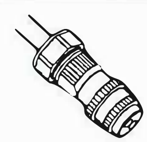
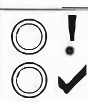


Figure 8 Connection Interfaces

Table 10 Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Grounding		2 x M6 bolt	
B	AC mains input	INPUT: 200-250 V 1W+N+PE 2W+PE 12.5A 50-60Hz	AC power connector	
C	Communication		Circular connector 4p	
D	Optical indicators		–	–
E	DC output	--48 V 16.3 A Max	Screw terminal connector	Open end 2 x 2.5 + 2.5 mm2> Diameter 8–8.7 mm

5.1 Position A, Ground

The unit must be grounded to protect it from overvoltage and lightning strikes. The grounding interface on the unit accepts an M6 dual cable lug on a coated cable.

For more information about grounding principles, refer to *Grounding Guidelines for RBS Sites.*

5.2 Position B, AC Power In

An AC power supply connector to be used is supplied with Power 6302. Table 11 lists AC cable requirements.

Table 11 AC Cable Requirements

Cable	Recommended AC Mains Breaker	Recommended Cross-Sectional Area
Shielded AC cable	20 A	3 x 2.5 to 4 mm^2 + shield 3 to 6 mm^2

5.3 Position C, Communication Interface

Recommended cable RPM 777 533/01500.

5.4 Position D, Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in *Indicators, Buttons, and Switches.*

5.5 Position E, DC Power Out

The DC output cable shall be shielded with 2 x 2.5 mm^2 inner wires. The shield will be used as functional earth (FE) and the area must be at least 2.5 mm^2. The outer diameter must be 8.0 to 8.7mm. Recommended cable TFL 901 34.

The output of Power 6302 shall be connected directly to the DC input power connector on the Radio by mounting a DC input power connector on the Power 6302 DC output cable. The DC input power connector is ordered together with the Radio. Maximum allowed cable length between Power 6302 and a Radio is 1.5 m.

6 Standards and Regulations

This section presents a brief overview of standards and regulatory product approval.

6.1 Regulatory Approval

The product complies with the following market requirements:

- European Community (EC) market requirements, Electromagnetic Compatibility (EMC) Directive (2014/30/EU)
- Low Voltage Directive LVD 2014/35/EU
- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU)
- North American market requirements

6.1.1 Environmental Standards Compliance

The product complies with the following environmental standard:

Europe

- EN 50 581 (RoHS)

6.1.2 Safety Standards Compliance

In accordance with market requirements, the product complies with the following product safety standards and directives:

International

- IEC 60 950-1

Europe

- EN 60950-1

North America

- UL 60950-1

- CAN/CSAC22.2 No. 60950-1B-07

6.1.2.1 Outdoor Specific Requirements

The product complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65)
- IEC 60 950-22:2006

Europe

- EN 60529 (IP65)
- EN 60 950-22:2006

6.1.3 EMC Standards Compliance

The product complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS37.113

Europe

- EMC Directive 2014/30/EU

North America

- FCC CFR 47 Part 15
- ICES-003 class B

6.1.4 Marking

To show compliance with legal requirements, the product is marked with one of the following labels:

International

- CE mark

North America

- FCC CFR 47 Part 15

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory requirements.

6.2.1 Spare Parts

The product adheres to the Ericsson Spare Part Strategy.

6.2.2 Surface Quality

The surface quality of the unit is in accordance with Ericsson standard class A4.

Appendix B

Calculation Methodology

CALCULATION METHODOLOGY

All sounds originate from a source. The sound energy, produced by a source, creates variations in air pressure, which travels in all directions much like a wave ripples across the water. The "loudness" or intensity of a sound is a function of the sound pressure level, defined as the ratio of two pressures: the measured sound pressure from the source divided by a reference pressure (i.e. threshold of human hearing). Sound level measurements are most commonly expressed using the decibel (dB) scale. The decibel scale is logarithmic to accommodate the wide range of sound intensities to which the human ear is capable of responding. On this scale, the threshold of human hearing is equal to 0 dB, while levels above 140 dB can cause immediate hearing damage.

One property of the decibel scale is that the combined sound pressure level of separate sound sources is not simply the sum of the contributing sources. For example, if the sound of one source of 70 dB is added to another source of 70 dB, the total is only 73 dB, not a doubling to 140 dB. In terms of human perception of sound, a 3 dB difference is the minimum perceptible change for broadband sounds (i.e. sounds that include all frequencies). A difference of 10 dB represents a perceived halving or doubling of loudness.

Environmental sound is commonly expressed in terms of the A-weighted sound level (dBA). The A-weighting is a standard filter to make measured sound levels more nearly approximate the frequency response of the human ear. Table 1 and Figure 2 show the adjustments made at each octave band frequency to contour un-weighted sound levels (dB) to A-weighted sound levels (dBA). This frequency response is defined in the American National Standards Institute Standard No. 5.1 and most other relevant standards related to measurement of noise levels.

Table 1
A-Weighted Octave Band Adjustment (+/- dB)

Octave Band Center Frequency (Hz)	32	64	125	250	500	1000	2000	4000	8000	16000
A-weighting Adjustment (±dB)	-39.4	-26.2	-16.1	-8.6	-3.6	0.0	+1.2	+1.0	-1.1	-6.6

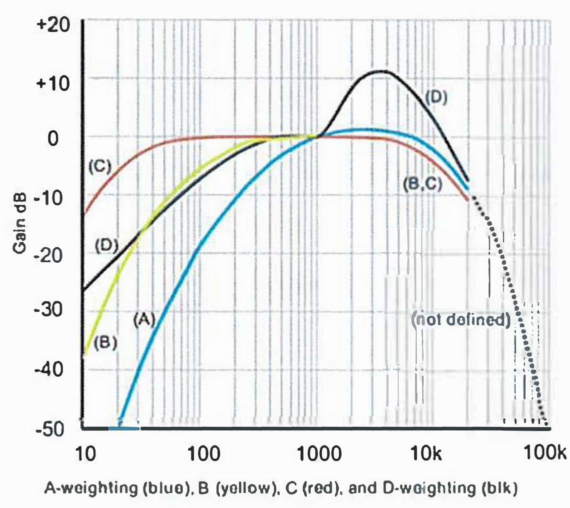


FIGURE 2 - WEIGHTED OCTAVE BAND ADJUSTMENTS (±dB)

Environmental sound varies depending on environmental conditions. Some sounds are sharp impulses lasting for short periods, while others rise and fall over longer periods. There are various measures (metrics) of sound pressure designed for different purposes. The Leq, or equivalent sound level, is the steady-state sound level over a period of time that has the same acoustic energy as the fluctuating sound that was measured over the same period. The Leq is commonly referred to as the average sound level and is calculated automatically by the sound level meter using methods defined in ANSI S1.4-1983[1]. Manufacturer-provided data for noise-generating equipment typically includes a measured sound pressure level (L_p), expressed in A-weighted decibels, taken at a specific distance from the equipment, known as a reference distance. For the purposes of this report, L_1 refers to the measured sound level, and r_1 refers to the reference distance from the source.

Sound varies inversely as the square of the distance from the source increases. This property of sound propagation is used to determine the sound levels at various distances from the source when L_1 and r_1 have been provided. In an unobstructed free-field environment, without any barriers or reflecting surfaces, sounds pressure drops by 6 dBA with each doubling of distance. This relationship is expressed in the following equation:

$$L_2 = L_1 - |20 * \log\left(\frac{r_1}{r_2}\right)|$$

Where r_2 refers to the distance at distance 2 and L_2 refers to the sound level in dBA at distance 2.

When multiple sound sources are combined, the L_P values for each source must first be converted to sound power (L_W).

$$L_W = L_P + |10 * \log\left(\frac{Q}{4\pi * r^2}\right)|$$

In this report, EBI has assumed Q (directionality) is equal to 1 to represent full-sphere propagation.

The resultant L_W values are then added together, using logarithmic decibel addition, where L_Σ refers to the total sound power level, and L_1, L_2, etc. refer to the sound power of different individual sources.

$$L_\Sigma = 10 * log_{10}\left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}} + \cdots 10^{\frac{L_n}{10}}\right) dB$$

The total sound power (L_W) of all proposed sources is then used to calculate the total sound pressure level (L_P) at a reference distance (r).

$$L_P = L_W - |10 * \log\left(\frac{Q}{4\pi * r^2}\right)|$$

[1] American National Standards Institute, ANSI S1-4-1983, American National Standard Specification for Sound Level Meters, 1983

AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 1

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Almond Ave near Los Altos High School. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city.   The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers

lower latency, or the processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 141 Almond Avenue is needed to close the high-band LTE service coverage in an area bordered roughly by Jardin Drive to the north, N San Antonio Road to the west, Angela Drive to the south and Alicia Way to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes and a high school.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and

data rates sufficient to stream video and complete calls. In-building service is critical as customers increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. Hons. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip B A Dale C Eng
AT&T Mobility Services LLC
Network, Planning & Engineering
RAN Design & RF Engineering
October 23, 2019

AT&T Small Cell
Site ID: LOSA0_01
Public Right-of-Way near 141 Almond Avenue
Alternative Sites Analysis

Map of Small Cell Node LOSA0_01 and Alternative Sites

Proposed Small Cell – LOSA0_01

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called “small cells,” that can be installed on utility infrastructure in the public right-of-way.

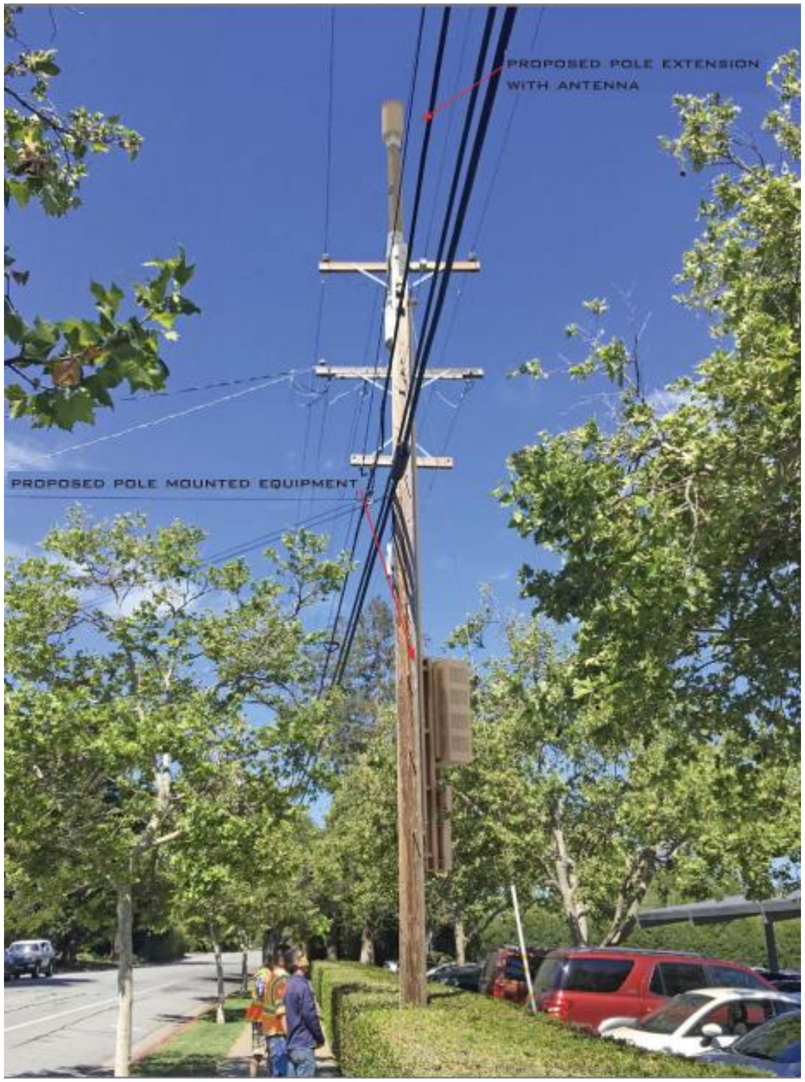
- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T’s existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_01 will improve signal quality and capacity within AT&T’s wireless network.

LOSA0_01– Proposed Location

Public right-of-way near 141 Almond Avenue



- AT&T proposes to place Small Cell LOSA0_01 on a PG&E owned wood utility pole in the public right-of-way near 141 Almond Avenue in the City of Los Altos. The pole is a preferred location as it meets network objective requirements and is the less intrusive option when compared to surrounding candidates

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- This pole is shielded from the road by existing street trees and was least intrusive option when compared with surrounding poles

- AT&T has determined this location is viable.

LOSA0_01– Alternative Site 1

Public right-of-way near 200 Alicia Way

- This location is a wood utility pole located in the public ROW on the north side of Almond Avenue across from N Gordan Way
- This pole was initially considered but ruled out as a potential candidate as the additional of an extension arm would require relocation of two tiers of existing cross arms to meet G0-95 requirements
- This pole was considered more aesthetically intrusive when compared to primary candidate
- Pole presented potential climbing space issues per G0-95 requirements.

LOSA0_01 – Alternative Site 2

Public right-of-way near 201 Alicia Way

- Alternative Site 2, this site location is a wood utility pole located in the public ROW on the SE corner of Almond Avenue and Alicia Way

- This location would be challenging to approve due the pole acting as a utility crossing point for power and communication lines from four (4) separate directions

- This pole was considered more aesthetically intrusive when compared to primary candidate

- Pole presented potential climbing space issues per G0-95 requirements.

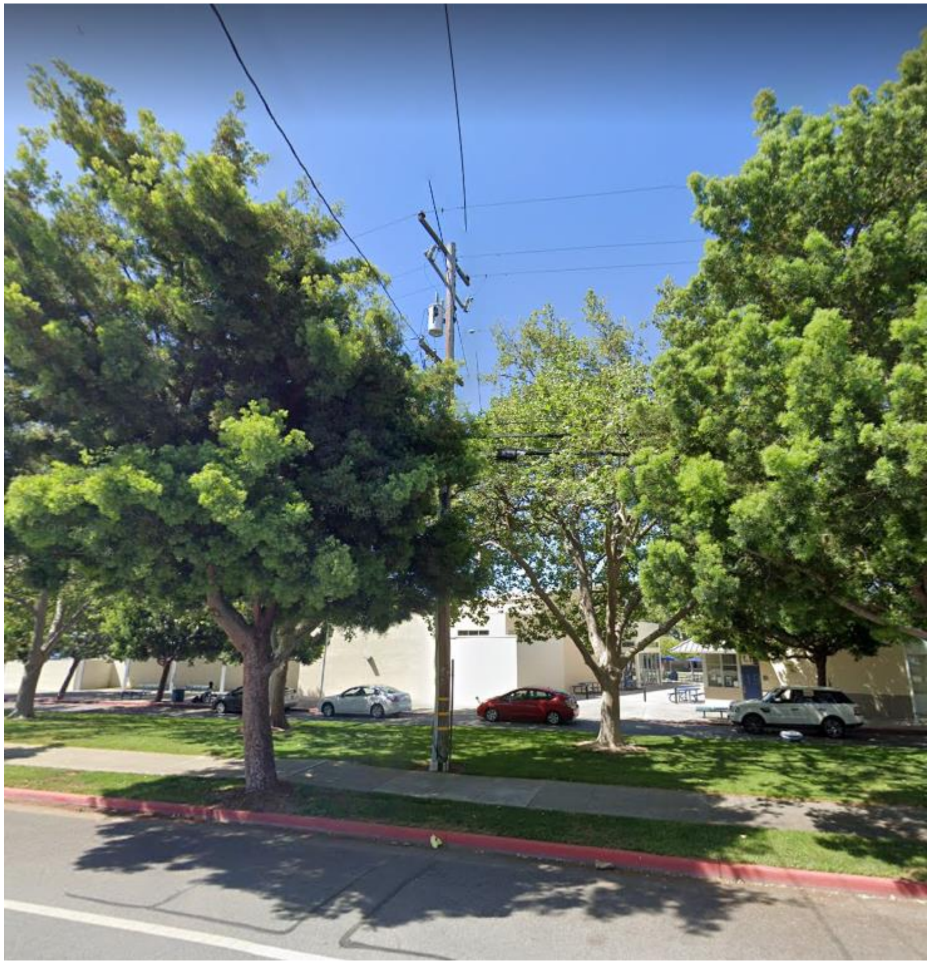
LOSA0_01 – Alternative Site 3

Public right-of-way near 140 Almond Ave

- Alternative Site 3, this site location is a wood utility pole located in the public ROW on the north side of Almond Avenue approx. 145’ east of Valencia Ave
- This location would be challenging to approve due the pole acting as a utility crossing point for power and communication lines from four (3) separate directions
- Due to the existing sidewalk, accessory radio equipment would be protruding over the sidewalk
- The site was considered but ultimately considering less desirable when compared to the primary due to existing (3) large redwood trees located north west of the pole and the impact to desired coverage area
- Pole presented potential climbing space issues per G0-95 requirements.

LOSA0_01 – Alternative Site 4

Public right-of-way near 140 Almond Ave



- Alternative Site 4, this site location is a wood utility pole located in the public ROW on the north side of Almond Ave approx. 465’ west of Alicia Way

- This location would be challenging to approve due the pole acting as a utility crossing point for power and communication lines from four (4) separate directions

- This pole was considered more aesthetically intrusive when compared to primary candidate

- Pole presented potential climbing space issues per G0-95 requirements.

LOSA0_01 – Alternative Site 5

Public right-of-way near 201 Valencia Drive

- Alternative Site 5, this site location is a wood utility pole located in the public ROW on the SW corner of Valencia Dr and Almond Way
- This pole was considered more aesthetically intrusive when compared to primary candidate as the antenna and extension arm would be skylined for travelers heading west on Almond Ave
- Pole was ultimately rejected as it presented potential vertical clearance issues per G0-95 requirements due to existing utility pole mounted street light. Two (2) tiers of cross arms required to be relocated down the pole 2’ to allow pole top extension which would not allow the proper vertical clearance requirements of 6’ (per GO-95) from top of luminaire to bottom of conductor

LOSA0_01 – Alternative Site 6

Public right-of-way near 92 Almond Way

- Alternative Site 6, this site location is a wood utility pole located in the public ROW on the north side of Almond Avenue approx. 114’ west of Valencia Dr
- This pole was considered more aesthetically intrusive when compared to primary candidate as both the side mounted radio equipment and the antenna with pole top extension would be skylined to travelers heading both east and west on Almond Ave
- Pole was considered less desirable as the side mounted radio equipment would be protruding over het adjacent sidewalk in conformance with GO-95 requirements

LOSA0_01 – Alternative Site 7

Public right-of-way near 83 Almond Way

- Alternative Site 7, this site location is a wood utility pole located in the public ROW on the north side of Almond Avenue approx. 197’ west of Valencia Dr

- This pole was considered more aesthetically intrusive when compared to primary candidate as both the side mounted radio equipment and the antenna with pole top extension would be skylined for travelers heading both east and west on Almond Ave

- Pole was considered less desirable as the side mounted radio equipment would be protruding over the adjacent sidewalk in conformance with GO-95 Requirements

Proposed Small Cell LOSA0_01- Conclusion

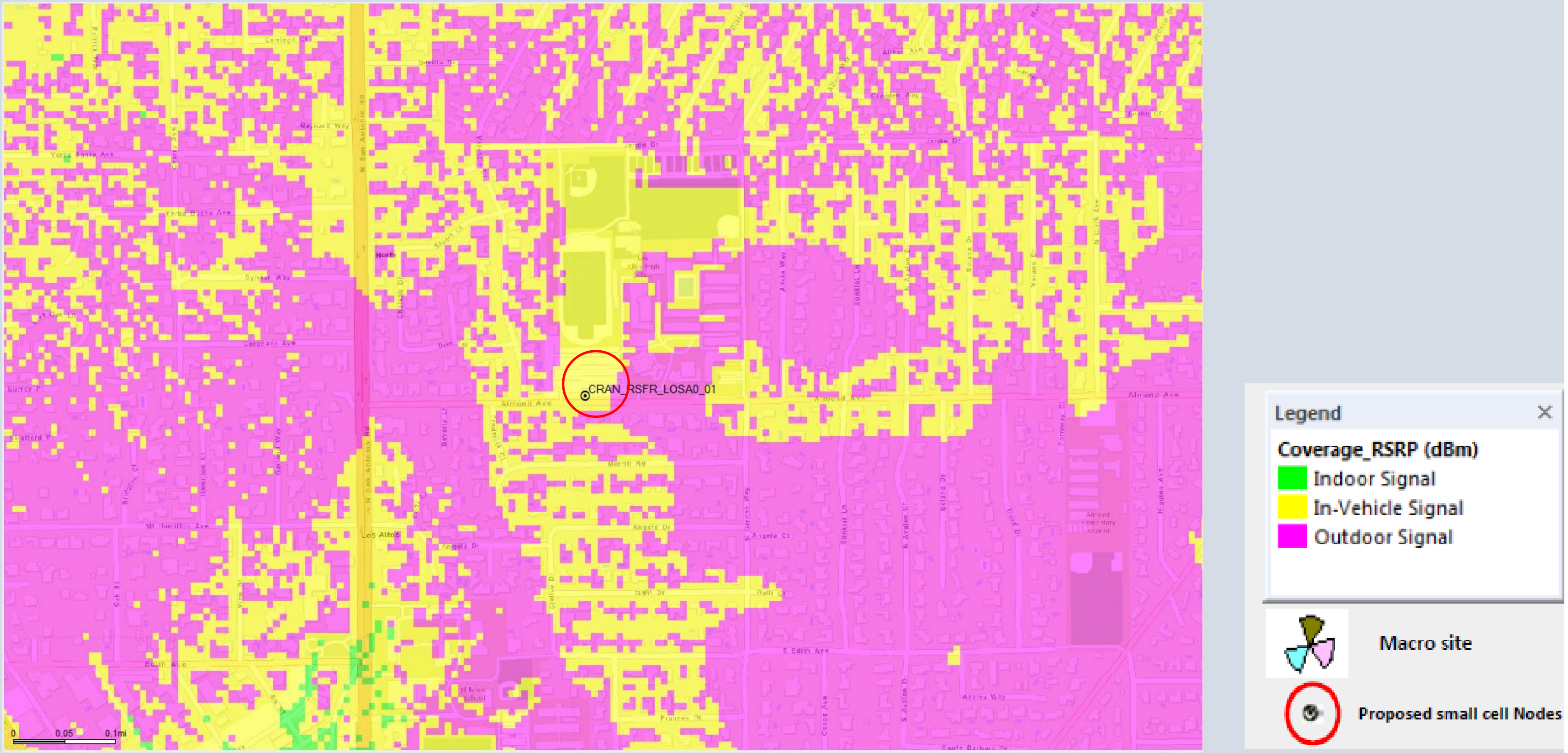
- Small Cell LOSA0_01 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_01 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

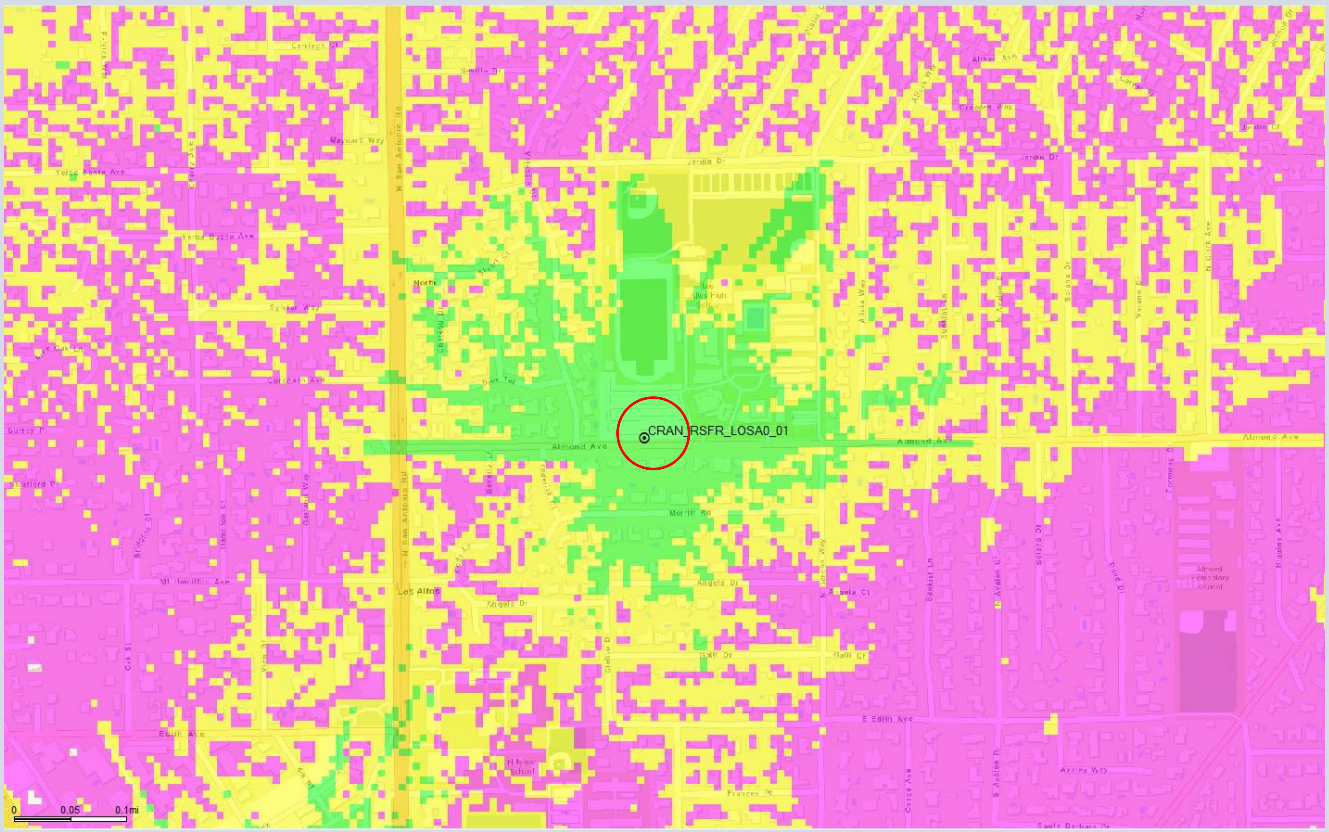
- Small Cell LOSA0_01 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

