Staff Report to the Zoning Administrator

Application Number: 131089

Applicant: Sharon James, Crown Castle Inc. (for Verizon)
Owners: William and Theresa Bray
APN: 105-281-21

Agenda Date: December 6, 2013
Agenda Item #: 4
Time: After 9:00 a.m.

Project Description: Proposal to install a microcell wireless communication facility on an existing 36-foot tall utility pole, including a cylindrical approximately 24-inch tall and 12-inch diameter "omni" or multi-directional antenna (for a total proposed height of 38-feet, 3-inches), and related pole-mounted equipment, on a parcel in the Residential Agriculture (RA) zone district, as part of a 13 microcell site distributed antenna system (DAS) in the Freedom Boulevard/Day Valley Road portion of the Aptos Hills.

Location: The pole upon which the microcell node with antennas will be installed (location ID #FB12) is located on APN 105-281-21 on the north side of Day Valley Rd. (945 Day Valley Rd.).

Supervisorial District: 2nd District (District Supervisor: Zach Friend)

Permits Required: Requires a Commercial Development Permit

Technical Reviews: N/A

Staff Recommendation:

- Certification that the proposal is exempt from further Environmental Review under the California Environmental Quality Act.
- Approval of Application **131089**, based on the attached findings and conditions.

Exhibits

A. Categorical Exemption (CEQA determination)
B. Findings
C. Conditions
D. Project plans
E. Assessor's, Location, Zoning and General Plan Maps
F. Photo-Simulations
G. RF Report

County of Santa Cruz Planning Department
701 Ocean Street, 4th Floor, Santa Cruz CA 95060

Parcel Information

Parcel Size:	24,975 sq. ft.
Existing Land Use - Parcel:	Single Family Dwelling
Existing Land Use - Surrounding:	Cox Rd. and Day Valley Rd. roadways, and single family residential uses on adjacent and nearby parcels
Project Access:	Take Freedom Blvd. from Hwy 1 to left on McDonald Rd., to right on Day Valley Rd., to just past (east of) intersection with Cox Rd. at 945 Day Valley Rd. Subject utility pole is located on north side of Day Valley Rd.
Planning Area:	Aptos Hills
Land Use Designation:	R-S (Suburban Residential)
Zone District:	RA (Residential Agriculture)
Coastal Zone:	__ Inside X Outside
Appealable to Calif. Coastal Comm.	__ Yes X No

Environmental Information

Geologic Hazards:	Not mapped/no physical evidence on site
Soils:	N/A
Fire Hazard:	Not a mapped constraint
Slopes:	N/A
Env. Sen. Habitat:	Not mapped/no physical evidence on site
Grading:	No grading proposed
Tree Removal:	No trees proposed to be removed
Scenic:	Not a mapped resource
Drainage:	Existing drainage adequate
Archeology:	Not mapped/no physical evidence on site

Services Information

Urban/Rural Services Line:	__ Inside X Outside
Water Supply:	N/A
Sewage Disposal:	N/A
Fire District:	Aptos/La Selva FPD
Drainage District:	N/A

History

There have not been other development applications proposed for this particular utility pole in the past.

Project Setting

The subject utility pole is located on the north side of Day Valley Road, next to the shoulder, on APN 105-281-21 (945 Day Valley Rd.), a parcel that is zoned RA (Residential Agricultural). All adjacent/nearby parcels are also zoned RA or A (Agricultural). All the adjacent parcels contain

single family residences and/or outbuildings.

Zoning & General Plan Consistency

The subject parcels are located in the RA (Residential Agricultural) zone district, a designation in which Wireless Communications Facilities (WCFs) are "discouraged" but still allowed in the County's WCF Ordinance if they are "collocated" (i.e., antennas of multiple service providers on a single pole or roof) on an existing WCF tower or structure. Utility pole mounted microcells are also considered to be a type of collocation in the WCF Ordinance. Since the proposed WCF is a utility pole mounted microcell as part of a Distributed Antenna System (DAS), it is therefore allowed in the RA zone district. The proposed DAS node/microcell WCF is an allowed use within the zone district, and the zoning is consistent with the site's (R-S) Suburban Residential General Plan designation.

Design Review

The proposed DAS node/microcell complies with the requirements of the County Design Review Ordinance, in that the proposed project will be part of existing utility poles, increasing the height of one and adding equipment boxes to the other, but still being relatively visually inconspicuous, and thus will have minimal visual impact on surrounding land uses and the natural landscape.