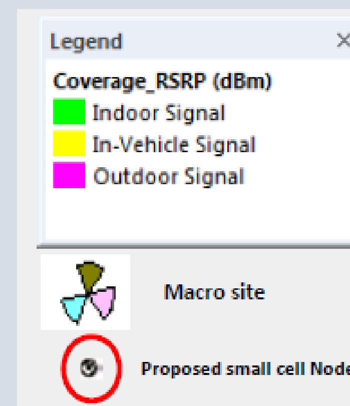
EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_01



LTE 1900 Coverage with Small Cell LOSA0_01





AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 2

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Linden Avenue near Pine Lane. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the

processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 687 Linden Avenue is needed to close the high-band LTE service coverage in an area bordered roughly by Thames Lane to the north, Los Altos Avenue to the west, Beker Lane to the south and Kingswood Way to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and data rates sufficient to stream video and complete calls. In-building service is critical as customers

increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

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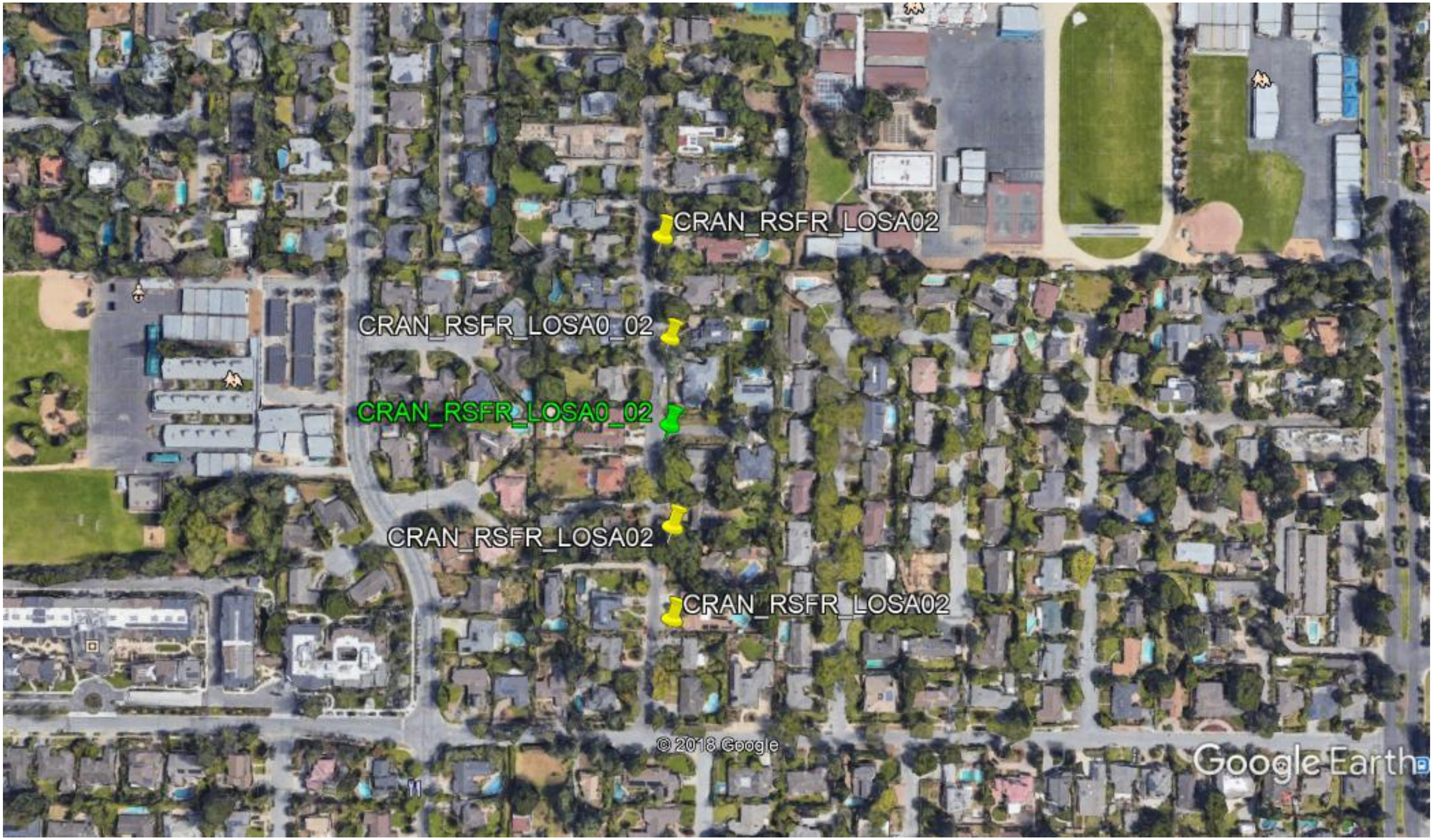
July 19, 2019

AT&T Small Cell
Site ID: LOSA0_02
Public Right-of-Way near 687 Linden Avenue
Alternative Sites Analysis

Map of Small Cell Node LOSA0_02 and Alternative Sites



Proposed Small Cell – LOSA0_02

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_02 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_02– Proposed Location

Public right-of-way near 687 Linden Avenue

- AT&T proposes to place Small Cell LOSA0_02 on a PG&E owned wood utility pole in the public right-of-way near 687 Linden Avenue in the City of Los Altos. The pole is a preferred location as it meets network objective and is less intrusive when compared to surrounding candidates

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile.

- This pole is shielded from north bound traffic by a mature street tree in the foreground and the accessory equipment will not be sky lined for drivers travelling south on Linden

- AT&T has determined this location is viable.

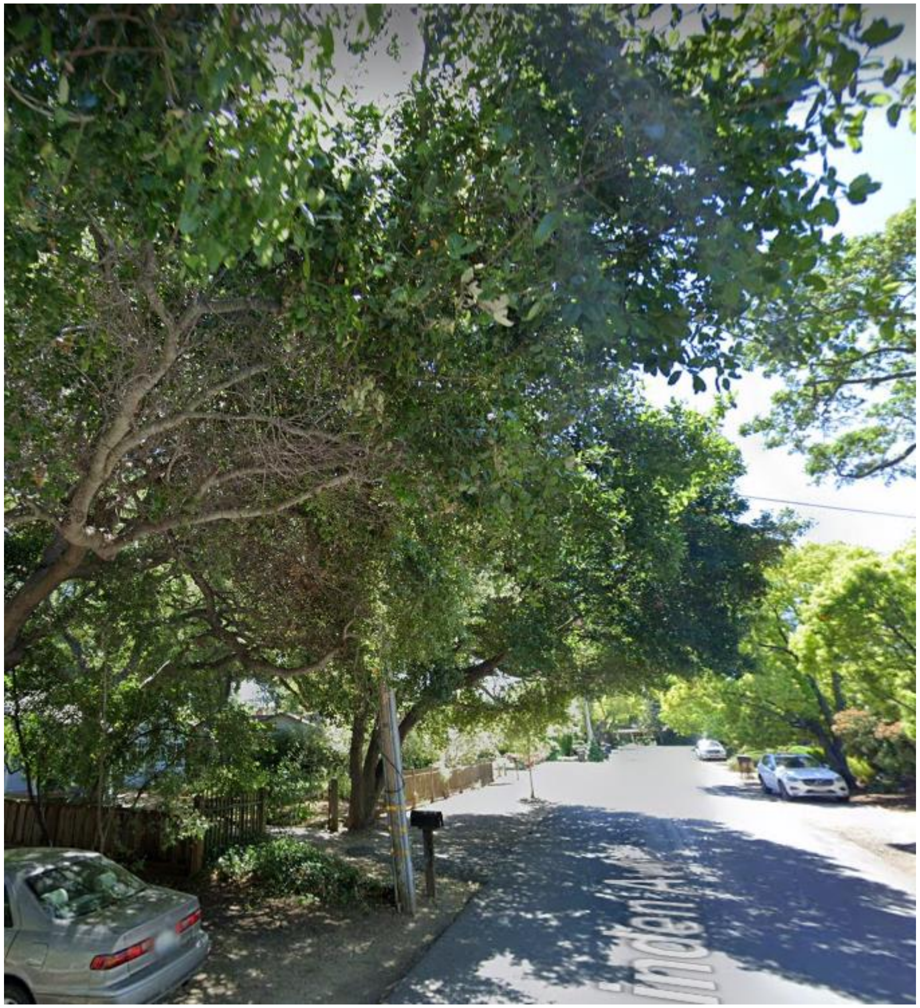
LOSA0_02– Alternative Site 1

Public right-of-way near 717 Linden Avenue

- This location is a wood utility pole located in the public ROW on the east side of Linden Ave approximately 500 feet from Pine Lane
- This pole was considered more aesthetically intrusive when compared to primary candidate as the equipment would be more visible for drivers traveling north on Linden

LOSA0_02– Alternative Site 2

Public right-of-way near 651 Linden Avenue



- This location is a wood utility pole located in the public ROW on the east side of Linden Ave approximately 343' feet north from Pine Lane

- This pole was ultimately rejected due to the required excessive tree trimming required to install side mounted radio and power equipment

- This pole was considered but the pole top extension and antenna would be blocked by adjacent mature oak tree thus not meeting the network coverage/capacity objective

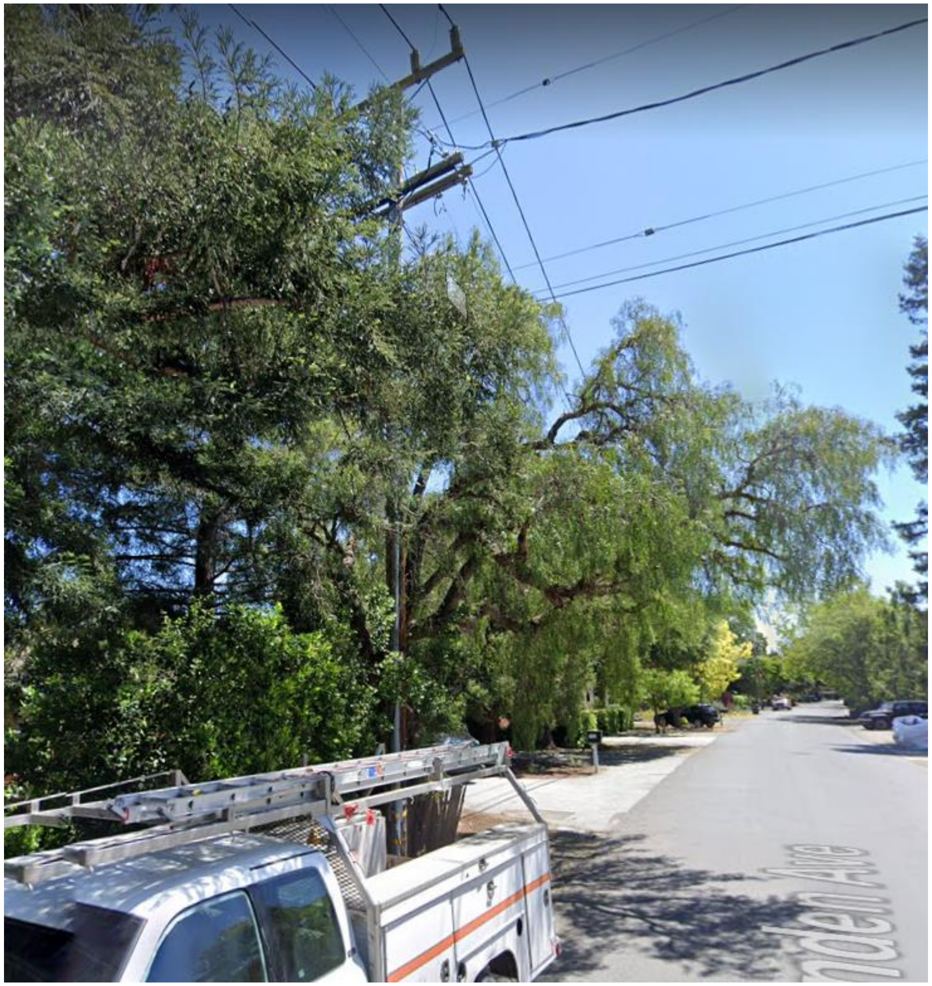
LOSA0_02– Alternative Site 3

Public right-of-way near 625 Linden Avenue

- This location is a wood utility pole located in the public ROW on the east side of Linden Ave approximately 190 feet from Pine Lane
- This pole was considered more aesthetically intrusive when compared to primary candidate as the equipment would be exposed/skylined and create a greater visual intrusion for travelers heading north and south on Linden Ave

LOSA0_02– Alternative Site 4

Public right-of-way near 731 Linden Avenue



- This location is a wood utility pole located in the public ROW on the east side of Linden Ave approximately 941 feet north from Pine Lane
- This pole was rejected as the mature street located directly south of the proposed site would require removal for the placement of side-mounted radio units and accessory power equipment

Proposed Small Cell LOSA0_02- Conclusion

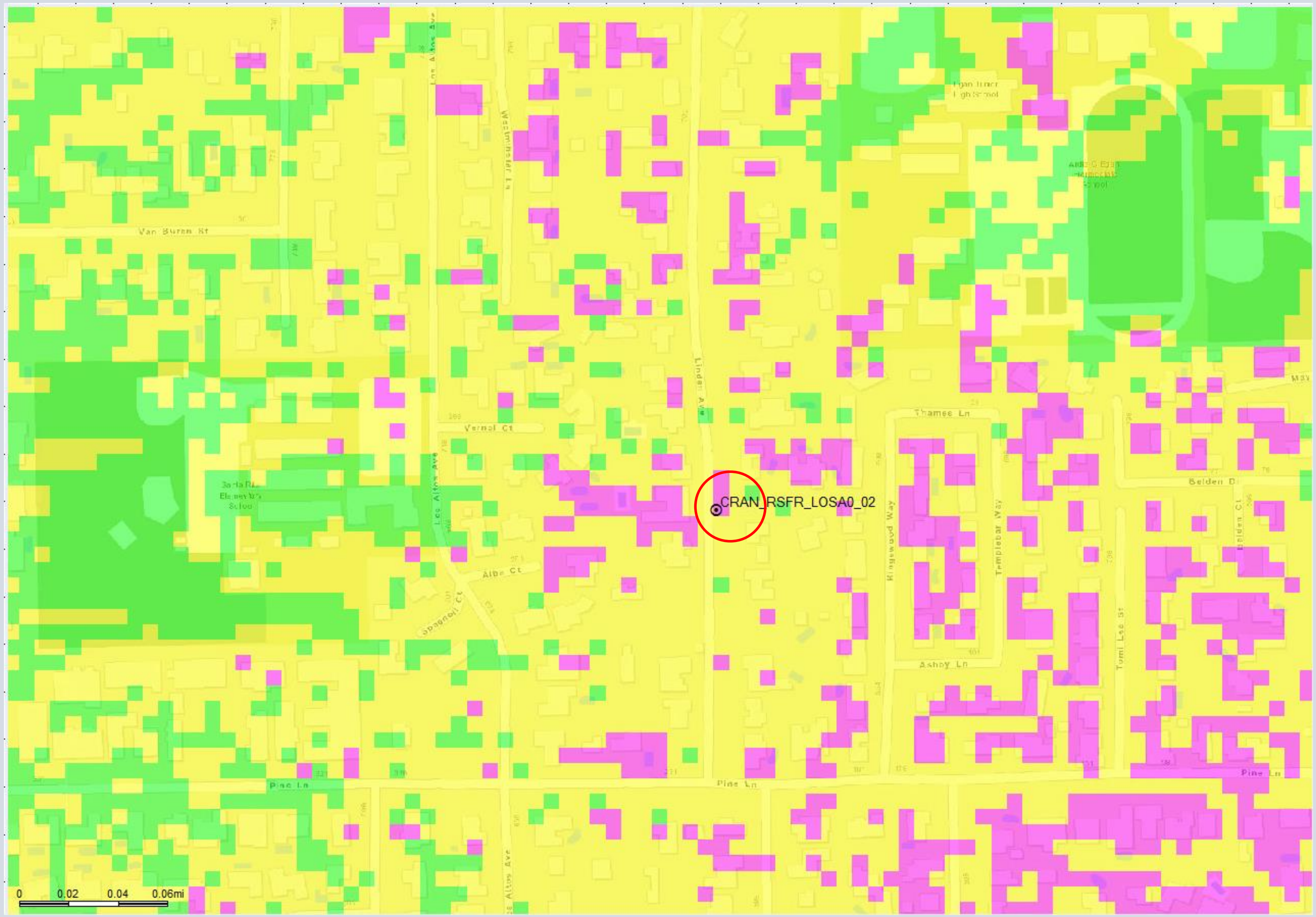
- Small Cell LOSA0_02 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_02 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_02 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_02



Legend

Coverage_RSRP (dBm)

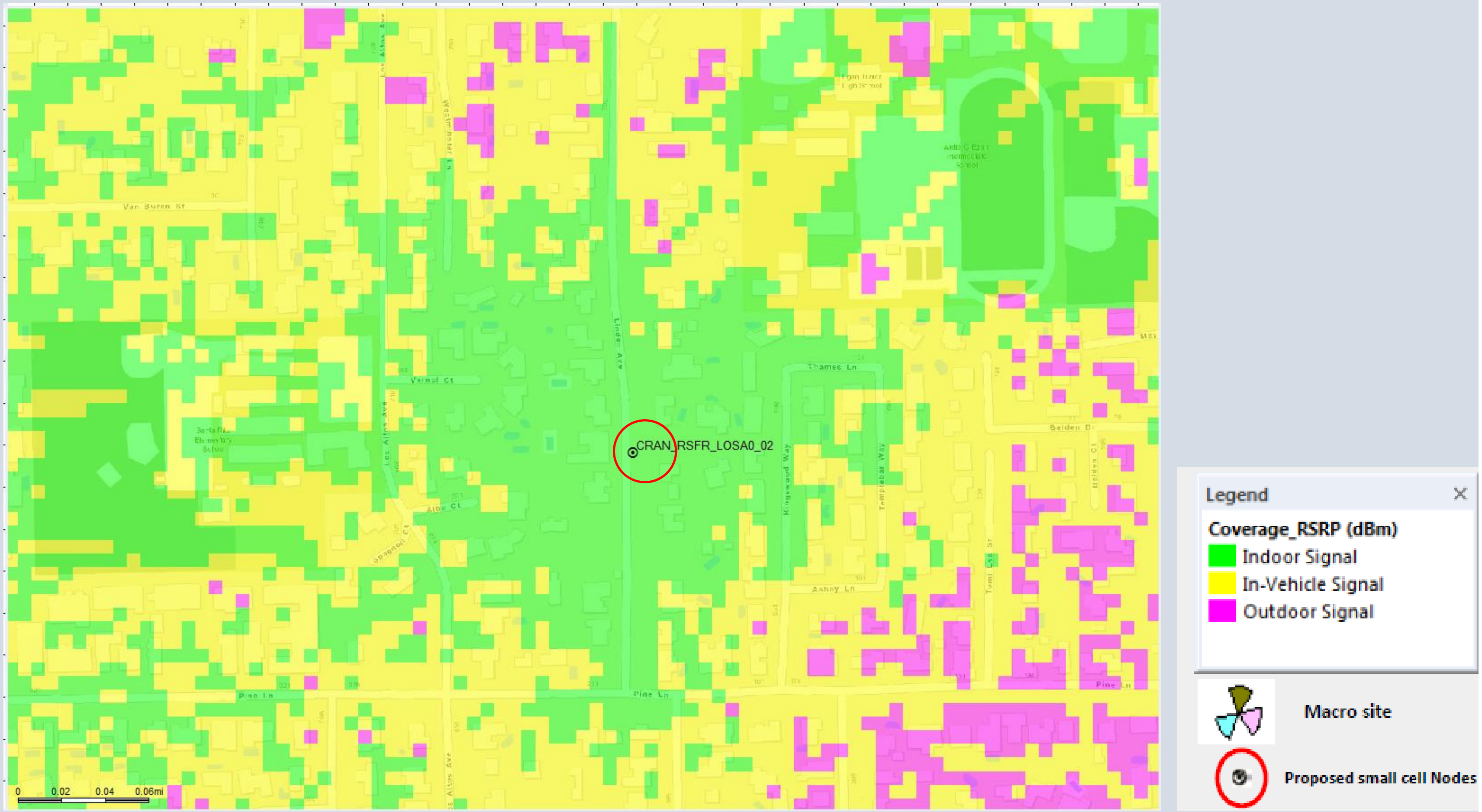
- Indoor Signal
- In-Vehicle Signal
- Outdoor Signal

Macro site

Proposed small cell Nodes

EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_02



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 3

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Valencia Drive near Jardin Drive. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 421 Valencia Drive is needed to close the high-band LTE service coverage in an area bordered roughly by Arbuelo Way to the north, N San Antonio Road to the west, Stuart Court to the south and Casita Way to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes and a High School.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and data rates sufficient to stream video and complete calls. In-building service is critical as customers increasingly use their mobile phones as their primary communication devices (more than 72% of

American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip Dale

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July 19, 2019

Rethink Possible®

AT&T Small Cell
Site ID: LOSA0_03
Public Right-of-Way near 421 Valencia Drive
Alternative Sites Analysis

Map of Small Cell Node LOSA0_03 and Alternative Sites

Proposed Small Cell – LOSA0_03

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_03 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_03– Proposed Location

Public right-of-way near 421 Valencia Driver

- AT&T proposes to place Small Cell LOSA0_03 on a PG&E owned wood utility pole in the public right-of-way near 421 Valencia Ave in the City of Los Altos. The pole is a preferred location as it meets network objective requirements and is the PG&E approved option within the immediate area

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- This accessory pole equipment will not be sky to traffic heading north on Valencia due to an existing mature street trees located in the foreground

- AT&T has determined this location is viable.

LOSA0_03– Alternative Site 1

Public right-of-way near 399 Valencia Drive

- This location is a wood utility pole located in the public ROW on the west side of Valencia Drive across from Jardin Drive

- This pole has more pole top equipment and presented potential climbing space issues per G0-95 requirements. PG&E rejected this site during preconstruction walk

LOSA0_03 – Alternative Site 2

Public right-of-way near 413 Valencia Drive

- This location is a wood utility pole located in the public ROW on the west side of Valencia Drive north of Jardin Drive
- This pole has more pole top equipment and presented potential climbing space issues per G0-95 requirements. PG&E rejected this site during preconstruction walk

LOSA0_03 – Alternative Site 3

Public right-of-way near 473 Valencia Drive

- This location is a wood utility pole located in the public ROW on the west side of Valencia Drive directly across from Savilla Dr

- This pole has more pole top equipment and per request of PG&E wireless facility carriers have been instructed to stay off pole with existing transformers when possible. This pole was thus rejected as the proposed candidate did not have a transformer

LOSA0_03 – Alternative Site 4

Public right-of-way near 125 Jardin Dr

- This location is a wood utility pole located in the public ROW on the north side of Jardin Dr approx. 117’ east of Valencia Dr

- This pole was rejected to the required excessive tree trimming in order to side mounted the accessory radio and power equipment

- This location was less desirable due to the existing base mounted fiber cabinet. The existing underground infrastructure running to the cabinet present possible issue when placing ground rods required per GO-95

LOSA0_03– Alternative Site 5

Public right-of-way near 125 Jardin Drive

- This location is a wood utility pole located in the public ROW on the NW corner of Jardin Dr and Panchita Way

- This pole has more pole top equipment and presented potential climbing space issues per G0-95 requirements.

  - Pole was ultimately rejected as it presented potential vertical clearance issues per G0-95 requirements due to existing utility pole mounted streetlight. Cross arms required to be relocated down the pole 2’ to allow pole top extension which would not allow the proper vertical clearance requirements of 6’ (per GO-95) from top of luminaire to bottom of conductor

Proposed Small Cell LOSA0_03- Conclusion

- Small Cell LOSA0_03 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_03 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

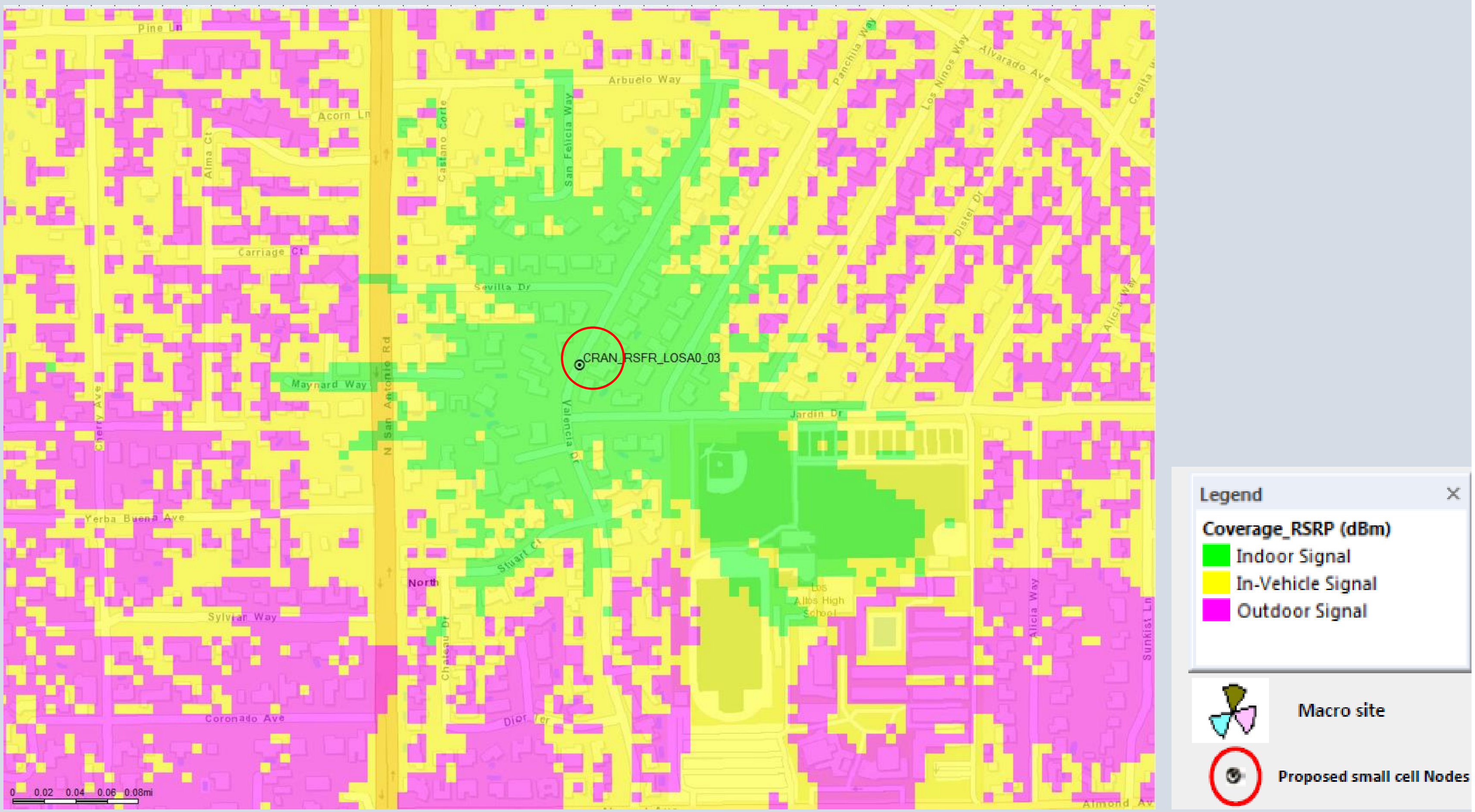
- Small Cell LOSA0_03 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_03

EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_03



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 4

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Pine Lane near Tomi Lea Street. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the

processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 33 Pine Lane is needed to close the high-band LTE service coverage in an area bordered roughly by May Lane to the north, Cherry Avenue to the west, Carriage Court to the south and Vera Cruz Avenue to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

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Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip Dale

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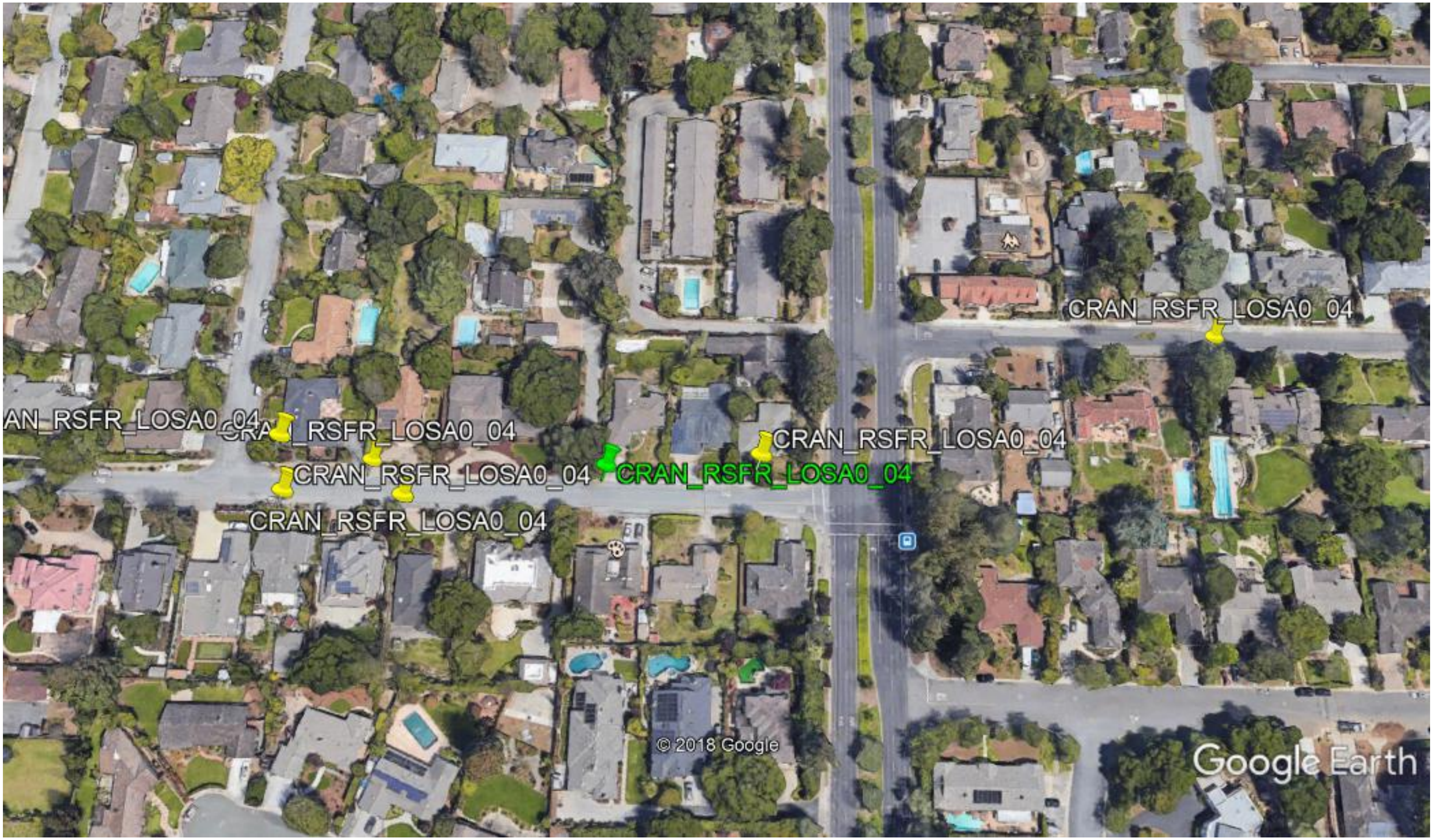
RAN Design & RF Engineering
July 19, 2019

AT&T Small Cell
Site ID: LOSA0_04
Public Right-of-Way near 33 Pine Lane
Alternative Sites Analysis

Rethink Possible®

Map of Small Cell Node LOSA0_04 and Alternative Sites



Proposed Small Cell – LOSA0_04

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called “small cells,” that can be installed on utility infrastructure in the public right-of-way.

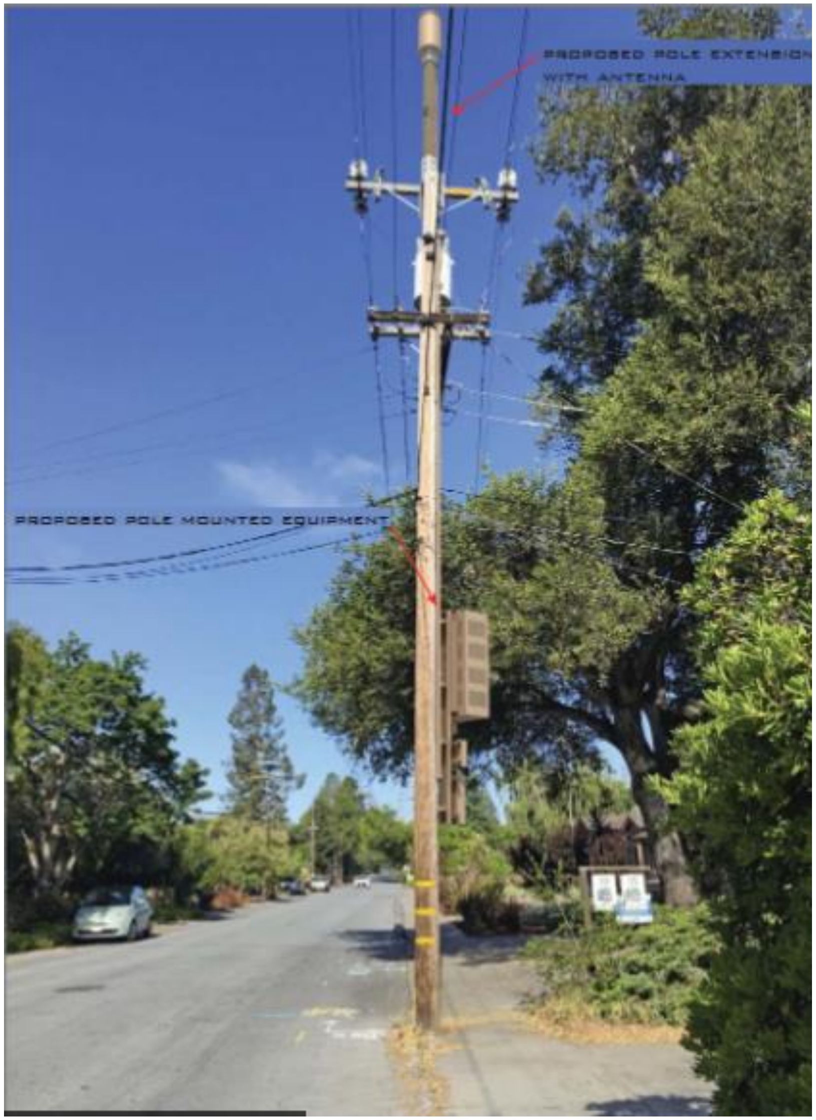
- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T’s existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_04 will improve signal quality and capacity within AT&T’s wireless network.

LOSA0_04– Proposed Location

Public right-of-way near 33 Pine Lane



- AT&T proposes to place Small Cell LOSA0_04 on a PG&E owned wood utility pole in the public right-of-way near 33 Pine Lane in the City of Los Altos. The pole is a preferred location as it meets network objective requirements and is the less intrusive option when compared to surrounding candidates

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- This accessory pole equipment will not be sky to traffic heading west on Pine Lane due to an existing mature street tree

- AT&T has determined this location is viable.

LOSA0_04 – Alternative Site 1

Public right-of-way near 75 Pine Lane

- This location is a wood utility pole located in the public ROW on the north side of Pine Lane near Tomi Lea Street

- When compared to the primary candidate this pole was considered more aesthetically intrusive as the equipment would be sky-lined for both directions of traffic

- This pole has more pole top equipment and excessive crossing power and comm lines presenting potential climbing space issues per G0-95 requirements.

LOSA0_04 – Alternative Site 2

Public right-of-way near 75 Pine Lane

- This location is a wood utility pole located in the public ROW on the north side of Pine Lane 50’ from N San Antonio Rd
- When compared to the primary candidate this pole was considered more aesthetically intrusive as the antenna equipment would be sky-lined for travelers heading west on Pine Ln
- This site was ultimately rejected as due to GO-95 climbing space requirements the side mounted radio equipment would be mounted in the NW quadrant of the pole resulting is required excessive tree trimming to the adjacent privately owned mature oak tree. Ultimately resulting in tree trimming on the neighboring property to offset the weight imbalance of caused by the trimming on the street side

LOSA0_04 – Alternative Site 3

Public right-of-way near 68 Pine Lane

- This location is a wood utility pole located in the public ROW on the south side of Pine Lane 429’ west of N San Antonio Rd
- When compared to the primary candidate this pole was considered more aesthetically intrusive as the antenna equipment and extension arm would be sky-lined for both directions of traffic
- This pole was ultimately rejected due to required extensive tree trimming to adjacent mature street tree to allow for side mounted radio and power equipment placement

LOSA0_04 – Alternative Site 4

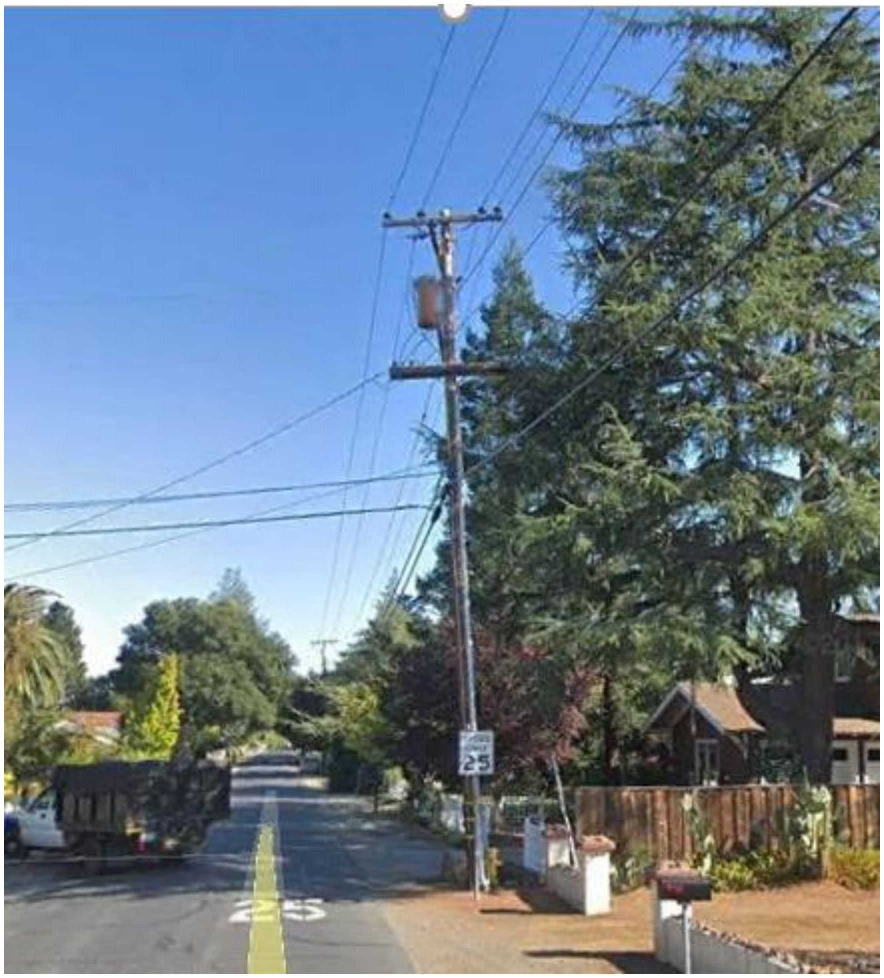
Public right-of-way near 611 Tomi Lea St

- This location is a wood utility pole located in the public ROW on the NE corner of Pine Ln and Tomi Lea St

- This pole was ultimately rejected due to not meeting FCC 50’ max height requirement

LOSA0_04– Alternative Site 5

Public right-of-way near 59 Alvarado Avenue



- This location is a wood utility pole located in the public ROW on the south side of Alvarado Avenue at the intersection of Vera Cruz Avenue
- This pole was considered no less intrusive than the Proposed Location.

LOSA0_04 – Alternative Site 6

Public right-of-way near 86 Pine Ln

- This location is a wood utility pole located in the public ROW on the south side of Pine Ln directly across from Tomi Lea St
- When compared to the primary candidate this pole was considered more aesthetically intrusive as the antenna equipment and extension arm as well as the side mounted radio and power equipment would be sky-lined for both directions of traffic

Proposed Small Cell LOSA0_04- Conclusion

- Small Cell LOSA0_04 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_04 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

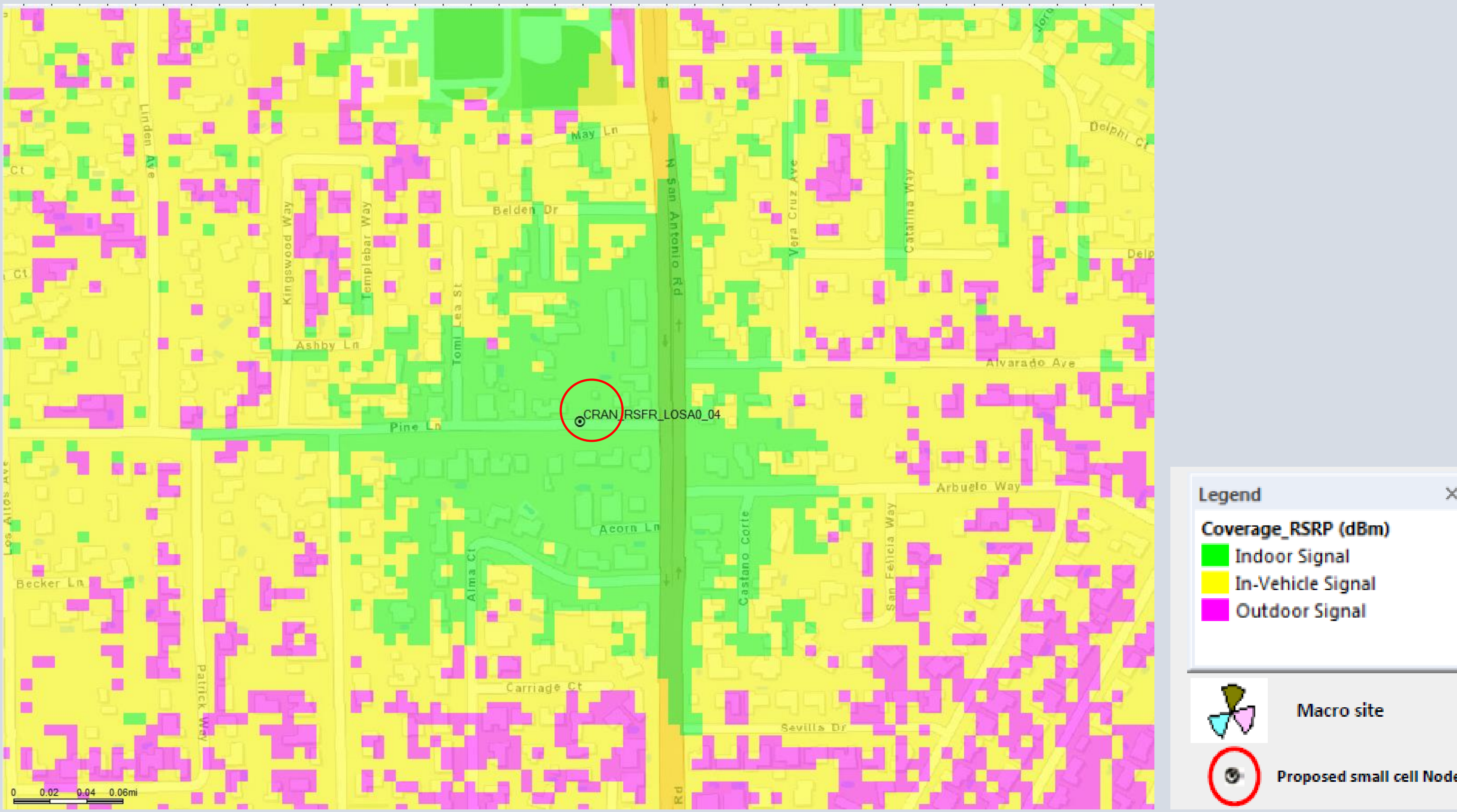
- Small Cell LOSA0_04 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_04

EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_04



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 5

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node towards the end of San Juan Courtt. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the

processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 49 San Juan Court is needed to close the high-band LTE service coverage in an area bordered roughly by East Portola Avenue to the north, Nela Lane to the west, Catalina Court to the south and Egan Junior high School to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes and a Junior High school.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and data rates sufficient to stream video and complete calls. In-building service is critical as customers

increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip Dale

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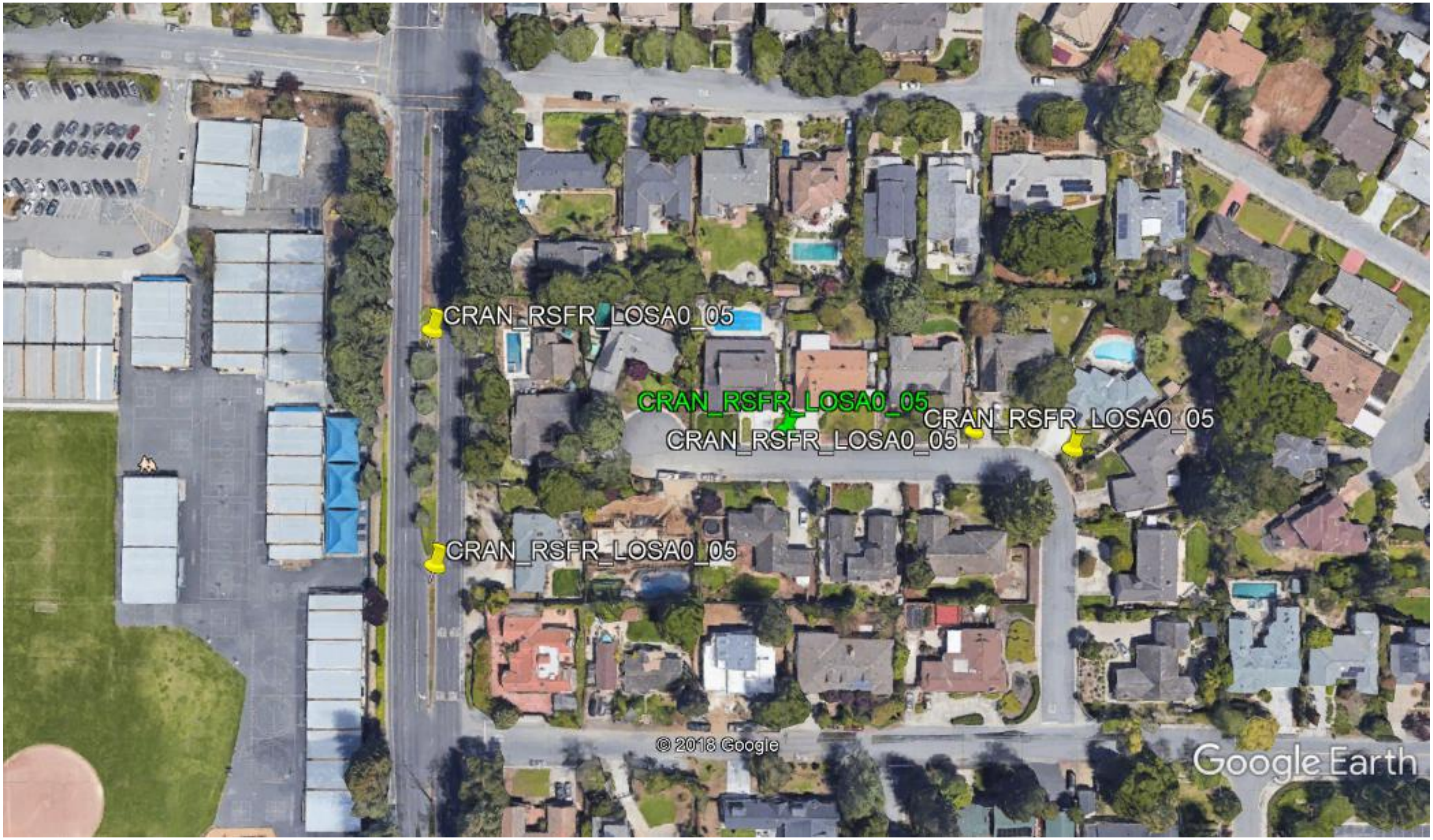
July 19, 2019

Rethink Possible®

AT&T Small Cell
Site ID: LOSA0_05
Public Right-of-Way near 49 San Juan Court
Alternative Sites Analysis

Map of Small Cell Node LOSA0_05 and Alternative Sites



Proposed Small Cell – LOSA0_05

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_05 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_05– Proposed Location

Public right-of-way near 49 San Juan Court

- AT&T proposes to place Small Cell LOSA0_05 on a PG&E owned wood utility pole in the public right-of-way near 49 San Juan Court in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Accessory equipment will be sky-lined to a lesser extent due to existing mature trees in the foreground when compared to alternate candidates within the designated network radius to meet existing network capacity requirements

- AT&T has determined this location is viable.