Radio Frequency Emissions

The County is prohibited by federal law from denying WCF applications, such as this one, on the basis of the health and/or environmental effects of radio frequency (RF) radiation so long as the WCF complies with the FCC's RF radiation emission limits. A RF radiation emissions calculation report has been prepared for this project by a qualified consulting engineer. The proposed facility is calculated to result in a maximum ambient RF level of no more than 1.3% of the applicable FCC public exposure limit at ground level, and less than 5% of that limit at the second floor level of the nearest 2-story structure. As per the County Code Section 13.10.664(B)(2), the applicant shall be required to submit an RF radiation monitoring report within 90-days of facility start-up, to verify the actual RF emission levels, and that the facility does not exceed the FCC limit, during peak-hour operations.

Environmental Review

Staff has determined that the proposed project is Categorically Exempt from the requirements of the California Environmental Quality Act (CEQA) because it qualifies as "New Construction or Conversion of a Small Structure" (Class 3, Section 15303). The CEQA Categorical Exemption form is attached as Exhibit A.

Conclusion

As proposed and conditioned, the project is consistent with all applicable codes and policies of the Zoning Ordinance and General Plan/LCP. Please see Exhibit "B" ("Findings") for a complete listing of findings and evidence related to the above discussion.

Staff Recommendation

- Certification that the proposal is exempt from further Environmental Review under the California Environmental Quality Act.

- **APPROVAL** of Application Number **131089**, based on the attached findings and conditions.

Supplementary reports and information referred to in this report are on file and available for viewing at the Santa Cruz County Planning Department, and are hereby made a part of the administrative record for the proposed project.

The County Code and General Plan, as well as hearing agendas and additional information are available online at: www.co.santa-cruz.ca.us

Report Prepared By: Frank Barron, AICP
Santa Cruz County Planning Department
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Santa Cruz CA 95060
Phone Number: (831) 454-2530
E-mail: frank.barron@co.santa-cruz.ca.us

CALIFORNIA ENVIRONMENTAL QUALITY ACT
NOTICE OF EXEMPTION

The Santa Cruz County Planning Department has reviewed the project described below and has determined that it is exempt from the provisions of CEQA as specified in Sections 15061 - 15332 of CEQA for the reason(s) which have been specified in this document.

Application Number: 131089
Assessor Parcel Number: 105-281-21
Project Location: 945 Day Valley Rd., Aptos, CA
Project Description: Proposal to install a microcell wireless communication facility (location ID# FB12) on an existing 36-foot tall utility pole, including a cylindrical approximately 24-inch tall and 12-inch diameter "omni" or multi-directional antenna (for a total proposed height of 38-feet, 3-inches), and related pole-mounted equipment, as part of a 13 microcell site distributed antenna system (DAS) in the Freedom Boulevard/Day Valley Road portion of the Aptos Hills.

Person or Agency Proposing Project: Sharon James, Crown Castle LLC

Contact Phone Number: (408) 468-5553

A. _____ The proposed activity is not a project under CEQA Guidelines Section 15378.
B. _____ The proposed activity is not subject to CEQA as specified under CEQA Guidelines Section 15060 (c).
C. _____ **Ministerial Project** involving only the use of fixed standards or objective measurements without personal judgment.
D. _____ **Statutory Exemption** other than a Ministerial Project (CEQA Guidelines Section 15260 to 15285).
Specify type:

E. __X__ **Categorical Exemption**

Specify type: 3 - New Construction or Conversion of Small Structure (Section 15303)

F. Reasons why the project is exempt:

Construction of a microcell wireless communication facility on an existing utility pole is not anticipated to generate any environmental impacts.

In addition, none of the conditions described in Section 15300.2 apply to this project.

_____ Date:_____
Frank Barron, Project Planner

EXHIBIT A

Development Permit Findings

1. That the proposed location of the project and the conditions under which it would be operated or maintained will not be detrimental to the health, safety, or welfare of persons residing or working in the neighborhood or the general public, and will not result in inefficient or wasteful use of energy, and will not be materially injurious to properties or improvements in the vicinity.

This finding can be made, in that the project is located in an area designated for Wireless Communication Facility, including DAS node/microcell, uses and is not encumbered by physical constraints to development. Construction will comply with prevailing building technology, the California Building Code, and the County Building ordinance to insure the optimum in safety and the conservation of energy and resources. The proposed DAS node/microcell will not deprive adjacent properties or the neighborhood of light, air, or open space, in that the structure meets all current setbacks that ensure access to these amenities.

2. That the proposed location of the project and the conditions under which it would be operated or maintained will be consistent with all pertinent County ordinances and the purpose of the zone district in which the site is located.

This finding can be made, in that the proposed location of the DAS node/microcell and the conditions under which it would be operated or maintained will be consistent with all pertinent County ordinances and the purpose of the RA (Residential Agricultural) zone district as the proposed DAS node/microcell is a permitted use in the zone district.

3. That the proposed use is consistent with all elements of the County General Plan and with any specific plan which has been adopted for the area.

This finding can be made, in that the proposed DAS node/microcell use is consistent with the use and density requirements specified for the Suburban Residential (R-S) land use designation in the County General Plan.

The proposed DAS node/microcell will not adversely impact the light, solar opportunities, air, and/or open space available to other structures or properties, and meets all current site and development standards for the zone district, in that the DAS node/microcell will not adversely shade adjacent properties, and will meet current setbacks for the zone district.

The proposed DAS node/microcell will be properly proportioned to the utility pole and will fit in with the character of the neighborhood. The proposed DAS node/microcell will result in a structure consistent with a design that could be approved on any similar utility pole in the vicinity.

4. That the proposed use will not overload utilities and will not generate more than the acceptable level of traffic on the streets in the vicinity.

This finding can be made, in that the proposed DAS node/microcell is to be constructed on

existing utility poles, and will not overload the poles structurally, nor will it overload the electric capacity of PG&E's network. Nor will it overload the land line telephone network, as the proposed DAS will be connected to a newly installed high capacity fiber optic overhead cable network. There will be no additional traffic generated by the proposed project.

5. That the proposed project will complement and harmonize with the existing and proposed land uses in the vicinity and will be compatible with the physical design aspects, land use intensities, and dwelling unit densities of the neighborhood.

This finding can be made, in that the proposed structure is located in a mixed neighborhood containing a variety of architectural styles, and the proposed DAS node/microcell is not inconsistent with the land use intensity and density of the neighborhood.

6. The proposed development project is consistent with the Design Standards and Guidelines (sections 13.11.070 through 13.11.076), and any other applicable requirements of this chapter.

This finding can be made, in that the proposed DAS node/microcell will be of an appropriate scale and type of design that will not diminish the aesthetic qualities of the surrounding properties and will not reduce or visually impact available open space in the surrounding area.

EXHIBIT B

Wireless Communication Facility Use Permit Findings

1. The development of the proposed wireless communications facility (WCF) as conditioned will not significantly affect any designated visual resources, environmentally sensitive habitat resources (as defined in the Santa Cruz County General Plan/LCP Sections 5.1, 5.10, and 8.6.6.), and/or other significant County resources, including agricultural, open space, and community character resources; or there are no other environmentally equivalent and/or superior and technically feasible alternatives to the proposed wireless communications facility as conditioned (including alternative locations and/or designs) with less visual and/or other resource impacts and the proposed facility has been modified by condition and/or project design to minimize and mitigate its visual and other resource impacts.

This finding can be made, in that the proposed WCF is of the microcell type which, due to its small size and co-location onto a utility pole, is the least visually obtrusive type of WCF. Moreover, its installation and use next to a road right-of-way will not impact any sensitive habitat resources or other significant County resources, including agricultural, open space, and community character resources. Finally, there are no other environmentally equivalent and/or superior and technically feasible alternatives to the proposed microcell designs that have less visual and/or other resource impacts.

2. The site is adequate for the development of the proposed wireless communications facility and, for sites located in one of the prohibited and/or restricted areas set forth in Sections 13.10.661(B) and 13.10.661 (C), that the applicant has demonstrated that there are not environmentally equivalent or superior and technically feasible: (1) alternative sites outside the prohibited and restricted areas; and/or (2) alternative designs for the proposed facility as conditioned.

This finding can be made, in that the proposed DAS node/microcell is to consist of an antenna and equipment mounted upon a utility pole along a roadway, an area where numerous utility poles are already located, even though the proposed site is within a "restricted area" as set forth in County Code Section 13.10.661(C), it is allowed as microcells are considered to be a type of co-located facility for this purpose. Microcell WCF installations mounted upon utility poles, such as these, are encouraged in the WCF Ordinance as the preferred WCF design, due to their relatively inconspicuous nature.

3. The subject property upon which the wireless communications facility is to be built is in compliance with all rules and regulations pertaining to zoning uses, subdivisions and any other applicable provisions of this title (County Code 13.10.660) and that all zoning violation abatement costs, if any, have been paid.

This finding can be made, in that the existing infrastructure uses of the subject parcels are in compliance with the requirements of the zone districts and General Plan designations, in which they are located, and that there are no outstanding or unpaid zoning violation abatement costs.

EXHIBIT B

4. The proposed wireless communication facility as conditioned will not create a hazard for aircraft in flight.

This finding can be made, in that the proposed microcell antenna will be placed upon a 36-foot tall utility pole, the top of which is at a height too low to interfere with the observed height of aircraft from nearby airports.

5. The proposed wireless communication facility as conditioned is in compliance with all FCC and California PUC standards and requirements.

This finding can be made, in that the maximum ambient RF levels at ground level due to the proposed WCF operations are calculated to be no more than 1.3% of the most restrictive applicable (i.e., FCC) limit, and less than 5% of that limit at the nearest second story level.