LOSA0_05– Alternative Site 1

Public right-of-way near 71 San Juan Court

- This location is a wood utility pole located in the public ROW on the north side of San Juan Court approximately 300 feet from Jordan Avenue
- This pole was considered to be no less intrusive than the proposed site location

LOSA0_05– Alternative Site 2

Public right-of-way near 115 San Juan Court

- This location is a wood utility pole located in the public ROW on the north side of San Juan Court approximately 225 feet from Jordan Avenue
- This pole was considered to be no less instructive than the proposed site location

LOSA0_05– Alternative Site 3

Public right-of-way near 757 N San Antonio Rd

- This location is a steel utility pole located in the public ROW on the median island of San Antonio Rd approx. 117’ north of Jordan Ave

- This site was ultimately rejected as it supports a cutoff switch which is an automatic rejection per GO-95 requirements

LOSA0_05– Alternative Site 4

Public right-of-way near 785 N San Antonio Rd

- This location is a steel utility pole located in the public ROW on the median island of San Antonio Rd approx. 220’ south of E Portola Ave
- The existing pole does not allow a pole top extension in order to meet GO-95 requirements and would require replacement and redesign
- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

Proposed Small Cell LOSA0_05- Conclusion

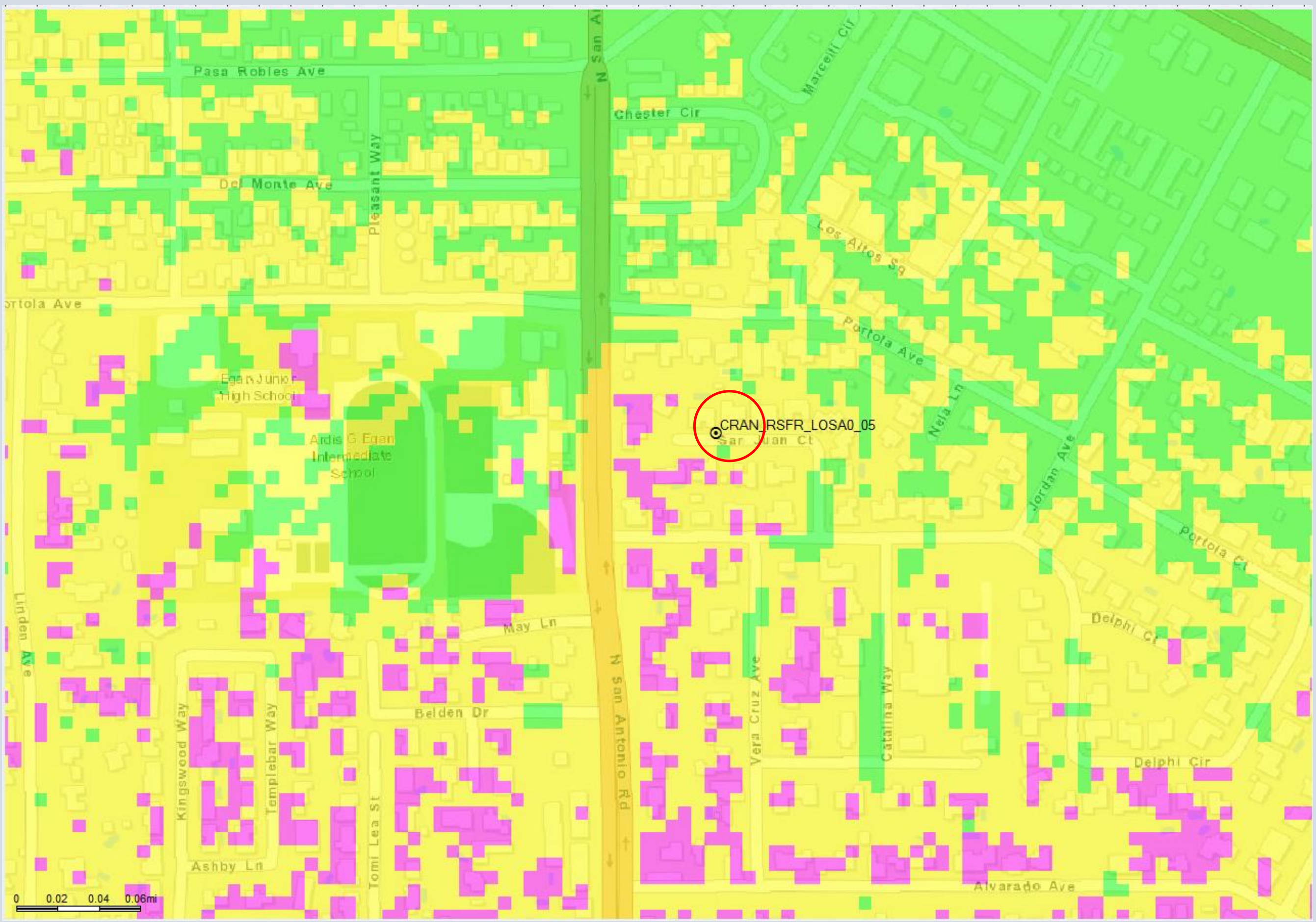
- Small Cell LOSA0_05 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_05 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_05 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_05



Legend

Coverage_RSRP (dBm)

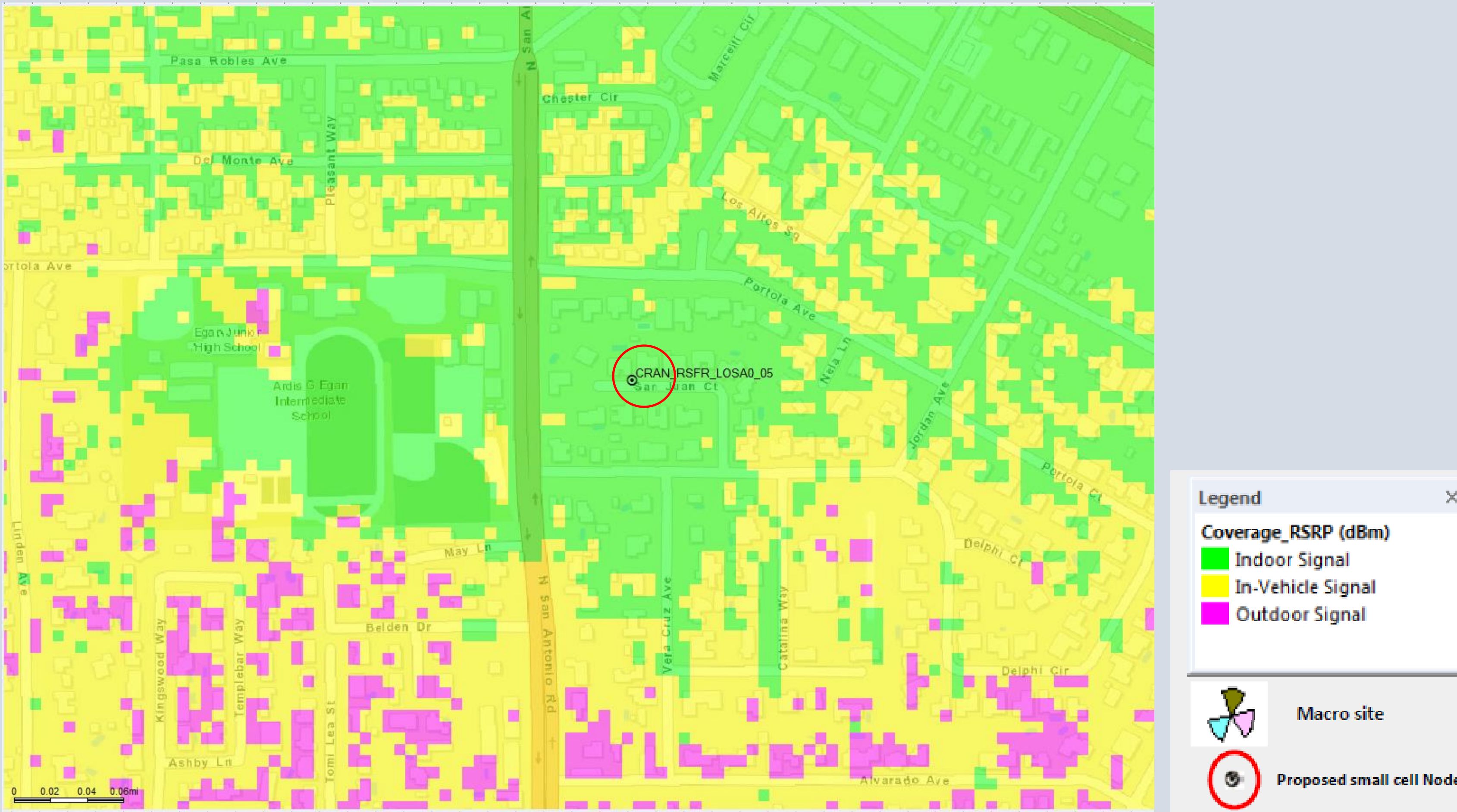
- Indoor Signal
- In-Vehicle Signal
- Outdoor Signal

Macro site

Proposed small cell Nodes

EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_05



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 6

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Los Altos Avenue near W Portola Avenue. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the processing time it takes to move data through a network, such as how long it takes to

start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 791 Los Altos Avenue is needed to close the high-band LTE service coverage in an area bordered roughly by Pasa Robles Avenue to the north, Laverne Way to the west, Van Buren Street to the south and Mercedes Avenue to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

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To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and data rates sufficient to stream video and complete calls. In-building service is critical as customers

increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

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Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip Dale

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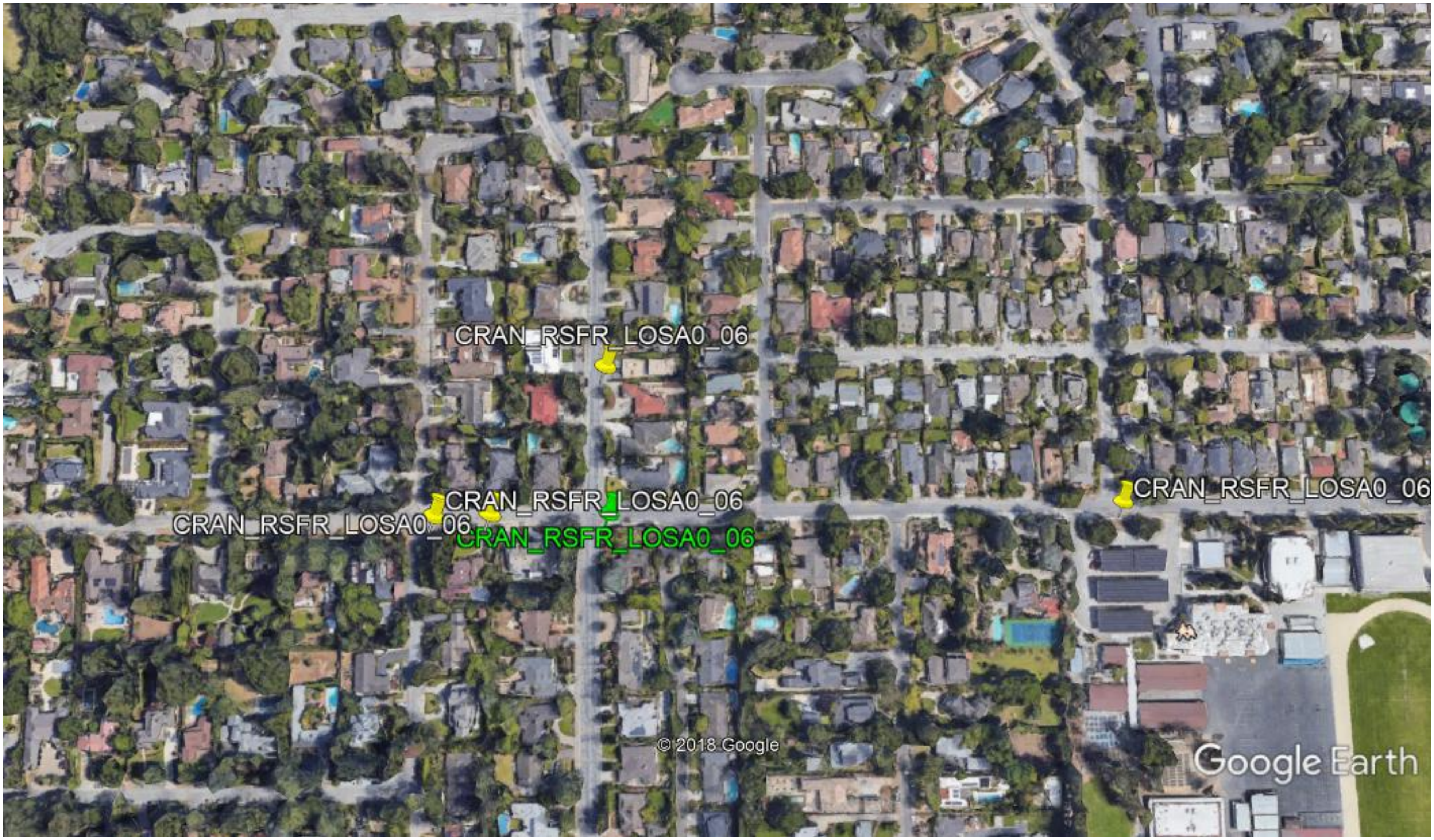
July 19, 2019

Rethink Possible®

AT&T Small Cell
Site ID: LOSA0_06
Public Right-of-Way near 791 Los Altos Avenue
Alternative Sites Analysis

Map of Small Cell Node LOSA0_06 and Alternative Sites



Proposed Small Cell – LOSA0_06

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_06 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_06– Proposed Location

Public right-of-way near 791 Los Altos Avenue

- AT&T proposes to place Small Cell LOSA0_06 on a PG&E owned wood utility pole in the public right-of-way near 791 Los Altos Avenue in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Due to the corner location and present existing mature shrubs/foliage and mature trees in the foreground, the accessory equipment will less intrusive when compared to the alternate candidates

- AT&T has determined this location is viable.

LOSA0_06– Alternative Site 1

Public right-of-way near 100 West Portola Avenue

- This location is a wood utility pole located in the public ROW on the south side of West Portola Avenue where it intersects with Mercedes Avenue

- This pole was considered but was determined to not meet the network objective is it would not adequately fill the existing capacity gap throughout the entire network area.

- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as equipment will be sky-lined for travelers heading south on Mercedes Avenue

LOSA0_06– Alternative Site 2

Public right-of-way near 831 Los Altos Ave

- This location is a wood utility pole located in the public ROW on the south side of West Portola Avenue where it intersects with Mercedes Avenue

- This pole was considered but was determined to not meet the network objective is it would not adequately fill the existing capacity gap throughout the entire network area.

- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as antenna and extension arm equipment will be sky-lined for travelers heading north and south on Los Altos Ave

LOSA0_06– Alternative Site 3

Public right-of-way near 340 W Portola Ave

- This location is a wood utility pole located in the public ROW on the south side of West Portola Avenue approx. 191’ from Los Altos Ave
- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as antenna and extension arm equipment will be sky-lined for travelers heading east west on
- This site was ultimately rejected as it serves as power crossing point and presented potential GO-95 climbing space issues. In addition, due to existing pole mounted equipment space conflicts are presented in order to have the ability to run necessary conduit for power, grounding, and antenna communication lines.

LOSA0_06– Alternative Site 4

Public right-of-way near 366 W Portola Ave

- This location is a wood utility pole located in the public ROW on the SE corner of W Portola Ave and Santa Rita Ave
- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as antenna and extension arm equipment will be sky-lined for travelers heading east west on
- This site was ultimately rejected as existing equipment paired with proposed side mounted equipment would not allow proper climbing space per GO-95 requirements

Proposed Small Cell LOSA0_06- Conclusion

- Small Cell LOSA0_06 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_06 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_06 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_06

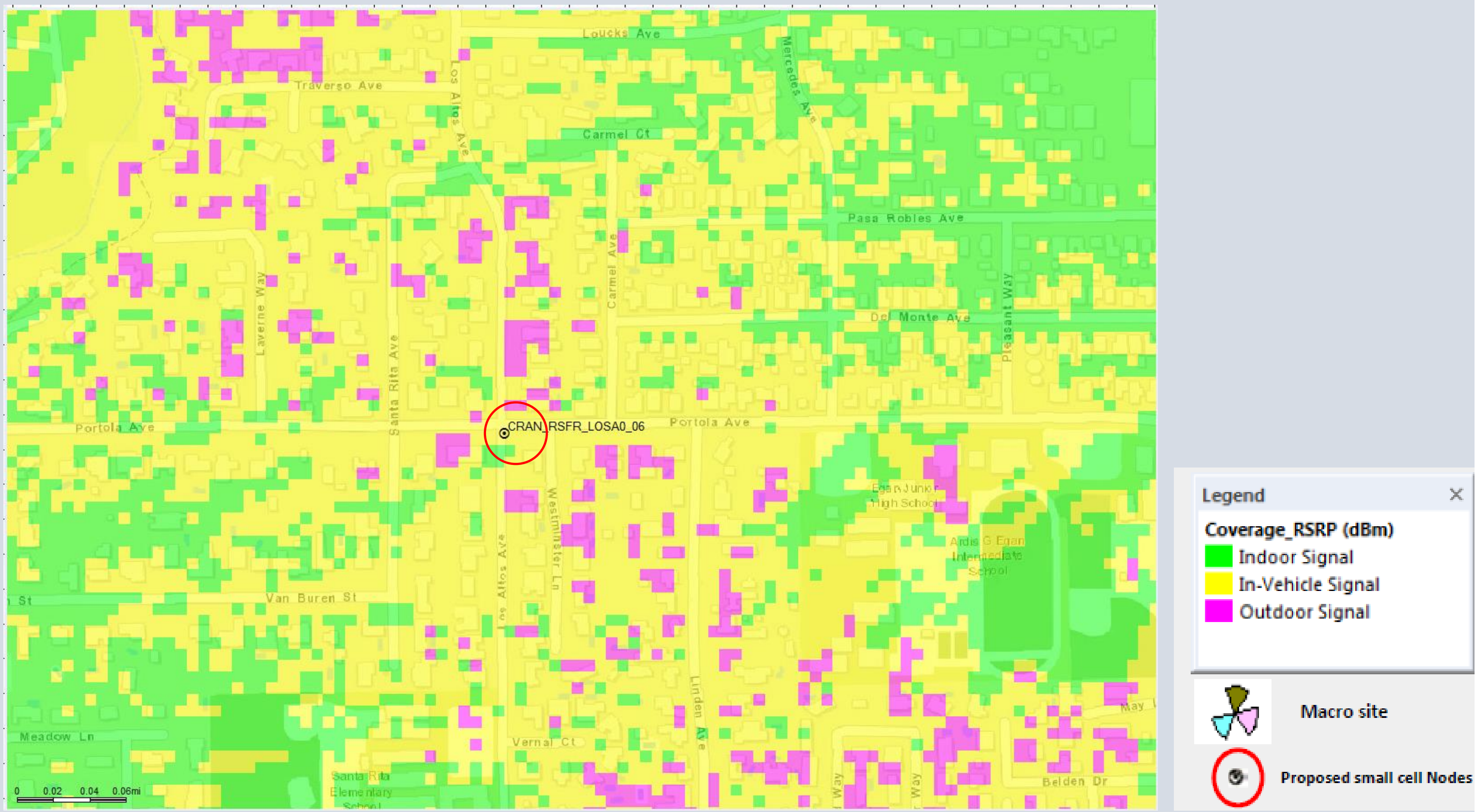
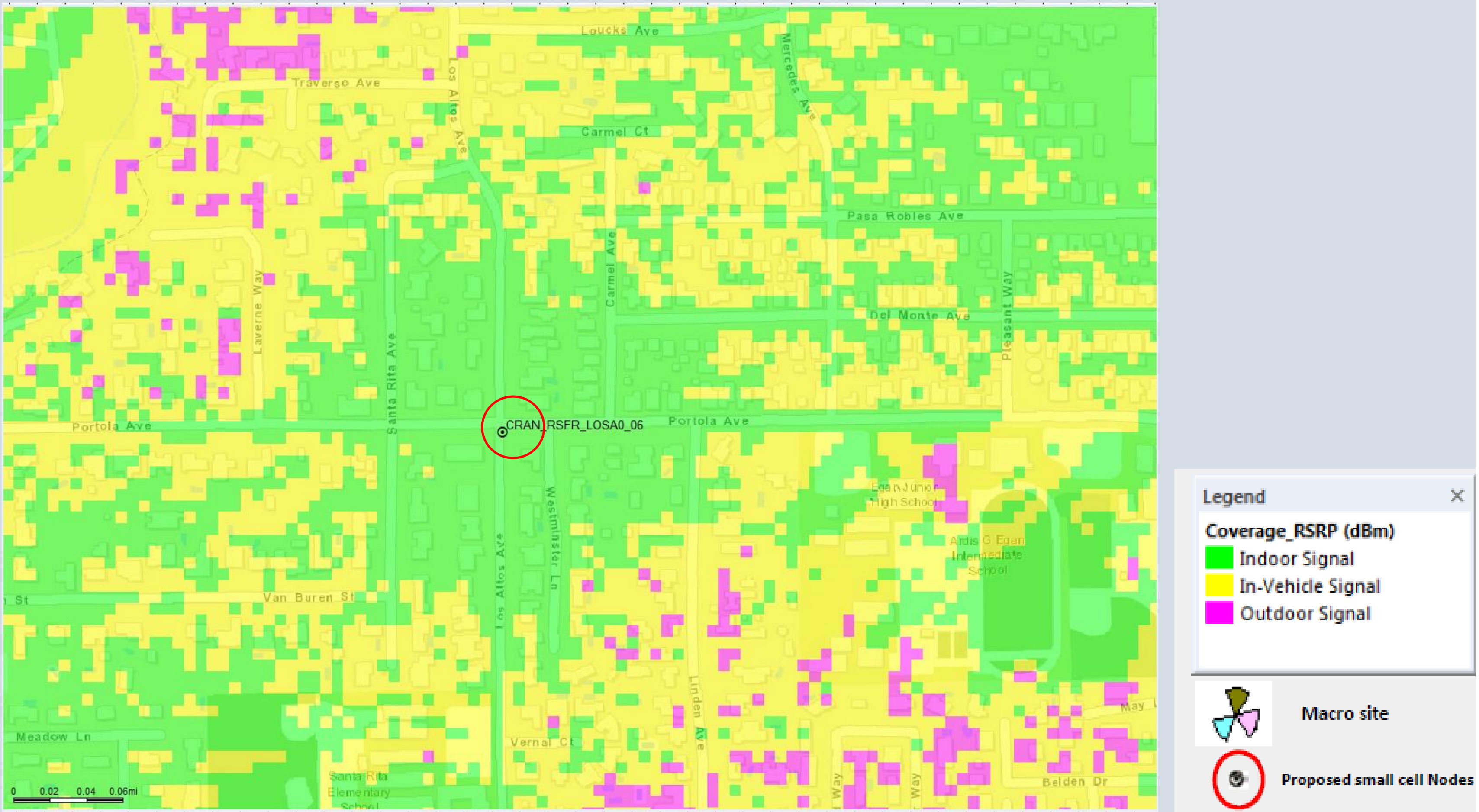


EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_06



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 7

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Eleanor Avenue near Hillview Avenue. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the processing time it takes to move data through a network, such as how long it takes to

start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 97 Eleanor Avenue is needed to close the high-band LTE service coverage in an area bordered roughly by Galli Drive to the north, Los Altos History Museum to the west, Marvin Avenue to the south and South Gordon Way to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes and recreation areas and playing fields.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and

data rates sufficient to stream video and complete calls. In-building service is critical as customers increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

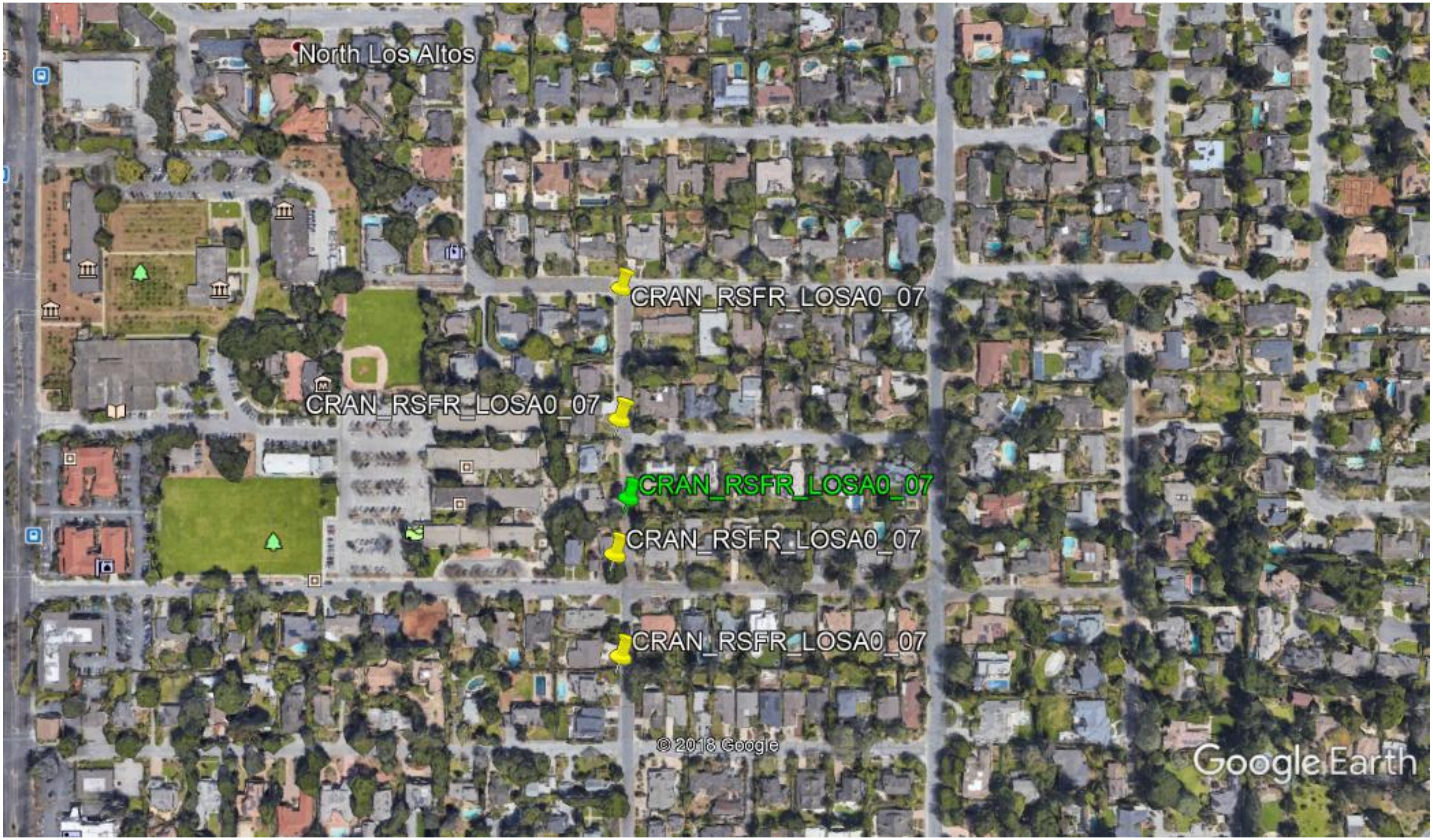
My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip Dale

Philip B A Dale C Eng
AT&T Mobility Services LLC
Network, Planning & Engineering
RAN Design & RF Engineering
July 19, 2019

AT&T Small Cell
Site ID: LOSA0_07
Public Right-of-Way near 98 Eleanor Avenue
Alternative Sites Analysis

Map of Small Cell Node LOSA0_07 and Alternative Sites



Proposed Small Cell – LOSA0_07

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_07 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_07– Proposed Location

Public right-of-way near 98 Eleanor Avenue

- AT&T proposes to place Small Cell LOSA0_07 on a PG&E owned wood utility pole in the public right-of-way near 98 Eleanor Avenue in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Existing mature tree foliage assist in blending the proposed accessory side mounted equipment to create a less intrusive proposed site location proposal

- AT&T has determined this location is viable.

LOSA0_07– Alternative Site 1

Public right-of-way near 2 Eleanor Avenue

- This location is a wood utility pole located in the public ROW on the south side of East Edith Avenue where it intersects with Eleanor Avenue
- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as equipment would create a more visible intrusion for drivers heading north on Eleanor Ave toward Edith Ave
- In addition, the site is located near a pedestrian sidewalk compared to the proposed primary that does not have designated foot traffic sidewalk below the site. Side mounted accessory radio and power equipment would be required to protrude over sidewalk in conformance GO-95 requirements

LOSA0_07– Alternative Site 2

Public right-of-way near 80 Eleanor Avenue

- This location is a wood utility pole located in the public ROW on the west side of Eleanor directly across from Frances Dr
- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as equipment would create a more visible intrusion for drivers heading north and south on Eleanor Ave
- Pole was ultimately rejected as it presented potential vertical clearance issues per G0-95 requirements due to existing utility pole mounted streetlight. Cross arms required to be relocated down the pole 2’ to allow pole top extension which would not allow the proper vertical clearance requirements of 6’ (per GO-95) from top of luminaire to bottom of conductor

LOSA0_07– Alternative Site 3

Public right-of-way near 191 Hillview Avenue

- This location is a wood utility pole located in the public ROW on the west side of Eleanor directly across from Frances Dr
- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as equipment would create a more visible intrusion for drivers heading east on Hillview Ave
- Pole was ultimately rejected as it presented potential vertical clearance issues per G0-95 requirements due to existing utility pole mounted streetlight. Cross arms required to be relocated down the pole 2’ to allow pole top extension which would not allow the proper vertical clearance requirements of 6’ (per GO-95) from top of luminaire to bottom of conductor

LOSA0_07– Alternative Site 4

Public right-of-way near 182 Eleanor Avenue

- This location is a wood utility pole located in the public ROW on the west side of Eleanor Ave approx. 161’ south of Hillview Ave

- This pole was considered more aesthetically intrusive when compared to the chosen primary candidate as antenna and associated radio and power equipment would create a more visible intrusion for drivers heading north and south on Eleanor Ave

Proposed Small Cell LOSA0_07- Conclusion

- Small Cell LOSA0_07 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_07 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_07 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_07

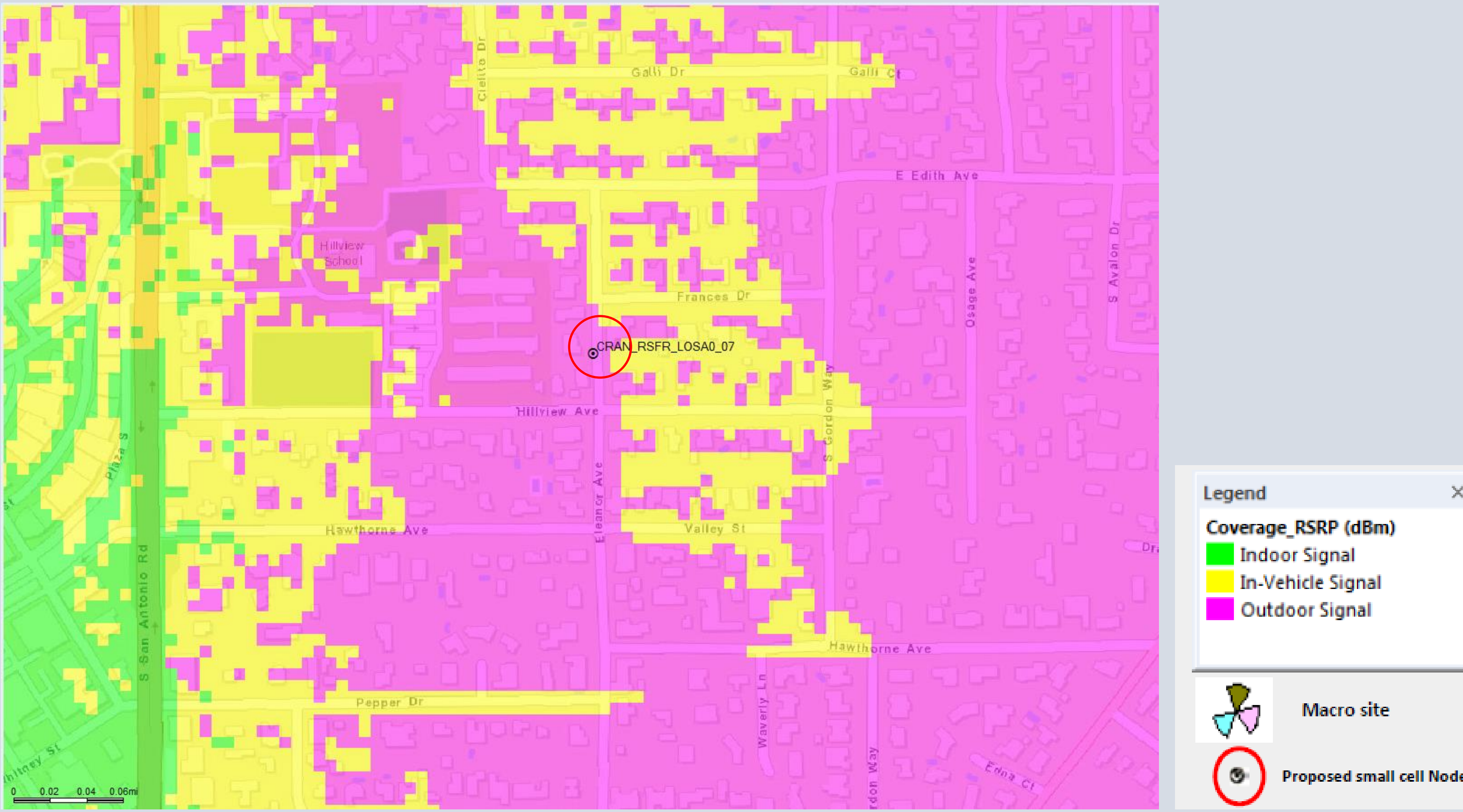
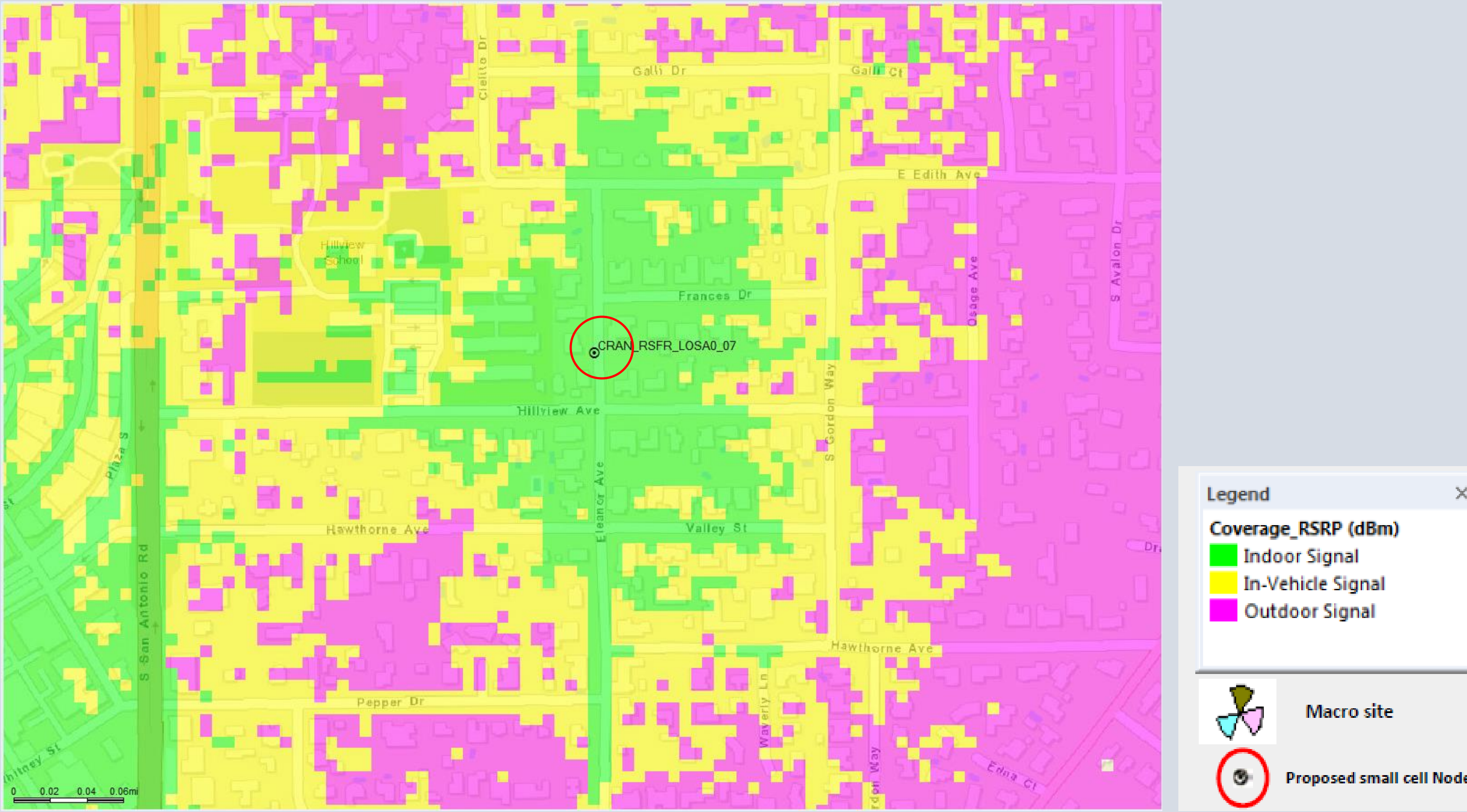


EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_07



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 8

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node approximately mid way along Garland Way. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the processing time it takes to move data through a network, such as how long it takes to

start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 7182 Garland Way is needed to close the high-band LTE service coverage in an area bordered roughly by Sylvian Way to the north, end of Coronado Avenue to the west, Mt Hamilton Avenue to the south and Chateau Drive to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and data rates sufficient to stream video and complete calls. In-building service is critical as customers

increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip Dale

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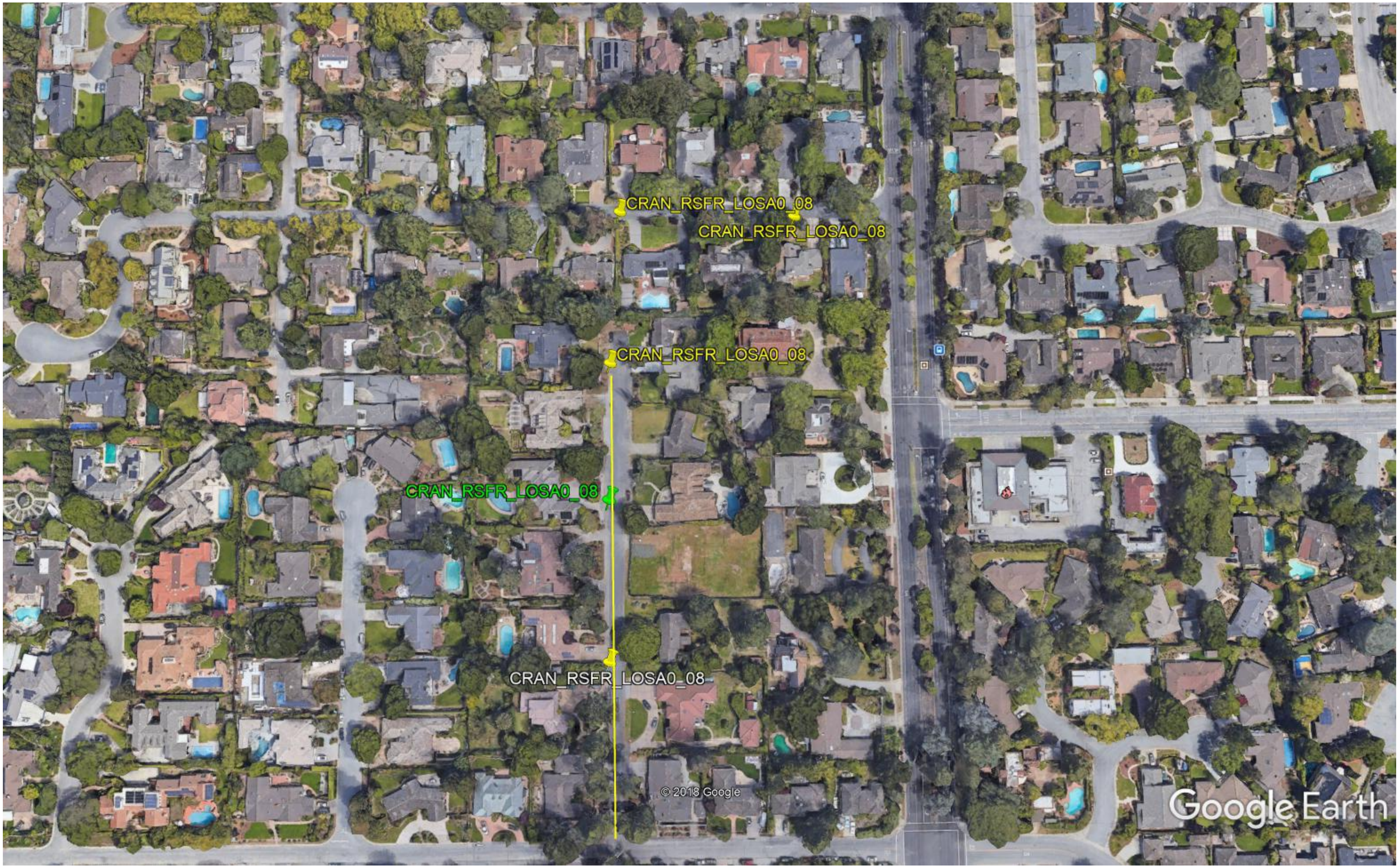
RAN Design & RF Engineering
July 19, 2019

AT&T Small Cell
Site ID: LOSA0_08
Public Right-of-Way near 182 Garland Way
Alternative Sites Analysis

Map of Small Cell Node LOSA0_08 and Alternative Sites



Property.

Proposed Small Cell – LOSA0_08

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

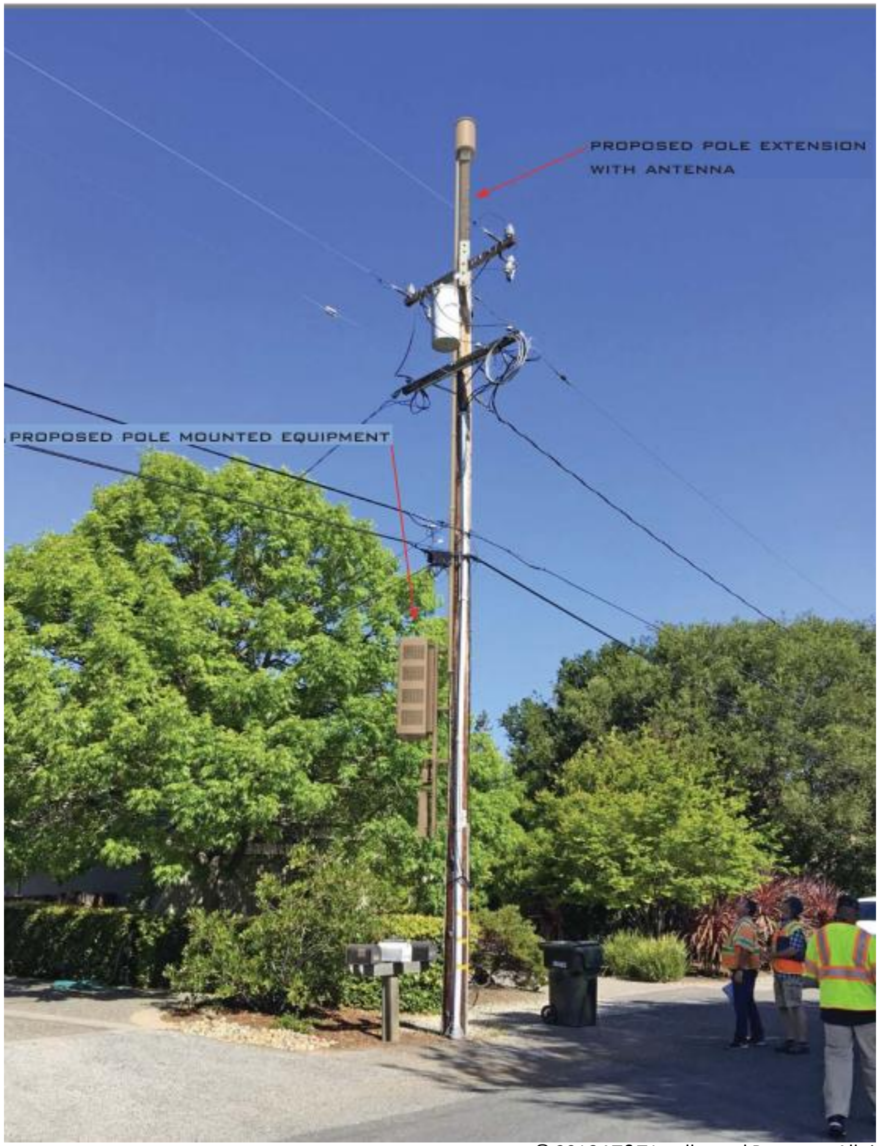
- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_08 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_08– Proposed Location

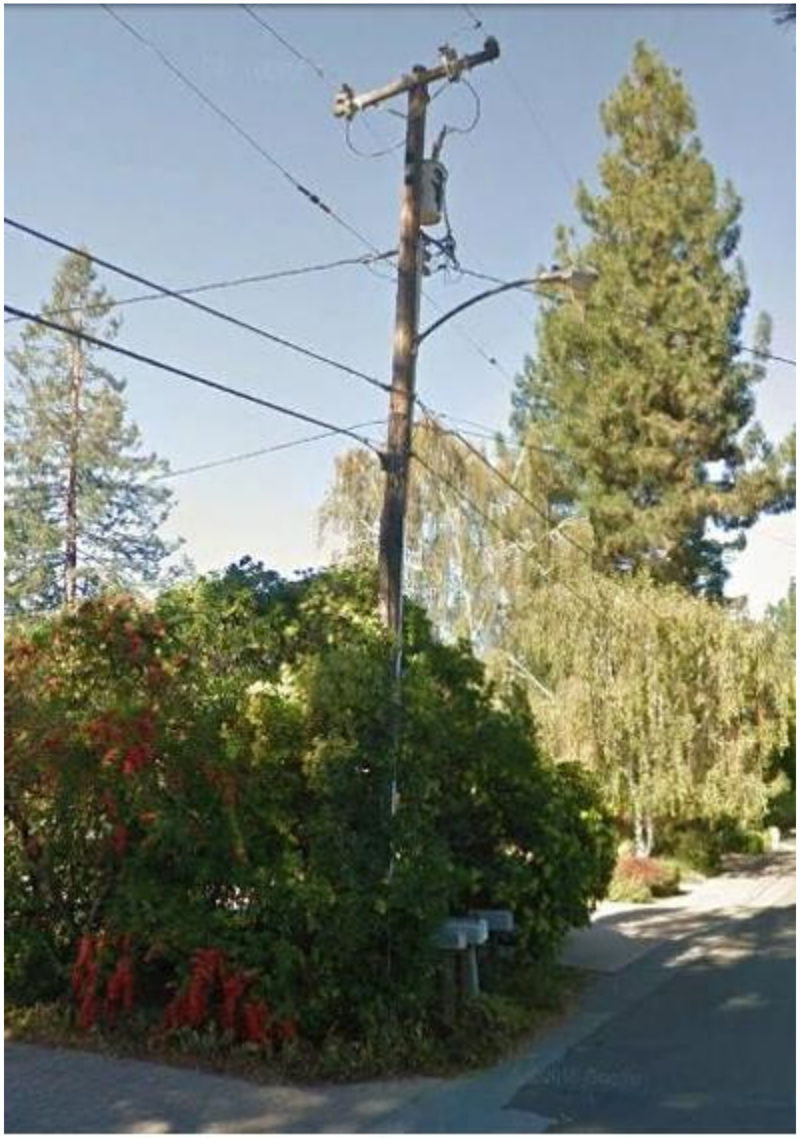
Public right-of-way near 182 Garland Way



- AT&T proposes to place Small Cell LOSA0_08 on a PG&E owned wood utility pole in the public right-of-way near 182 Garland Way in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.
- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile
- Existing mature tree foliage assist in preventing sky-lining of the proposed accessory side mounted equipment for both north and south travelers on Garland Way to create a less intrusive proposed site location proposal
- AT&T has determined this location is viable.

LOSA0_08– Alternative Site 1

Public right-of-way near 130 Garland Way



- This location is a wood utility pole located in the public ROW on the west side of Garland Way off Mount Hamilton Avenue
- This pole was considered more visibly intrusive when compared to the chosen primary candidate as the side mounted equipment would be potentially be sky-lined for travelers heading north on Garland Way
- In addition, considering the poles existing surrounding tree foliage, additional tree trimming to existing trees would be required

LOSA0_08– Alternative Site 2

Public right-of-way near 40 Coronado Ave

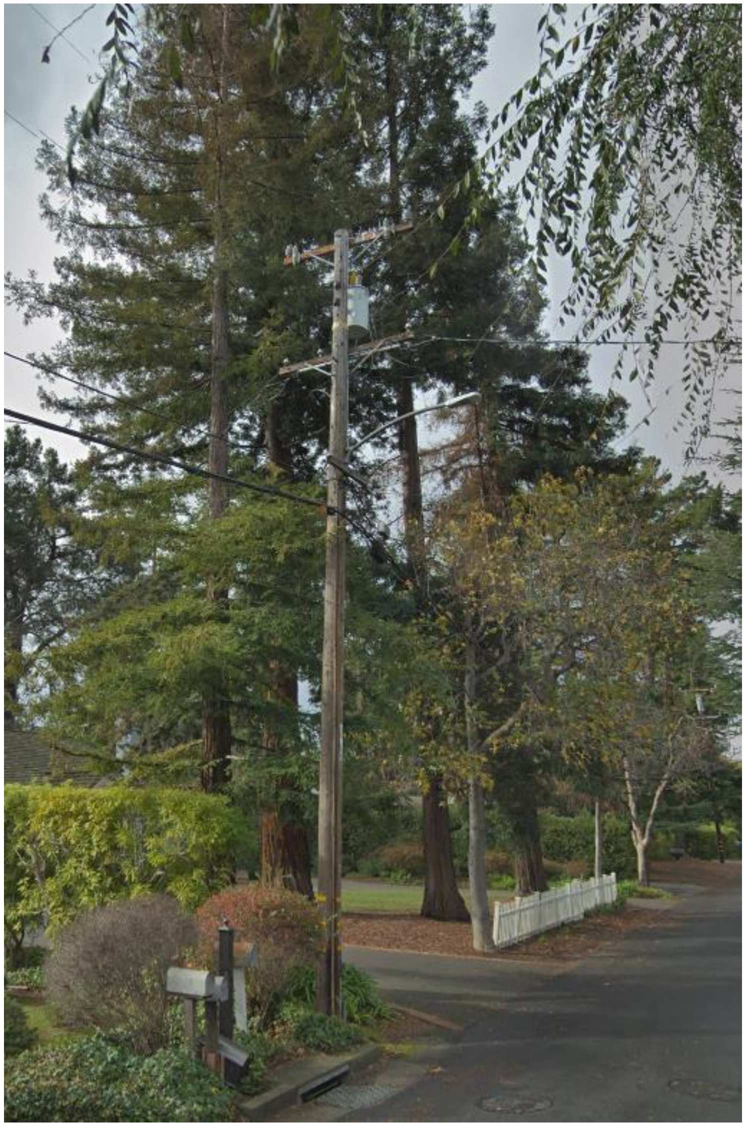
- This location is a wood utility pole located in the public ROW on the south side of Coronado Ave approx. 148’ west of N San Antonio Rd

- This pole was ultimately rejected as the required tree trimming required per GO-95 requirements to properly install side mounted radio and power equipment to the pole would be extensive.