Conditions of Approval

Exhibit D: Project Plans, 5 sheets, prepared by HP Communications, Inc., dated 6/14/13

I. This permit authorizes the construction of a microcell wireless communication facility on an existing 36-foot tall utility pole, including a cylindrical approximately 24-inch tall and 12-inch diameter "omni" or multi-directional antenna (for a total proposed height of 38-feet, 3-inches), and related pole-mounted equipment, as part of a 13 microcell site distributed antenna system (DAS) in the Freedom Boulevard/Day Valley Road portion of the Aptos Hills. This approval does not confer legal status on any existing structure(s) or existing use(s) on the subject site that are not specifically authorized by this permit. Prior to exercising any rights granted by this permit including, without limitation, any construction or site disturbance, the applicant/owner shall:

A. Sign, date, and return to the Planning Department one copy of the approval to indicate acceptance and agreement with the conditions thereof.

B. Obtain a Building Permit from the Santa Cruz County Building Official.

Any outstanding balance due to the Planning Department must be paid prior to making a Building Permit application. Applications for Building Permits will not be accepted or processed while there is an outstanding balance due.

C. Obtain an Encroachment Permit from the Department of Public Works for all work performed in the County road right-of-way.

D. Submit proof that these conditions have been recorded in the official records of the County of Santa Cruz (Office of the County Recorder) within 30 days from the effective date of this permit.

II. Prior to issuance of a Building Permit the applicant/owner shall:

A. Submit final architectural plans for review and approval by the Planning Department. The final plans shall be in substantial compliance with the plans marked Exhibit "D" on file with the Planning Department. Any changes from the approved Exhibit "D" for this development permit on the plans submitted for the Building Permit must be clearly called out and labeled by standard architectural methods to indicate such changes. Any changes that are not properly called out and labeled will not be authorized by any Building Permit that is issued for the proposed development. The final plans shall include the following additional information:

1. One elevation shall indicate materials and colors as they were approved by this Discretionary Application. If specific materials and colors have not been approved with this Discretionary Application, in addition to showing

EXHIBIT C

the materials and colors on the elevation, the applicant shall supply a color and material board in 8 1/2" x 11" format for Planning Department review and approval.

2. Details showing compliance with any fire department requirements, as applicable.

B. Submit four copies of the approved Discretionary Permit with the Conditions of Approval attached. The Conditions of Approval shall be recorded prior to submittal, if applicable.

C. Meet all requirements and pay any applicable plan check fee of the Aptos/La Selva Beach Fire Protection District.

III. All construction shall be performed according to the approved plans for the Building Permit. Prior to final building inspection, the applicant/owner must meet the following conditions:

A. All site improvements shown on the final approved Building Permit plans shall be installed.

B. All inspections required by the building permit shall be completed to the satisfaction of the County Building Official.

C. Pursuant to Sections 16.40.040 and 16.42.080 of the County Code, if at any time during site preparation, excavation, or other ground disturbance associated with this development, any artifact or other evidence of an historic archaeological resource or a Native American cultural site is discovered, the responsible persons shall immediately cease and desist from all further site excavation and notify the Sheriff-Coroner if the discovery contains human remains, or the Planning Director if the discovery contains no human remains. The procedures established in Sections 16.40.040 and 16.42.080, shall be observed.

IV. Operational Conditions

A. In the event that future County inspections of the subject property disclose noncompliance with any Conditions of this approval or any violation of the County Code, the owner shall pay to the County the full cost of such County inspections, including any follow-up inspections and/or necessary enforcement actions, up to and including permit revocation.

B. The wireless communication facility may not be connected to a power source or operated until a final inspection and clearance from the Santa Cruz County Planning Department has been received.

C. The use of temporary generators to power the wireless communication facility is

not allowed.

D. The exterior finish and materials of the wireless communication facility must be maintained on an annual basis to continue to blend with the existing trees and utilities infrastructure. Additional paint and/or replacement materials shall be installed as necessary to blend the wireless communication facility with the existing trees and utilities infrastructure to maintain visual appearance as approved.

E. The operator of the wireless communication facility must submit within 90 days of commencement of normal operations (or within 90 days of any major modification of power output of the facility) a written report to the Santa Cruz County Planning Department, and all interested parties who attended the public hearing, documenting the measurements and findings with respect to compliance with the established Federal Communications Commission (FCC) Non-Ionizing Electromagnetic Radiation (NEIR) exposure standard. The wireless communication facility must remain in continued compliance with the NEIR standard established by the FCC at all times. Failure to submit required reports or to remain in continued compliance with the NEIR standard established by the FCC will be a violation of the terms of this permit.

F. If, in the future, the pole based utilities are relocated underground at this location, the operator of the wireless communication facility must abandon the facility and be responsible for the removal of all permanent structures and the restoration of the site as needed to re-establish the area consistent with the character of the surrounding natural landscape.