- This pole presented potential climbing space issues in conformance with GO-95 due to existing pole mounted conduit and communication lines

LOSA0_08– Alternative Site 3

Public right-of-way near 74 Coronado Ave



- This location is a wood utility pole located in the public ROW on the south side of Coronado Ave approx. 415’ west of N San Antonio Rd

- Pole was ultimately rejected as it presented potential vertical clearance issues per G0-95 requirements due to existing utility pole mounted streetlight. Cross arms required to be relocated down the pole 2’ to allow pole top extension which would not allow the proper vertical clearance requirements of 6’ (per GO-95) from top of luminaire to bottom of conductor

- This pole presented potential conflicts regarding ground rod conduit placement due to number of existing grounds and conduit installed at the base of the pole

LOSA0_08– Alternative Site 4

Public right-of-way near 216 Garland Way

- This location is a wood utility pole located in the public ROW on the west side of Garland Way approx. 674’ north of Mt. Hamilton Ave

- Pole was ultimately rejected as it would require replacement in order to create the necessary clearances and height requirements to install to install top mounted canister design that meets GO-95 requirements

- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

Proposed Small Cell LOSA0_08- Conclusion

- Small Cell LOSA0_08 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_08 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_08 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_08

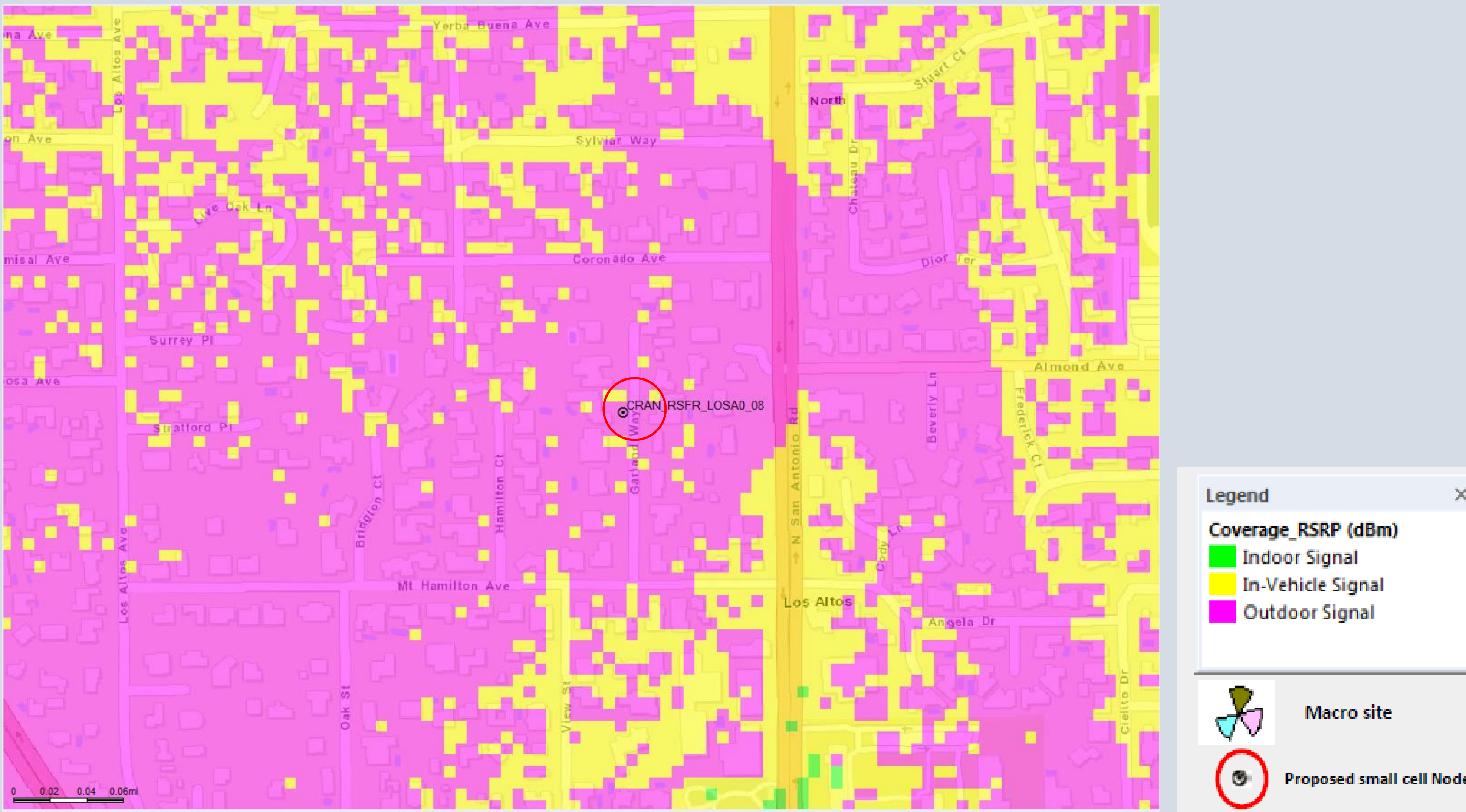
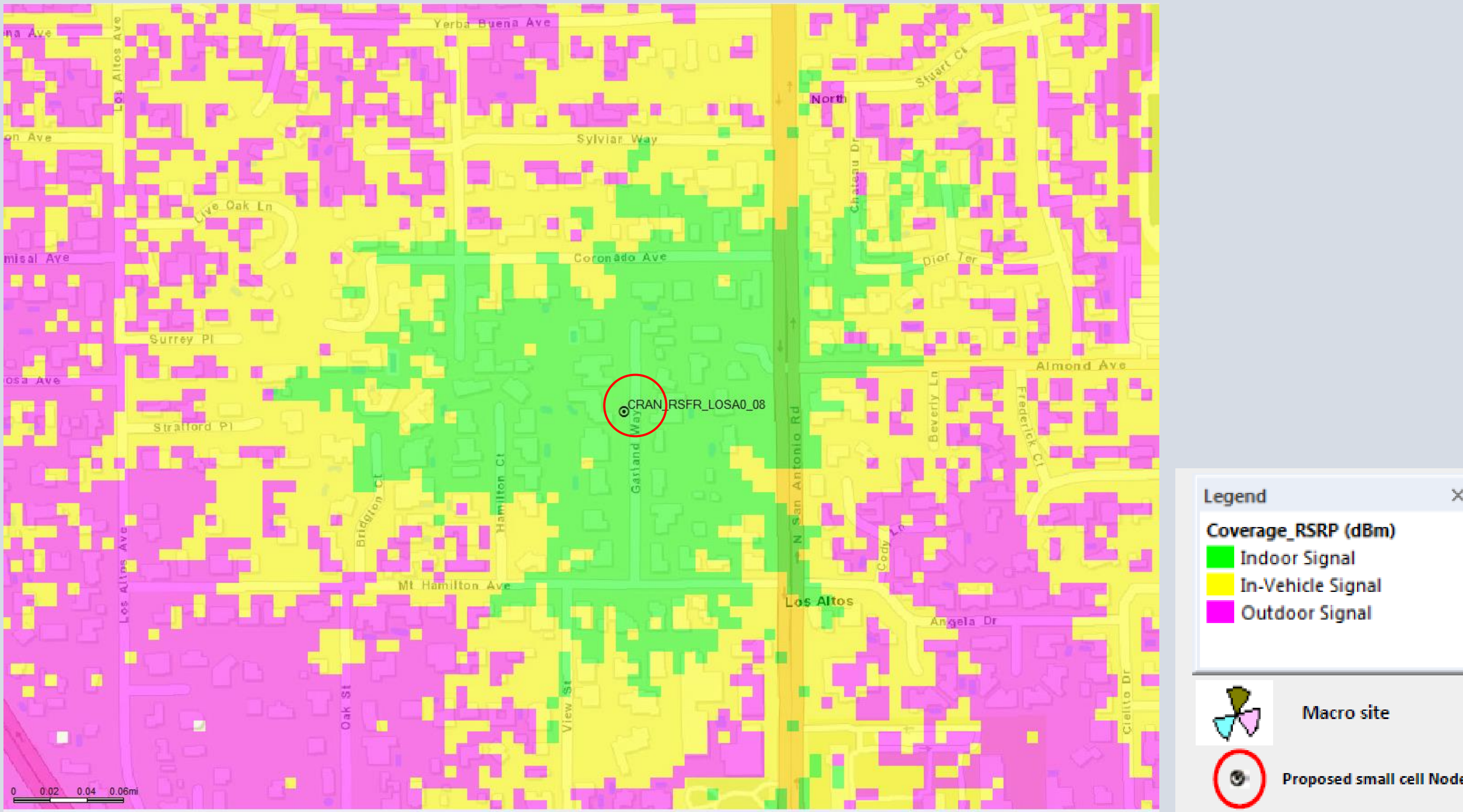


EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_08



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 9

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

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The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Patrick Way. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers lower latency, or the processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 491 Patrick Way is needed to close the high-band LTE service coverage in an area bordered roughly by Pine Lane to the north, Guadalupe Drive to the west, Sylvian Way to the south and Alma Court to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

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To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and data rates sufficient to stream video and complete calls. In-building service is critical as customers

increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

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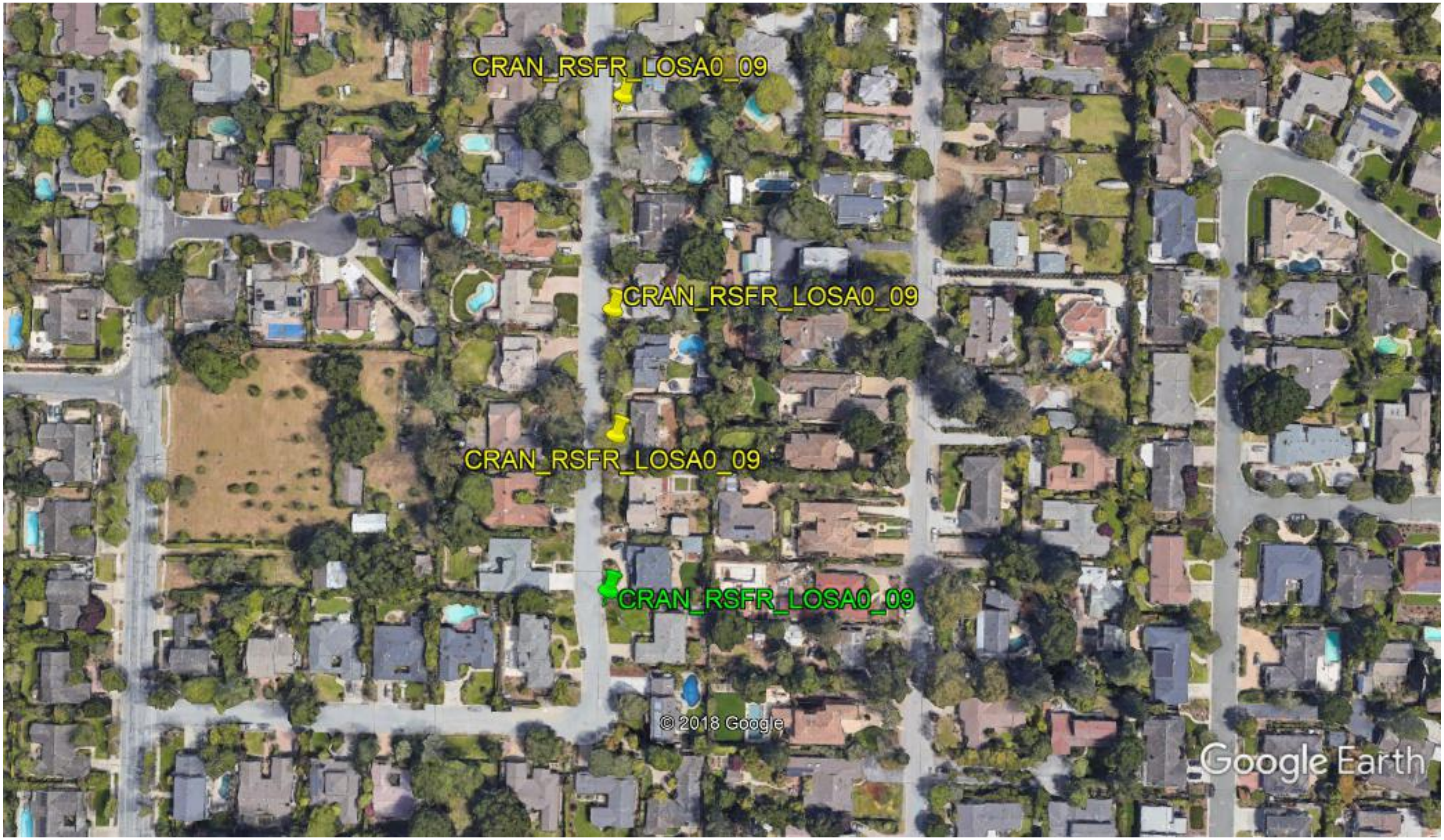
Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. Hons. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip B A Dale C Eng
AT&T Mobility Services LLC
Network, Planning & Engineering
RAN Design & RF Engineering
October 23, 2019

AT&T Small Cell
Site ID: LOSA0_09
Public Right-of-Way near 491 Patrick Way
Alternative Sites Analysis

Map of Small Cell Node LOSA0_09 and Alternative Sites



Proposed Small Cell – LOSA0_09

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_09 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_09– Proposed Location

Public right-of-way near 491 Patrick Way

- AT&T proposes to place Small Cell LOSA0_09 on a PG&E owned wood utility pole in the public right-of-way near 491 Patrick Way in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Existing tree foliage/young trees assist in preventing sky-lining of the proposed accessory side mounted equipment for travelers heading south on Patrick Way. Presence of premature growth trees adjacent to the pole as well as mature growth tree in the foreground further assist in to create a less intrusive proposed site location proposal

- AT&T has determined this location is viable.

LOSA0_09– Alternative Site 1

Public right-of-way near 531 Patrick Way

- This location is a wood utility pole located in the public ROW on the west side of Patrick Way approx. 663’ south of Patrick Way/Pine Lane intersection

- This pole was ultimately rejected due to the presence of power disconnect equipment located on the street side of the pole resulting in non-compliance with G0-95 requirements

LOSA0_09– Alternative Site 2

Public right-of-way near 551 Patrick Way

- This location is a wood utility pole located in the public ROW on the west side of Patrick Way approx. ’ south of Patrick Way/Pine Lane intersection

- This pole was considered no less intrusive than the proposed location

LOSA0_09– Alternative Site #3

Public right-of-way near 571 Patrick Way

- This location is a wood utility pole located in the public ROW on the west side of Patrick Way approx. 252’ south of Patrick Way/Pine Lane intersection
- This pole would require excessive trimming to the adjacent street tree for proper installation and to maintain the required clearances per GO-95 for side mounted radio equipment
- This pole was ultimately rejected due as it was unable to meet network objective requirements for this site location

Proposed Small Cell LOSA0_09- Conclusion

- Small Cell LOSA0_09 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_09 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_09 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_09

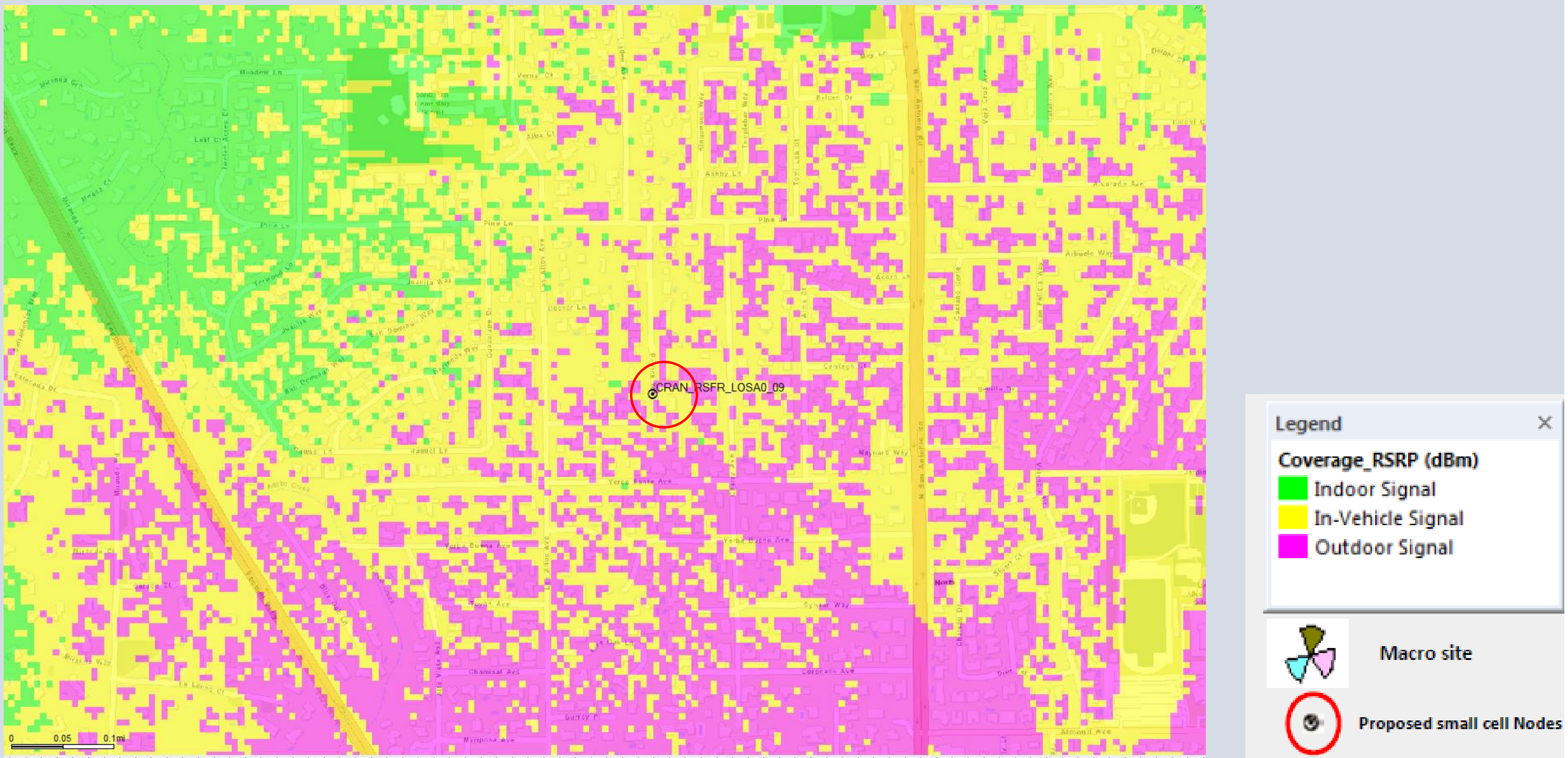
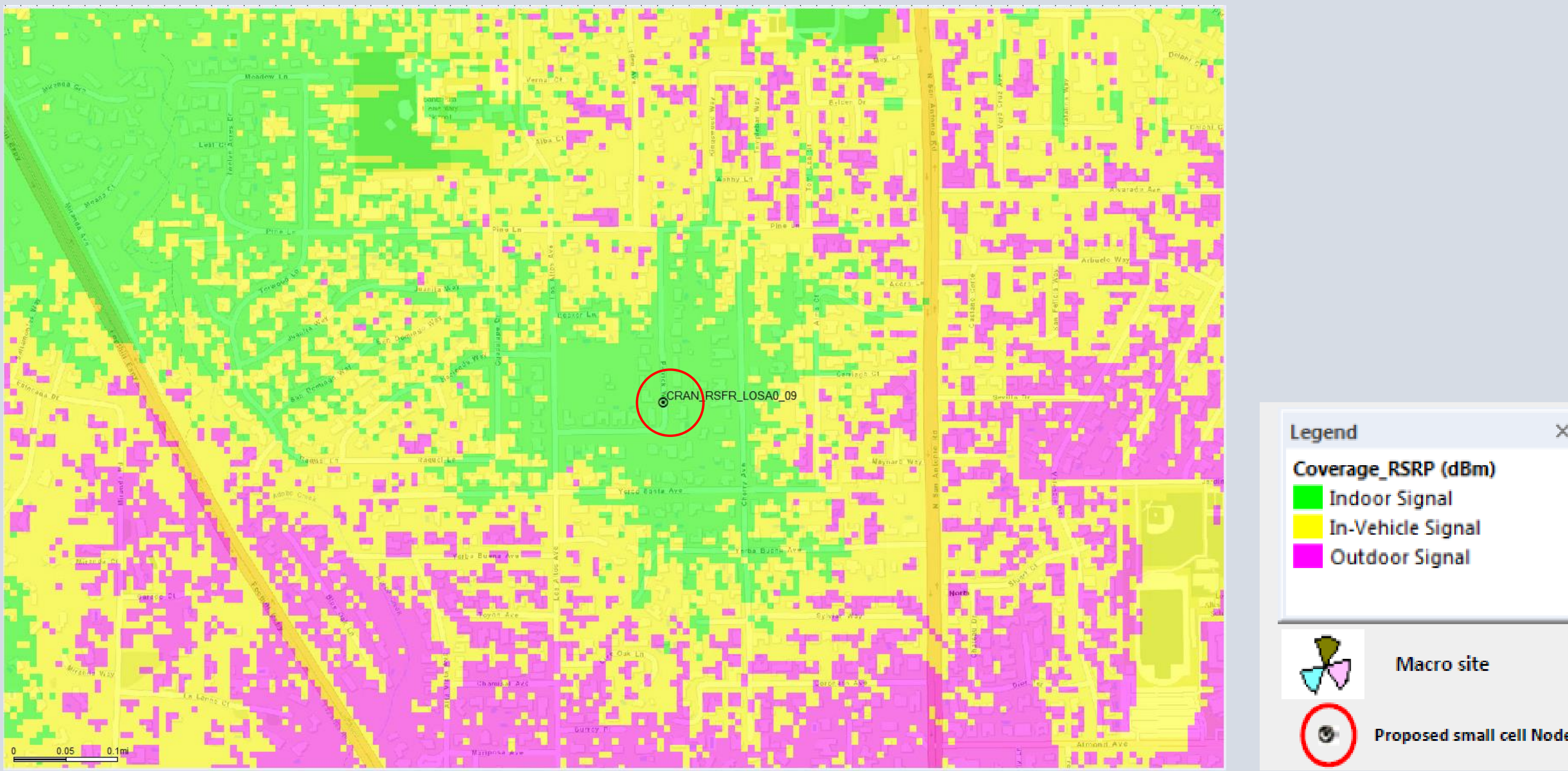


EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_09



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 10

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

Spectrum is a finite resource and there are a limited number of airwaves capable and available for commercial use. Wireless carriers license those airwaves from the FCC. To ensure service quality, AT&T must knit together its spectrum assets to address customers' existing usage and forecasted demand for wireless services, and it must use its limited spectrum in an efficient manner.

AT&T uses high-band (i.e., 2300 MHz, 2100 MHz, and 1900 MHz) and low-band (i.e., 850 MHz and 700 MHz) spectrum to provide wireless service. Each spectrum band has different propagation characteristics and signal quality may vary due to noise or interference based on network characteristics at a given location. To address this dynamic environment, AT&T deploys multiple layers of its licensed spectrum and strives to bring its facilities closer to the customer. To address the existing and forecasted demand and to support 5G speeds in the near future, AT&T plans to deploy small cell facilities within public rights-of-way.

The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Los Altos Avenue and Toyon Avenue. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers

lower latency, or the processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 300 Los Altos Avenue is needed to close the high-band LTE service coverage in an area bordered roughly by Pine Lane to the north, Foothill Expressway to the west, Stratford Place to the south and cherry Avenue to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and

data rates sufficient to stream video and complete calls. In-building service is critical as customers increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

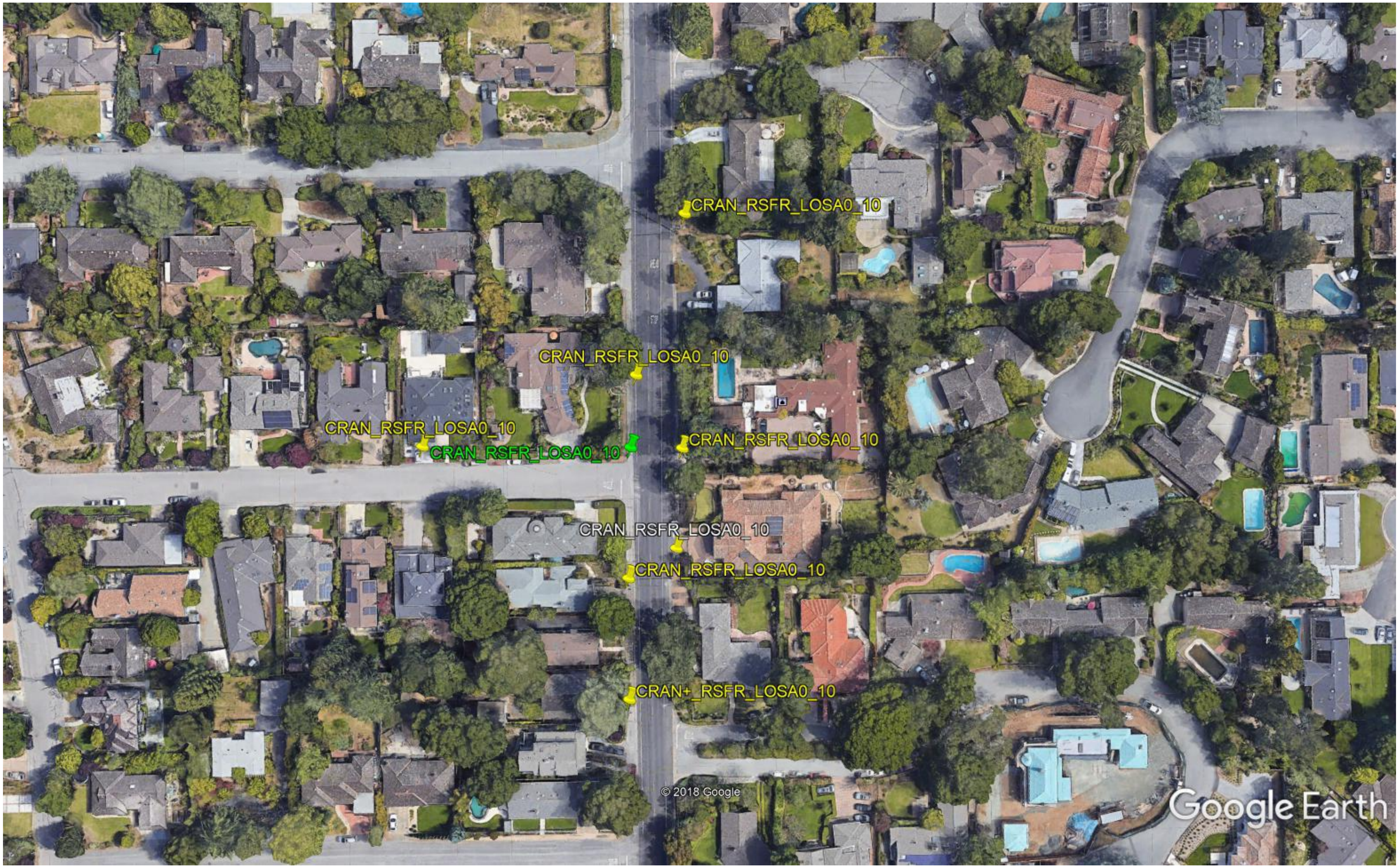
My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. Hons. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip B A Dale C Eng
AT&T Mobility Services LLC
Network, Planning & Engineering
RAN Design & RF Engineering
October 23, 2019

Rethink Possible®

AT&T Small Cell
Site ID: LOSA0_10
Public Right-of-Way near 300 Los Altos Avenue
Alternative Sites Analysis

Map of Small Cell Node LOSA0_10 and Alternative Sites



Proposed Small Cell – LOSA0_10

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.