G. If, as a result of future scientific studies and alterations of industry-wide standards resulting from those studies, substantial evidence is presented to Santa Cruz County that radio frequency transmissions may pose a hazard to human health and/or safety, the Santa Cruz County Planning Department shall set a public hearing and in its sole discretion, may revoke or modify the conditions of this permit.

H. If future technological advances would allow for reduced visual impacts resulting from the proposed telecommunication facility, the operator of the wireless communication facility must make those modifications which would allow for reduced visual impact of the proposed facility as part of the normal replacement schedule. If, in the future, the facility is no longer needed, the operator of the wireless communication facility must abandon the facility and be responsible for the removal of all permanent structures and the restoration of the site as needed to re-establish the area consistent with the character of the surrounding natural landscape.

I. Any modification in the type of equipment shall be reviewed and acted on by the Planning Department staff. The County may deny the modification or amend the

approved conditions at that time, or the Planning Director may refer it for public hearing before the Zoning Administrator.

J. Transfer of Ownership: In the event that the original permittee sells its interest in the permitted wireless communications facility, the succeeding carrier shall assume all responsibilities concerning the project and shall be held responsible to the County for maintaining consistency with all project conditions of approval, including proof of liability insurance. Within 30-days of a transfer of ownership, the succeeding carrier shall provide a new contact name to the Planning Department.

K. In the event that future County inspections of the subject property disclose noncompliance with any Conditions of this approval or any violation of the County Code, the owner shall pay to the County the full cost of such County inspections, including any follow-up inspections and/or necessary enforcement actions, up to and including permit revocation.

V. As a condition of this development approval, the holder of this development approval ("Development Approval Holder"), is required to defend, indemnify, and hold harmless the COUNTY, its officers, employees, and agents, from and against any claim (including attorneys' fees), against the COUNTY, it officers, employees, and agents to attack, set aside, void, or annul this development approval of the COUNTY or any subsequent amendment of this development approval which is requested by the Development Approval Holder.

A. COUNTY shall promptly notify the Development Approval Holder of any claim, action, or proceeding against which the COUNTY seeks to be defended, indemnified, or held harmless. COUNTY shall cooperate fully in such defense. If COUNTY fails to notify the Development Approval Holder within sixty (60) days of any such claim, action, or proceeding, or fails to cooperate fully in the defense thereof, the Development Approval Holder shall not thereafter be responsible to defend, indemnify, or hold harmless the COUNTY if such failure to notify or cooperate was significantly prejudicial to the Development Approval Holder.

B. Nothing contained herein shall prohibit the COUNTY from participating in the defense of any claim, action, or proceeding if both of the following occur:

1. COUNTY bears its own attorney's fees and costs; and

2. COUNTY defends the action in good faith.

C. Settlement. The Development Approval Holder shall not be required to pay or perform any settlement unless such Development Approval Holder has approved the settlement. When representing the County, the Development Approval Holder shall not enter into any stipulation or settlement modifying or affecting the interpretation or validity of any of the terms or conditions of the development

EXHIBIT C

approval without the prior written consent of the County.

D. Successors Bound. "Development Approval Holder" shall include the applicant and the successor'(s) in interest, transferee(s), and assign(s) of the applicant.

Minor variations to this permit which do not affect the overall concept or density may be approved by the Planning Director at the request of the applicant or staff in accordance with Chapter 18.10 of the County Code.

Please note: This permit expires three years from the effective date listed below unless a building permit (or permits) is obtained for the primary structure described in the development permit (does not include demolition, temporary power pole or other site preparation permits, or accessory structures unless these are the primary subject of the development permit). Failure to exercise the building permit and to complete all of the construction under the building permit, resulting in the expiration of the building permit, will void the development permit, unless there are special circumstances as determined by the Planning Director.

Approval Date: _____

Effective Date: _____

Expiration Date: _____

Wanda Williams Deputy Zoning Administrator	Frank Barron, AICP Project Planner

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Appeals: Any property owner, or other person aggrieved, or any other person whose interests are adversely affected by any act or determination of the Zoning Administrator, may appeal the act or determination to the Planning Commission in accordance with chapter 18.10 of the Santa Cruz County Code.

EXHIBIT C

NOTE

CROWN

FREEDOM
NODE VRZ_FB12
961 DAY VALLEY RD, APTOS, CA 95003

Call Before you Dig!

811

Know what's below.
Call before you dig.
Call 811 Before you Dig!