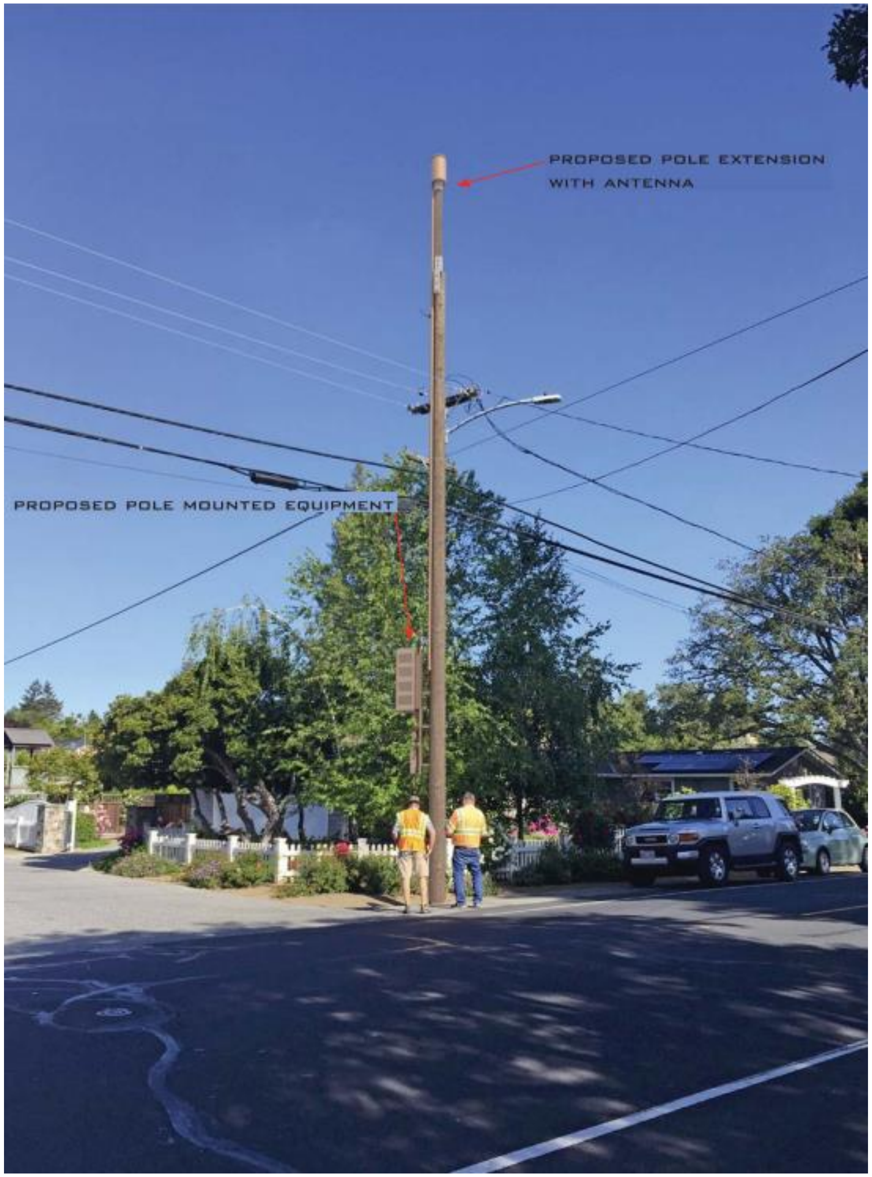
- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_10 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_10– Proposed Location

Public right-of-way near 300 Los Altos Avenue



- AT&T proposes to place Small Cell LOSA0_10 on a PG&E owned wood utility pole in the public right-of-way near 300 Los Altos Avenue in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Existing mature trees approximately 12' behind the proposed pole and in the foreground assist in preventing sky-lining of the proposed accessory side mounted equipment for travelers heading north and south along Los Altos Avenue.

- AT&T has determined this location is viable.

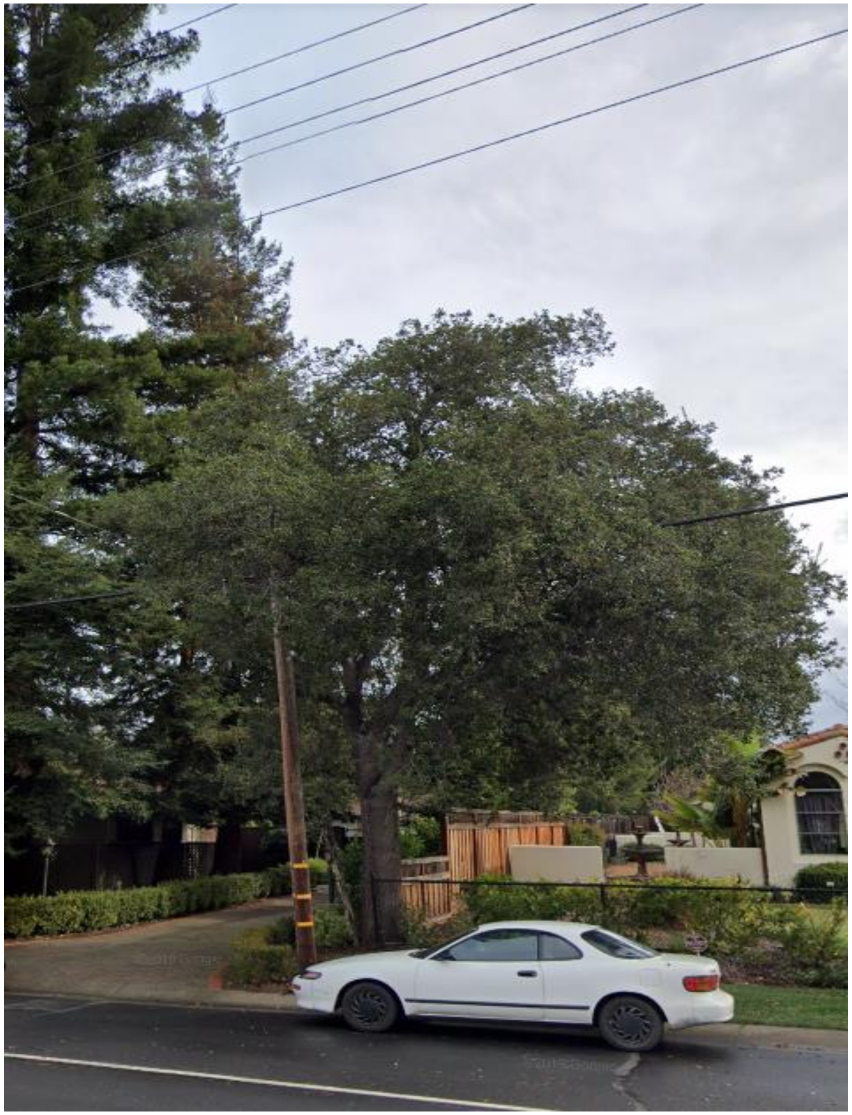
LOSA0_10– Alternative Site 1

Public right-of-way near 291 Los Altos

- This location is a wood utility pole located in the public ROW on the east side of Los Altos Avenue north of Live Oak Lane
- This pole was ultimately rejected due to the height of existing pole when paired with the addition of a required pole top extension in accordance with G0-95 requirements. Pole would no longer meet FCC 50’ max requirement.

LOSA0_10– Alternative Site 2

Public right-of-way near 295 Los Altos



- This location is a wood utility pole located in the public ROW on the east side of Los Altos Avenue directly across from Toyon Ave

- This pole was ultimately rejected as the pole would require replacement in order to meet RF objective antenna height. Site would no longer be in compliance with GO-95 requires as antenna would be mounted to a (N) taller pole directly below existing high-voltage power lines.

LOSA0_10– Alternative Site 3

Public right-of-way near 341 Toyon Ave

- This location is a wood utility pole located in the public ROW on the north side of Toyon Ave approx. 205’ west of Los Altos Ave

- This pole was ultimately rejected as it was as installation of a small cell wireless facility would be considered more visually instructive when compared to the proposed candidate. Both top mounted antenna equipment and side mounted radio equipment would be skylined for travelers heading both east and west on Toyon Ave

LOSA0_10– Alternative Site 4

Public right-of-way near 300 Los Altos Ave

- This location is a wood utility pole located in the public ROW on the west side of Los Altos Avenue approx. 85’ north of Toyon Ave
- Pole was ultimately rejected as it would require replacement in order to create the necessary clearances and height requirements to install to install top mounted canister design that meets GO-95 requirements
- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

LOSA0_10– Alternative Site 5

Public right-of-way near 355 Los Altos

- This location is a wood utility pole located in the public ROW on the east side of Los Altos Avenue approx. 237' north of Toyon Ave
- This pole was ultimately rejected due to the height of existing pole when paired with the addition of a required pole top extension in accordance with G0-95 requirements. Pole would no longer meet FCC 50' max requirement.

LOSA0_10– Alternative Site 6

Public right-of-way near 290 Los Altos

- This location is a wood utility pole located in the public ROW on the west side of Los Altos Ave approx. 85’ south of Toyon Ave

- This pole shows signs of structural inadequacy and would require replacement in order to place a small cell wireless facility at this location

- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

LOSA0_10– Alternative Site 7

Public right-of-way near 260 Los Altos

- This location is a wood utility pole located in the public ROW on the west side of Los Altos Ave approx. 192' south of Toyon Ave

- This site was ultimately rejected as in order to maintain compliance with GO-95 climbing space requirements, the existing equipment on the short pole must be transferred to the adjacent pole and the shorter pole removed

- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

Proposed Small Cell LOSA0_10- Conclusion

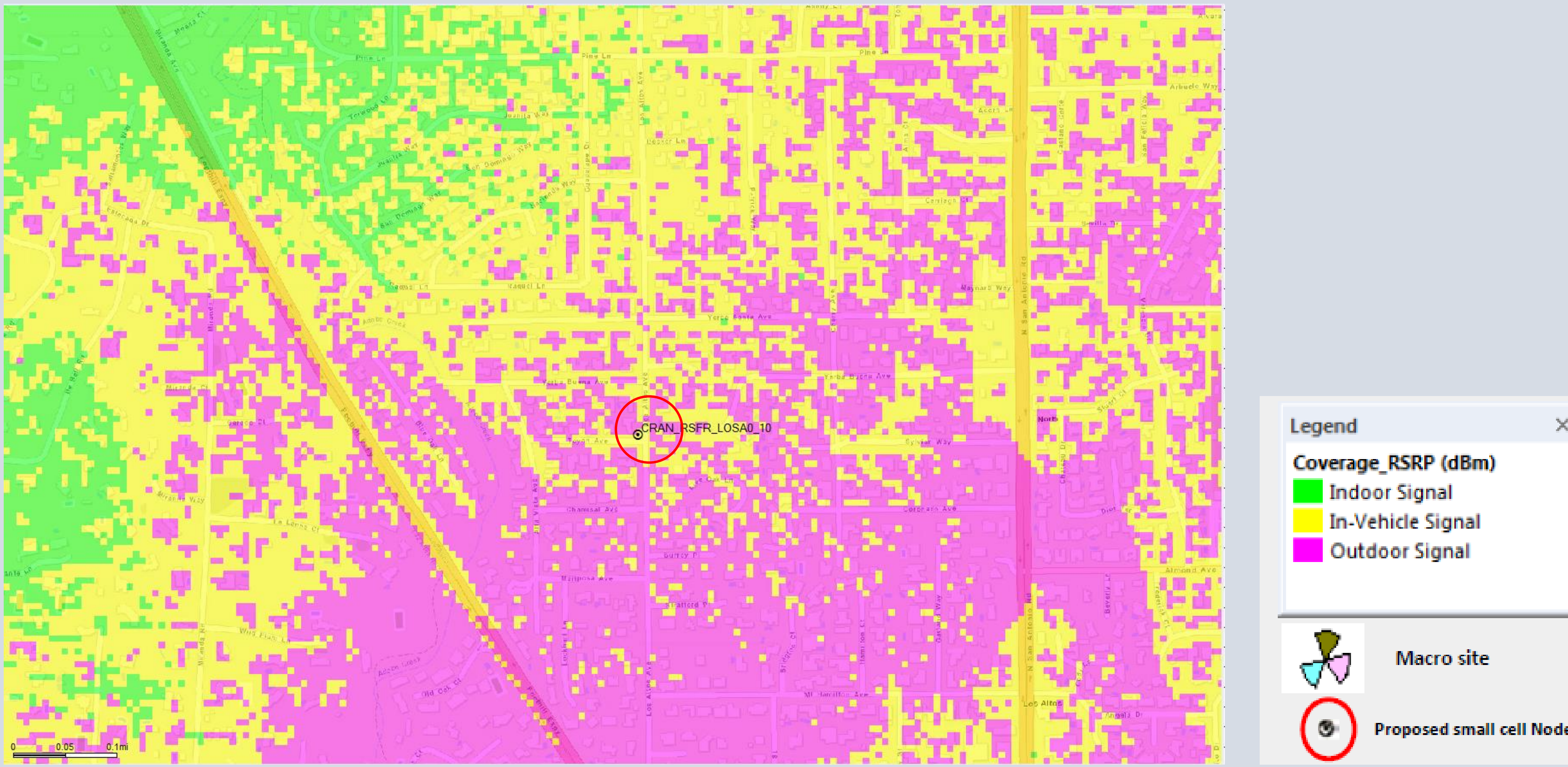
- Small Cell LOSA0_10 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_10 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_10 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_10



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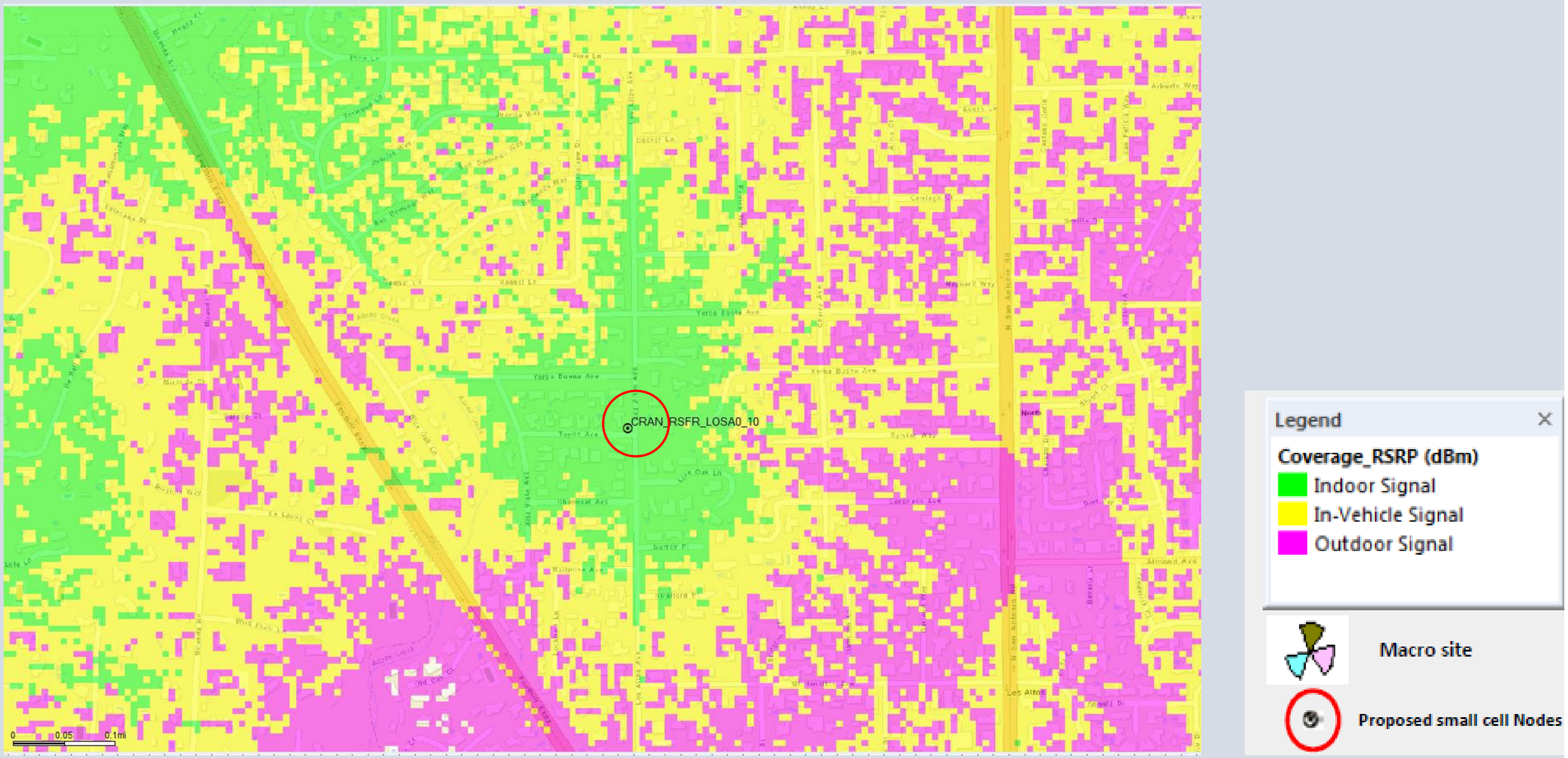
LTE 1900 Coverage with Small Cell LOSA0_10



AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 11

AT&T has experienced an unprecedented increase in mobile data use on its network since introduction of the iPhone in 2007. AT&T estimates that since introduction of the of the iPhone in 2007, mobile data usage has increased 470,000% on its network. AT&T forecasts its customers' growing demand for mobile data services to continue. The increased volume of data travels to and from customers' wireless devices and AT&T's wireless infrastructure over limited airwaves — radio frequency spectrum that AT&T licenses from the Federal Communications Commission ("FCC").

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The proposed node on a pole in the public rights-of-way at 130 Los Altos Avenue is needed to close the high-band LTE service coverage in an area bordered roughly by Chamisal Avenue to the north, Cypress Drive to the west, Edith Avenue to the south and Hamilton Court to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

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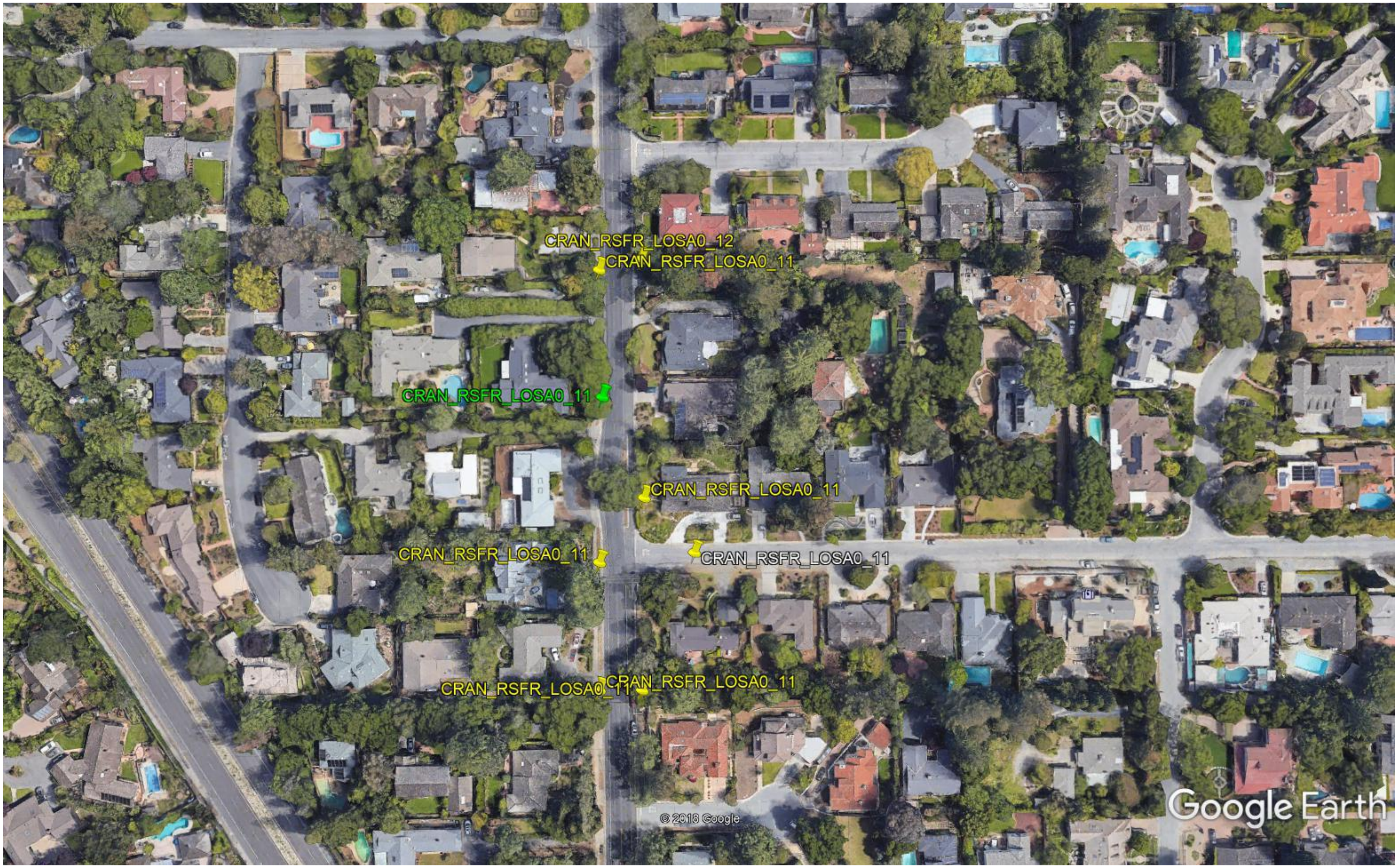
My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. Hons. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

Philip B A Dale C Eng
AT&T Mobility Services LLC
Network, Planning & Engineering
RAN Design & RF Engineering
October 23, 2019

Rethink Possible®

AT&T Small Cell
Site ID: LOSA0_11
Public Right-of-Way near 130 Los Altos Avenue
Alternative Sites Analysis

Map of Small Cell Node LOSA0_11 and Alternative Sites



Proposed Small Cell – LOSA0_11

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.

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- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.

- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T’s existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.

- Node LOSA0_11 will improve signal quality and capacity within AT&T’s wireless network.

LOSA0_11– Proposed Location

Public right-of-way near 130 Los Altos Avenue

- AT&T proposes to place Small Cell LOSA0_11 on a PG&E owned wood utility pole in the public right-of-way near 130 Los Altos Avenue in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Existing tree mature trees surrounding the proposed pole assist in masking the proposed accessory side mounted equipment for travelers heading north and south along Los Altos Avenue.

- AT&T has determined this location is viable.

LOSA0_11– Alternative Site 1

Public right-of-way near 290 Mt Hamilton Ave

- This location is a wood utility pole located in the public ROW on the south side of Mt Hamilton Avenue approx. 80’ east of Los Altos Avenue
- This pole ultimately did not meet the network objective as it does not adequately fill the network capacity gap throughout the entire coverage area
- This pole was considering more aesthetically intrusive when compared against the immediately adjacent tree foliage present at the primary proposed candidate

LOSA0_11– Alternative Site 2

Public right-of-way near 121 Los Altos Ave

- This location is a wood utility pole located in the public ROW on the east side of Los Altos Ave approx. 305’ north of Mt. Hamilton Ave
- This pole was ultimately rejected due to the height of existing pole when paired with the addition of a required pole top extension in accordance with G0-95 requirements. Pole would no longer meet FCC 50’ max requirement.

LOSA0_11– Alternative Site 3

Public right-of-way near 265 Mt Hamilton Ave

- This location is a wood utility pole located in the public ROW on the east side of Los Altos Ave approx. 38’ north of the Mt. Hamilton Ave and Los Altos Ave intersection

- This pole was ultimately rejected due to the height of existing pole when paired with the addition of a required pole top extension in accordance with G0-95 requirements. Pole would no longer meet FCC 50’ max requirement.

LOSA0_11– Alternative Site 4

Public right-of-way near 96 Los Altos Ave

- This location is a wood utility pole located in the public ROW on the west side of Los Altos Ave directly across from Mt. Hamilton Ave
- This pole was ultimately rejected as it would require replacement due to existing pole class
- This pole was considered more aesthetically intrusive when compared to primary candidate as the equipment would be more visible for drivers and pedestrians heading both north and south on Los Altos Ave
- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

LOSA0_11– Alternative Site 5

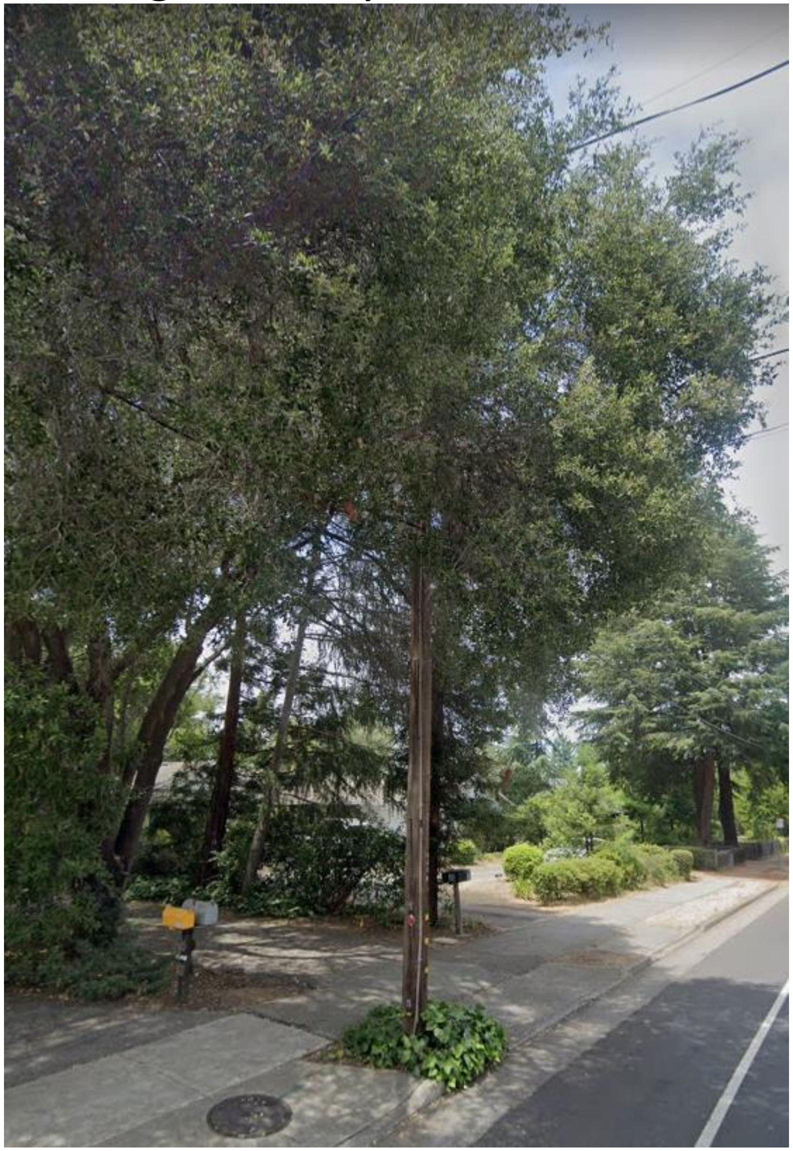
Public right-of-way near 121 Los Altos Ave

- This location is a wood utility pole located in the public ROW on the east side of Los Altos Ave approx. 138’ south of Mt. Hamilton Ave

- This pole was ultimately rejected due to the height of existing pole when paired with the addition of a required pole top extension in accordance with G0-95 requirements. Pole would no longer meet FCC 50’ max requirement.