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 THE AREAS GOVERNING CODES

1. STATE ADMINISTRATIVE CODE
2. STATE BUILDING CODE
3. ANSI/TIA-222-F LIFE SAFETY CODE NFPA-101-1980
4. STATE MECHANICAL CODE
5. STATE PLUMBING CODE
6. STATE ELECTRIC CODE
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

CODE COMPLIANCE

PROPERTY INFORMATION

CUSTOMER	CROWN CASTLE
PROJECT	FREEDOM BLVD
NODE	VRZ_FB12
LATITUDE	36.993887
LONGITUDE	-121.854406
STREET ADDRESS	961 DAY VALLEY RD
CITY, STATE	APTOS, CA 95003
POLE# / TYPE	POLE # N/A / WOOD POLE
RAD CENTER / ANTENNA HEIGHT	31'-7" TO RAD CENTER 32'-7" ANTENNA HEIGHT
ANTENNA TYPE	KATHREIN SCALA - 84010510
AZIMUTH FOR ANTENNA	N/A
POWER TO POLE	(N) LOW VOLTAGE
POLE ACCESS	STREET SIDE
POLE LOCATION & DESCRIPTION	APPROX. 114' EAST C/O OF COX RD & DAY VALLEY RD

PROJECT SUMMARY

VICINITY MAP

SHEET	DESCRIPTION	REV.
1	TITLE SHEET	0
2	SITE PLAN	0
3	UTILITY POLE EQUIPMENT PROFILES	0
4	UTILITY POLE EQUIPMENT TYPICALS	0
5	UTILITY POLE POWERING	0
6	SITE SURVEY	0

SHEET INDEX

THE PROJECT CONSISTS OF THE INSTALLATION AND OPERATION OF WIRELESS EQUIPMENT AND ANTENNAS FOR CROWN CASTLE ON EXISTING WOOD UTILITY POLES

PROJECT DESCRIPTION

INSTALL NEW WIRELESS EQUIPMENT AND ANTENNAS AND ALL ASSOCIATED BRACKETS IN ACCORDANCE TO CONSTRUCTION SPECIFICATIONS, REARRANGE ANY EXISTING FACILITIES IN ACCORDANCE TO GOVERNING CONSTRUCTION GUIDELINES

PROJECT SCOPE

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME

GENERAL CONTRACTOR NOTES

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
NODE VRZ_FB12
961 DAY VALLEY RD.
APTOS, CA 95003

CURRENT ISSUE DATE: 12/13/2012

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC.
13341 Temescal Cyn. Rd
Corona, CA. 92883
PHONE: (951) 47[illegible]-1818

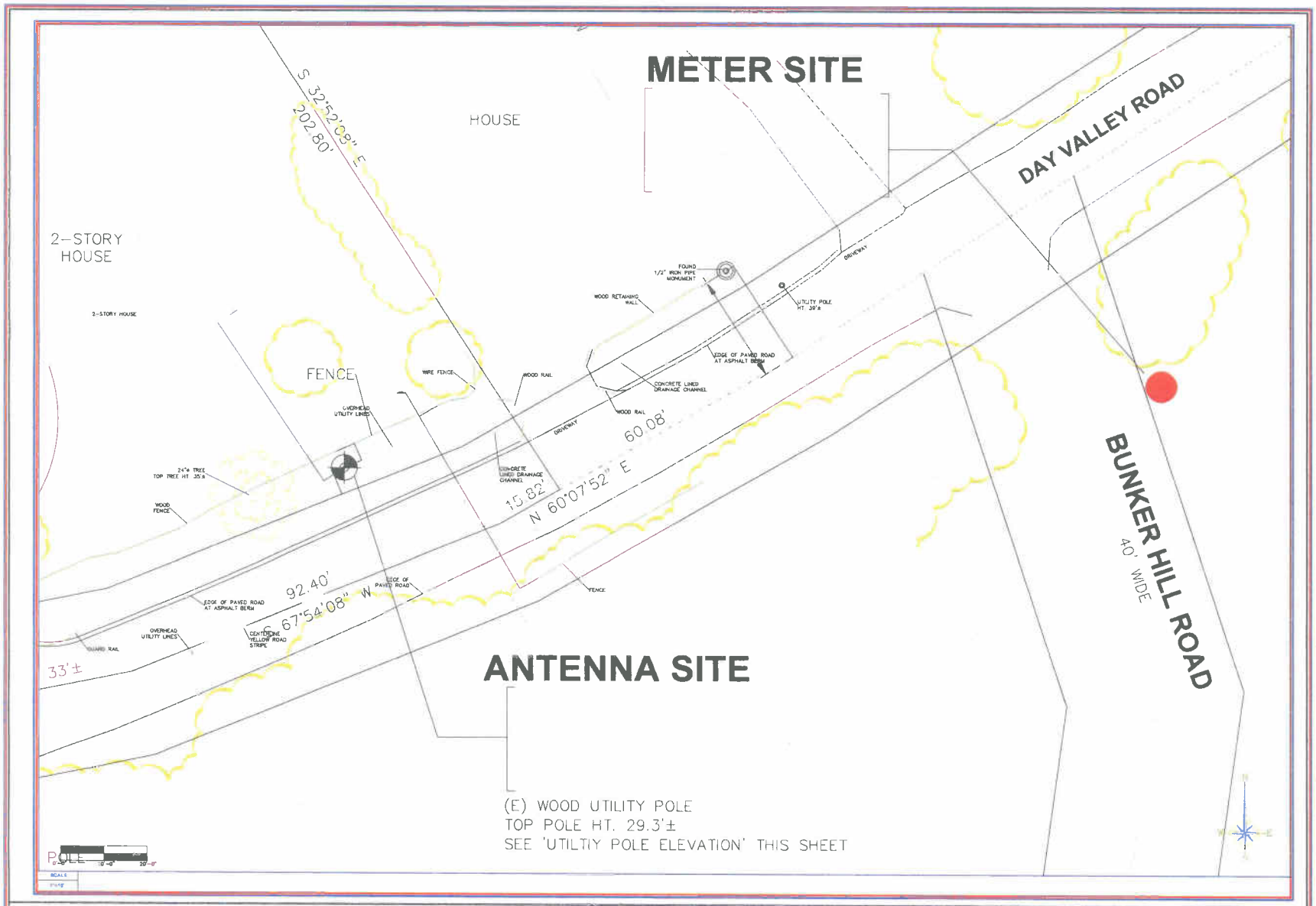
PLANS APPROVED BY:
CROWN
REP:

COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE NODE VRZ_FB12

SHEET NUMBER: 1
REVISION: 0
1 OF 6

1-15



CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
NODE VRZ_FB12
981 DAY VALLEY RD.
APTOS, CA 95003

CURRENT ISSUE DATE:
12/13/12

PERMIT SUBMISSION:

REV	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC
13341 Temescal Cyn. Rd
Corona, CA 92883
PHONE: (951) 471-1919

PLANS APPROVED BY:
CROWN
REP:

COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE NODE VRZ_FB12

SHEET NUMBER: 2
REVISION: 0
2 OF 6

EXHIBIT D

1-16

MAKE READY

STEP POLE ACCORDING TO GO-95 STANDARDS.

NEW CONSTRUCTION

N/A

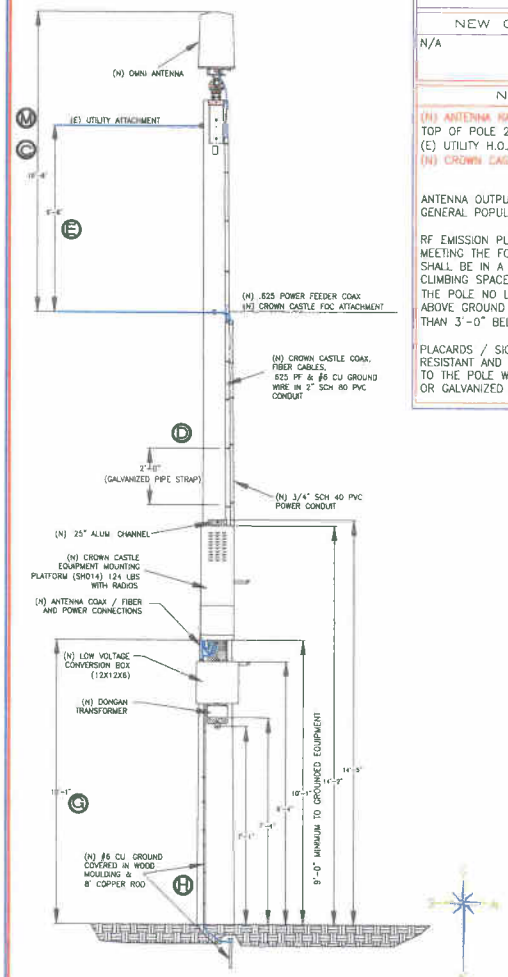
NOTES:

(N) ANTENNA RAD CENTER 31'-7"
TOP OF POLE 29'-3"
(E) UTILITY H.O.A 28'-5"
(N) CROWN CASTLE F.O.C. 28'-9"

ANTENNA OUTPUT DOES NOT EXCEED GENERAL POPULATION EXPOSURE LIMITS.