LOSA0_11– Alternative Site 6

Public right-of-way near 90 Los Altos Ave



- This location is a wood utility pole located in the public ROW on the west side of Los Altos Ave approx. 138’ south of Mt. Hamilton Ave and Los Altos Ave intersection
- This pole was ultimately rejected as it would require replacement due to existing pole class
- This pole was considered more aesthetically intrusive when compared to primary candidate as the equipment would be more visible for drivers and pedestrians heading both north and south on Los Altos Ave
- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

LOSA0_11– Alternative Site 7

Public right-of-way near 156 Los Altos Ave

- This location is a wood utility pole located in the public ROW on the west side of Los Altos Ave approx. 300’ north of Mt. Hamilton Ave and Los Altos Ave intersection

- This pole was ultimately rejected as it the adjacent street tree would require removal in order to meet GO-95 clearances around side mounted radio and power equipment

Proposed Small Cell LOSA0_11- Conclusion

- Small Cell LOSA0_11 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_11 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_11 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

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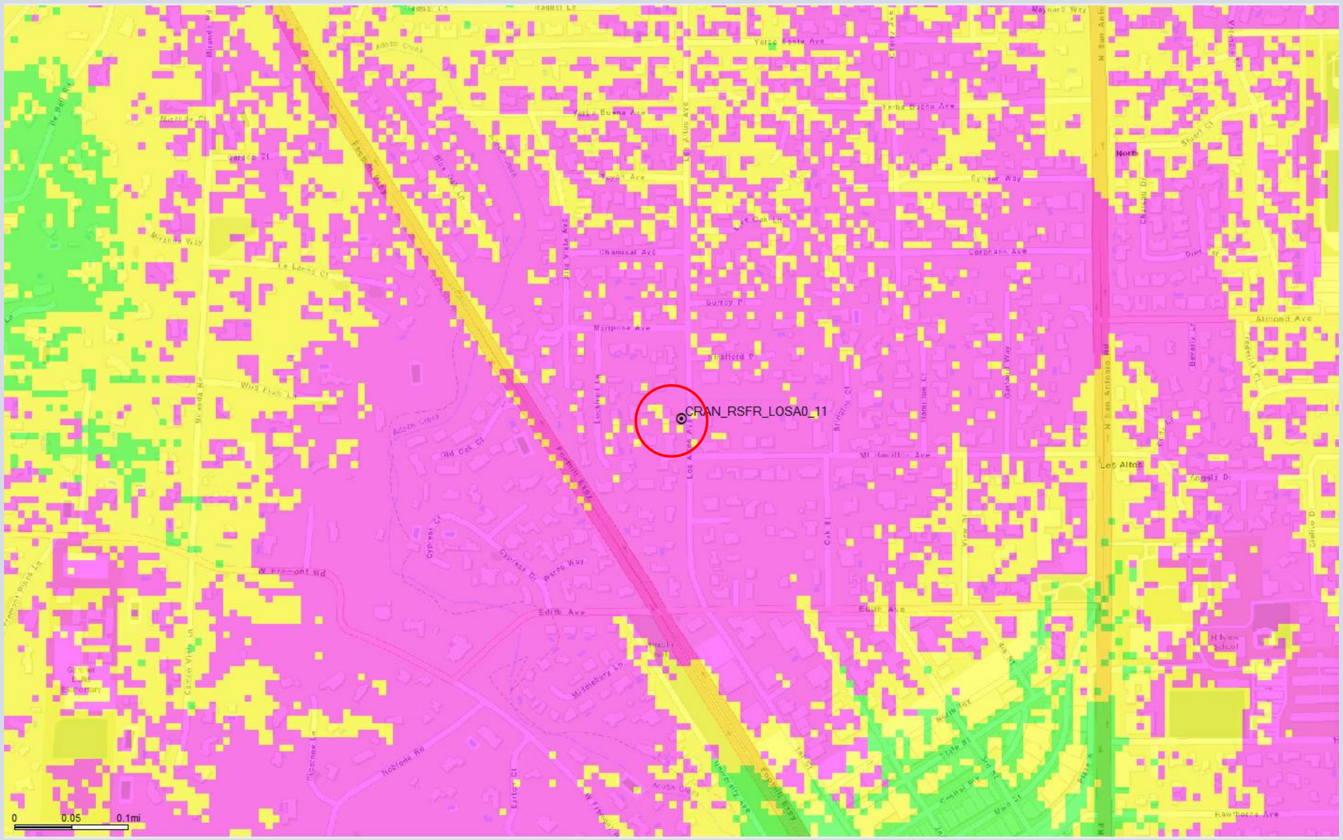


Legend

Coverage_RSRP (dBm)

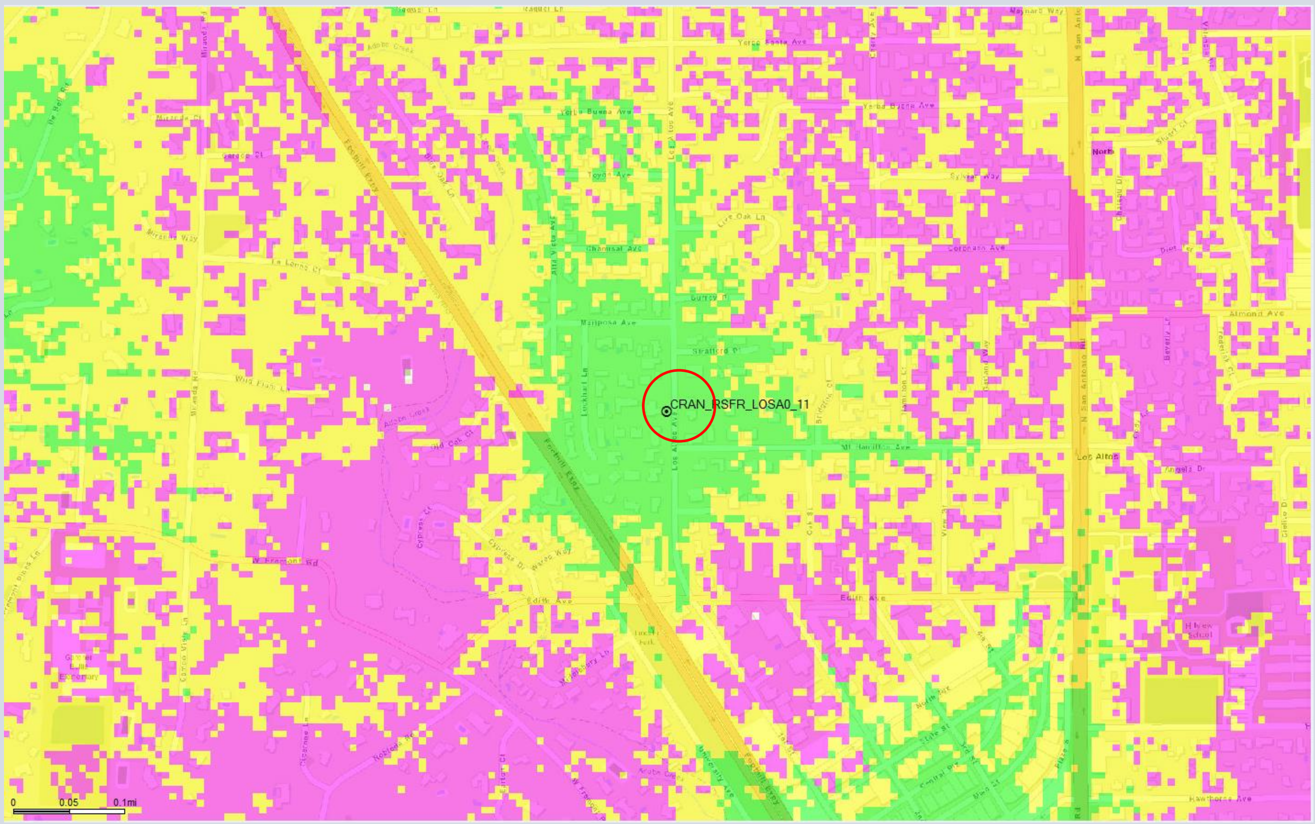
- Indoor Signal
- In-Vehicle Signal
- Outdoor Signal

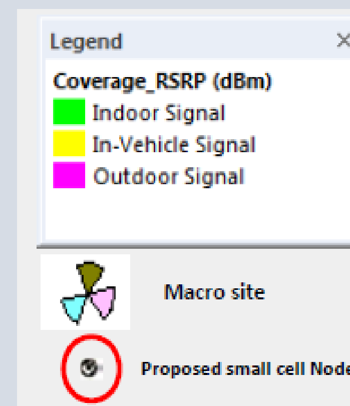
Macro site

Proposed small cell Nodes

EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_11





AT&T Mobility Radio Frequency Statement
Los Altos CA Small Cell Node 12

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The service coverage gap is caused by inadequate infrastructure in the area. AT&T currently has existing sites in the broader geographical area but as Exhibit 1 illustrates, these existing sites do not provide sufficient high-band, in building LTE service in the gap area. To meet its coverage objectives, AT&T needs to construct a new wireless communications facility. In order to provide high-band LTE service coverage in this portion of the city, AT&T needs to place its small cell node along Blue Oak Lane at Yerba Buena Avenue. Denial of this proposed facility would materially inhibit AT&Ts ability to provide and improve wireless services in this portion of the city. The proposed small cell facilities will help close gap in coverage and help address increasing data usage, voice, and other wireless services driven by smart phones and tablet usage. This node is part of an effort to fully deploy 4G LTE technology in the area. Specifically, the proposed facility will close this service gap and provide sufficient high-band 4G LTE, in building coverage for AT&T customers in the affected area. 4G LTE is capable of delivering speeds up to 10 times faster than industry – average 3G speeds. LTE technology also offers

lower latency, or the processing time it takes to move data through a network, such as how long it takes to start downloading a webpage or file once you've sent the request. Lower latency helps to improve the quality of personal wireless services. What's more, LTE uses spectrum more efficiently than other technologies, creating more space to carry data traffic and services and to deliver a better overall network experience.

The proposed node on a pole in the public rights-of-way at 356 Blue Oak Lane is needed to close the high-band LTE service coverage in an area bordered roughly by Juanita Way to the north, Miranda Road to the west, Chamisal Avenue to the south and Alta Vista Avenue to the east. This portion of Los Altos is primarily residential neighborhoods with dozens of homes.

It is important to understand that service problems can and do occur for customers even in locations where the coverage maps on AT&T's "Coverage Viewer" website appear to indicate that coverage is available. As the legend to the Coverage Viewer maps indicates, these maps display approximate coverage. Actual coverage in an area may differ from the website map graphics, and it may be affected by such things as terrain, weather, network changes, foliage, buildings, construction, high-usage periods, customer equipment, and other factors.

It is also important to note that the signal losses, slow data rates, and other service problems can and do occur for customers even at times when certain other customers in the same vicinity may not experience any problems on AT&T's network. These problems can and do occur even when certain customers' wireless phones indicate coverage bars of signal strength on the handset. The bars of signal strength that individual customers can see on their wireless phones are an imprecise and slow-to-update estimate of service quality. In other words, a customer's wireless phone can show coverage bars of signal strength, but that customer will still, at times, be unable to initiate voice calls, complete calls, or download data reliably and without service interruptions due to service quality issues.

To determine where new equipment needs to be located for the provisioning of reliable service in any area, AT&T's radio frequency engineers rely on far more complex tools and data sources than just signal strength from individual phones. AT&T uses industry standard propagation tools to identify the areas in its network where signal strength is too weak to provide reliable in-building service quality. This information is developed from many sources including terrain and clutter databases that simulate the environment, traffic maps that simulate the density of users in the environment, and propagation models that simulate signal relative to interference in the presence of terrain and clutter variation. AT&T designs and builds its wireless network to ensure customers will receive reliable in-building service quality and

data rates sufficient to stream video and complete calls. In-building service is critical as customers increasingly use their mobile phones as their primary communication devices (more than 72% of American households rely primarily or exclusively on wireless telecommunications) and rely on their mobile phones to do more (E911, video streaming, GPS, web access, text, etc.). In fact, the FCC estimates that 70% of 911 calls are placed by people using wireless phones. And with AT&T's selection by FirstNet as the wireless service provider to build and manage the nationwide first responder wireless network, each new facility will help strengthen first responder communications.

Exhibit 1 is a map of the existing high -band LTE service coverage (without the proposed small cell node). It includes high-band LTE service coverage provided by other existing AT&T sites. The green shaded areas of the map depict acceptable in-building coverage. In-building coverage means customers are able to place or receive a call on the ground floor of a building. The yellow shaded areas depict areas within a signal strength range that provide acceptable in-vehicle service coverage. In these areas, an AT&T customer should be able to successfully place or receive a call within a vehicle. The lavender shading depicts areas within a signal strength range in which a customer might have difficulty receiving a consistently acceptable level of service. The quality of service experienced by any individual customer can differ greatly depending on whether that customer is indoors, outdoors, stationary, or in transit. Any area in yellow or lavender category is considered inadequate service coverage and constitutes a service coverage gap.

Exhibit 2 to this statement is a map that predicts high-band LTE service coverage based on signal strength in the vicinity if the proposed small cell node is constructed as proposed. As shown by this map, constructing the proposed small cell node here closes this significant service coverage gap.

My conclusions are based on my knowledge of the proposed small cell locations and with AT&T's wireless network in the surrounding area. I have a B.Sc. Hons. degree in Micro-Electronic System Design from University of Ulster, UK, am a Chartered Engineer, and have worked as an engineering expert in the wireless communications industry for more than 33 years.

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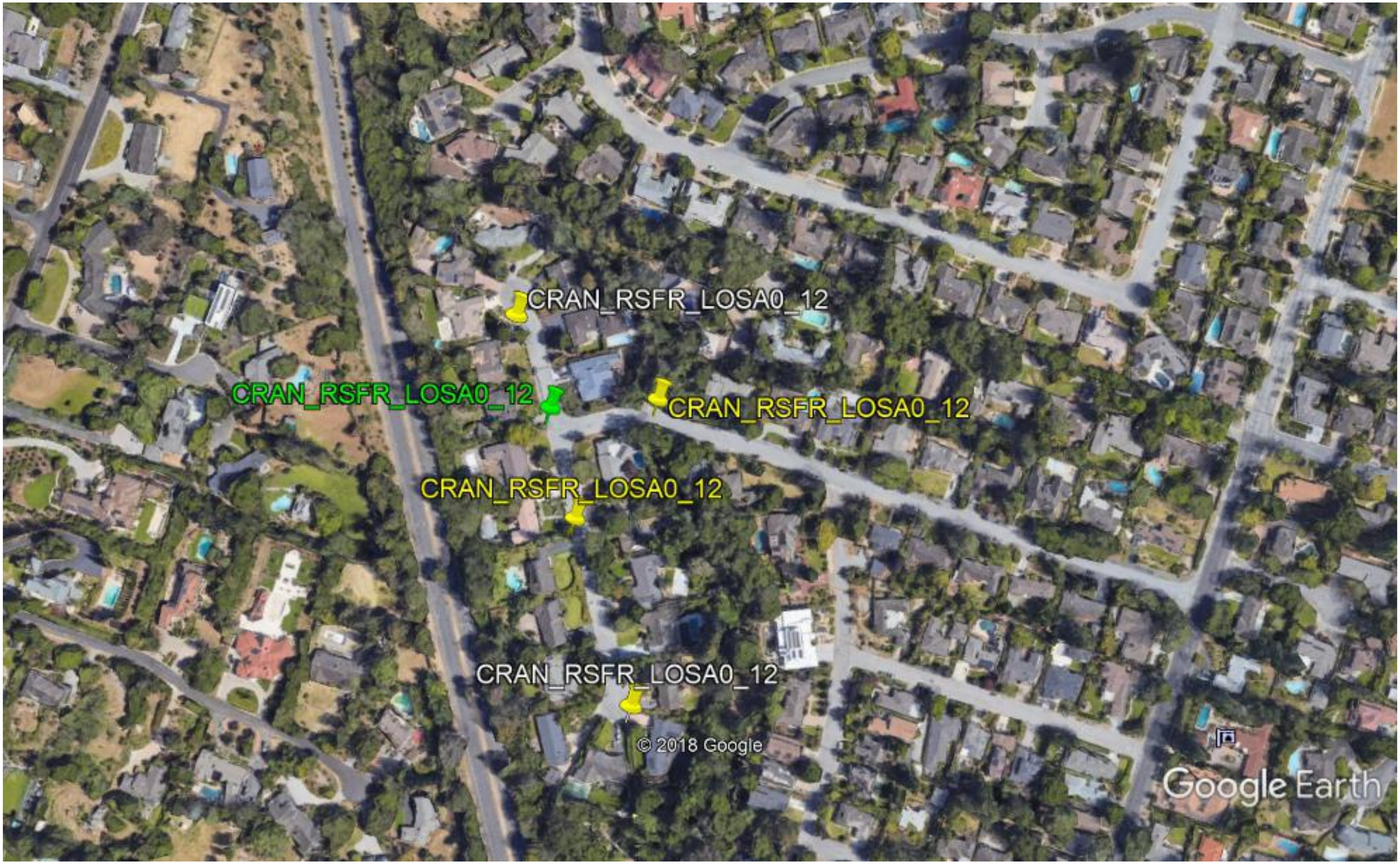
October 23, 2019

Rethink Possible®

AT&T Small Cell
Site ID: LOSA0_12
Public Right-of-Way near 356 Blue Oak Lane
Alternative Sites Analysis

Map of Small Cell Node LOSA0_12 and Alternative Sites



Proposed Small Cell – LOSA0_12

- AT&T is committed to providing and improving wireless telecommunications services and faster data rates throughout the City of Los Altos.
- Rather than construct traditional macro facilities, AT&T is choosing to deploy very small facilities, called "small cells," that can be installed on utility infrastructure in the public right-of-way.
- A small cell is a low-powered cell site, which, when grouped with other small cells, can provide coverage in areas where traditional macro wireless facilities are discouraged.
- Small cells are effective tools to provide and improve critical wireless services with a minimal impact. By placing small cells in areas where AT&T's existing facilities are constrained and where AT&T experiences high network traffic, AT&T can address existing and forecasted demands.
- Node LOSA0_12 will improve signal quality and capacity within AT&T's wireless network.

LOSA0_12– Proposed Location

Public right-of-way near 356 Blue Oak Lan

- AT&T proposes to place Small Cell LOSA0_12 on a PG&E owned wood utility pole in the public right-of-way near 356 Blue Oak Lane in the City of Los Altos. The pole is a preferred location as it meets network objective requirements.

- The proposed facility is a stealth installation designed to minimize visual impact by blending in with the existing wood utility pole. Antenna is cannister design to match the existing pole profile

- Existing tree mature trees in the foreground of the proposed pole assist in preventing to skyline the proposed accessory side mounted equipment for travelers heading north and south along Blue Oak Lane and travelers heading west on Yerba Buena Ave

- AT&T has determined this location is viable.

LOSA0_12– Alternative Site 1

Public right-of-way near 445 Yerba Buena Ave

- This location is a wood utility pole located in the public ROW on the north side of Yerba Buena Ave approx. 161’ east of Blue Oak Lane
- This pole was ultimately rejected as pole replacement is required due to existing pole class per G0-95 requirements. In addition, given proximity to the drainage culvert make a pole replacement unfavorable at this location
- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

LOSA0_12– Alternative Site 2

Public right-of-way near 333 Blue Oak Ln

- This location is a wood utility pole located in the public ROW on the west side Blue Oak Lane approx. 173’ south of Yerba Buena Ave
- This site would require significant tree trimming to the south of the adjacent tree in order to allow adequate space to install side mounted radio and power equipment as well as conduit for ground and communication lines. Due to extensive trimming on the south, moderate trimming would be required on the north side to offset the weight imbalance. As such this site was rejected when compared to the proposed site which requires significantly less trimming to existing street trees

LOSA0_12– Alternative Site 3

Public right-of-way near 301 Blue Oak Ln

- This location is a wood utility pole located in the public ROW at the south end of Blue Oak Ln approx. 532’ south of Yerba Buena Ave
- This pole was ultimately rejected as pole replacement is required due to existing pole class per G0-95 requirements. In addition, given proximity to the drainage culvert make a pole replacement unfavorable at this location
- Requiring AT&T to use this alternative would materially inhibit its ability to provide and improve wireless services

LOSA0_12– Alternative Site 4

Public right-of-way near 301 Blue Oak Ln

- This location is a wood utility pole located in the public ROW on the west side of Blue Oak Ln approx. 181’ north of Yerba Buena Ave
- This pole was considered no less intrusive than the proposed site location

Proposed Small Cell LOSA0_12- Conclusion

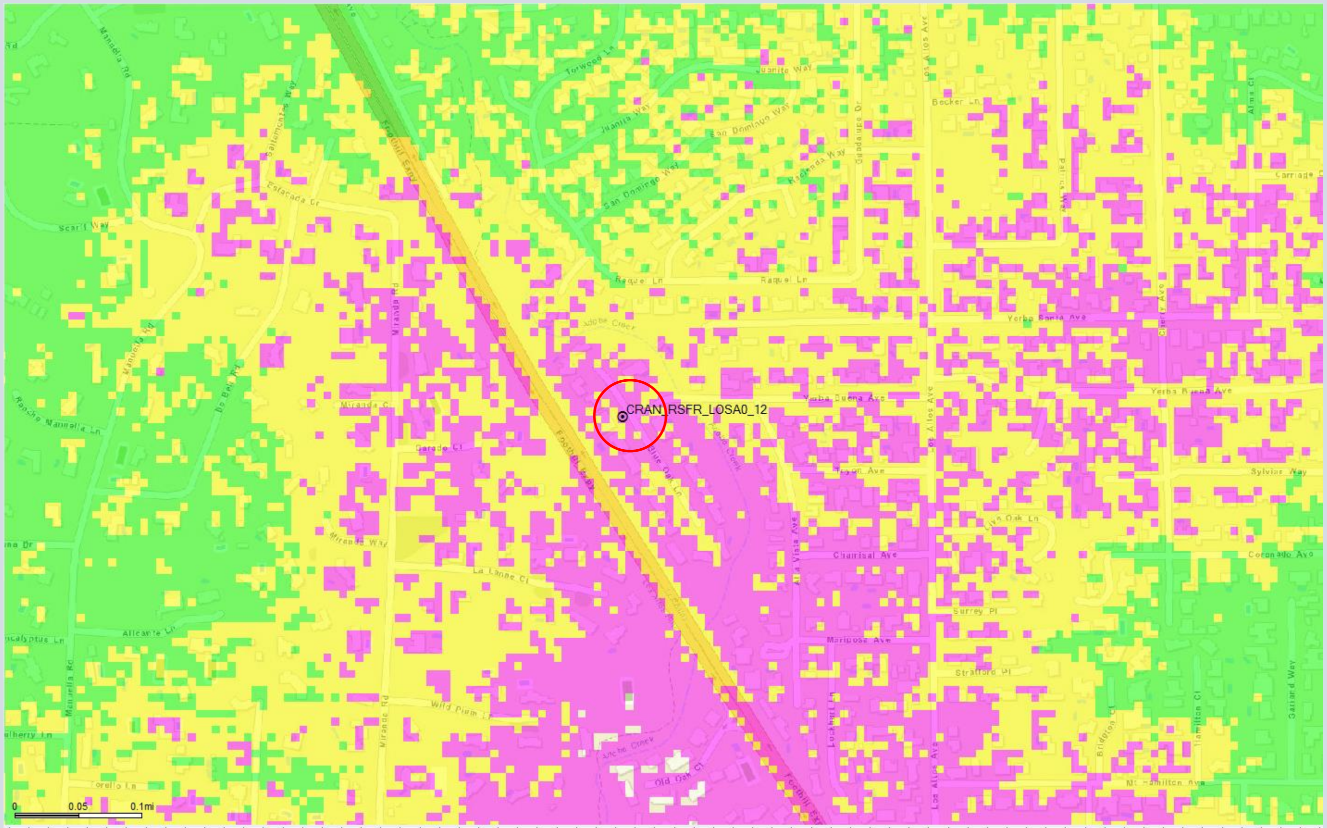
- Small Cell LOSA0_12 is an integral part of an overall small cell solution to help close AT&T significant service coverage gap in this portion of City of Los Altos.

- Small Cell LOSA0_12 will provide wireless telecommunications services and faster data rates to the area residents and local businesses.

- Small Cell LOSA0_12 is the best available means to help AT&T provide and improve critical wireless services in the surrounding areas, adding low-power, low-profile equipment to utility infrastructure in the public right-of-way.

EXHIBIT 1

LTE 1900 Coverage without Small Cell LOSA0_12



Legend

Coverage_RSRP (dBm)

- Indoor Signal
- In-Vehicle Signal
- Outdoor Signal

Macro site

Proposed small cell Nodes

EXHIBIT 2

LTE 1900 Coverage with Small Cell LOSA0_12