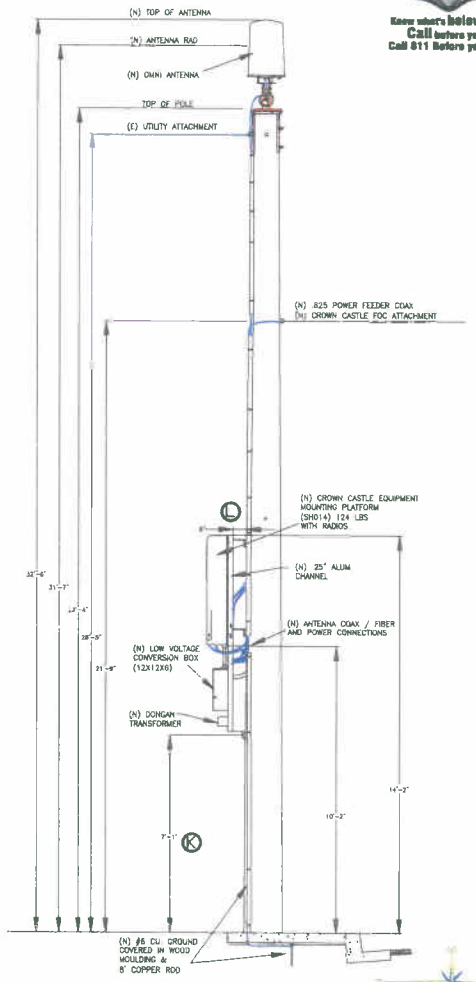
RF EMISSION PLACARDS / SIGNAGE MEETING THE FCC REQUIREMENTS SHALL BE IN A LOCATION VISIBLE FROM CLIMBING SPACE AND BE AFFIXED TO THE POLE NO LOWER THAN 9'-0" ABOVE GROUND LINE & NO HIGHER THAN 3'-0" BELOW THE ANTENNA.

PLACARDS / SIGNAGE ARE UVA RESISTANT AND SHALL BE ATTACHED TO THE POLE WITH GALVANIZED NAILS OR GALVANIZED SCREWS.



UTILITY POLE DETAIL POLE # N/A LOOKING SOUTH A

- Ⓐ – 48" MIN. CLEARANCE BETWEEN SECONDARY POWER AND LOWEST POINT OF ANTENNA ASSEMBLY.
- Ⓑ – POLE TOP EXTENSION UPPER AND LOWER BRACKET STEPS ARE TO BE INSTALLED WITH THE POLE TOP EXTENSION BRACKET ASSEMBLY. STEPS ARE NOT TO BE INSTALLED ON WOOD EXTENSION BAYONET.
- Ⓒ – 48" MIN CLEARANCE REQ'D.
- Ⓓ – 24" SPACING MAX. (GALVANIZED PIPE STRAP)
- Ⓔ – 72" MIN. TO SECONDARY LEVEL.
- Ⓕ – 12" MIN. SPACING FOR EQUIP TO CURB.
- Ⓖ – 15' MIN. (MAY BE REDUCED TO 9' WHEN NOT EXPOSED TO TRAFFIC).
- Ⓗ – GROUND INSTALLED BY COMM COMPANY (INCLUDES 8' COPPER ROD)
- Ⓘ – 24" MIN. FROM CENTER OF POLE
- Ⓙ – 24" MIN. CLEARANCE REQ'D.
- Ⓚ – 7' MIN. / 6' MAX. REQ'D.
- Ⓛ – 4" MIN. CLEARANCE BETWEEN EQUIPMENT AND POLE
- Ⓜ – PROTECTIVE COVERING MUST EXTEND A MINIMUM OF 3'-0" BEYOND ENERGIZED 0-750 VOLTS.
- Ⓝ – POLE STEPS TO BE INSTALLED FROM 8'-6" ABOVE GRADE TO CROWN CASTLE ATTACHMENT.

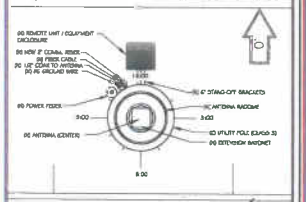


UTILITY POLE DETAIL POLE # N/A LOOKING EAST B

Call Before you Dig!
811
Know what's below.
Call before you dig.
Call 811 Before you Dig!

SITE POLE PICTURE C

POLE WILL BE STEPPED IN ACCORDANCE TO G095 STANDARDS IN RESPECT TO CLIMBING SPACE.
REMOTE EQUIPMENT @ 12:00
1-2" SCH 80 CROWN CASTLE RISER @ 11:30
1-3/4" SCH 40 CROWN CASTLE RISER @ 11:00



POLE# N/A
RISER POLE DETAIL D

UTILITY POLE EQUIPMENT PROFILES

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
NODE VRZ_FB12
961 DAY VALLEY RD.
APTOS, CA 95003

CURRENT ISSUE DATE: 12/13/2012

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC.
13341 Temescal Cyn. Rd
Corona, CA 92883
PHONE: (951) 471-1818

PLANS APPROVED BY:
CROWN
REP:

COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE NODE VRZ_FB12

SHEET NUMBER: 3
REVISION: 0
3 OF 6

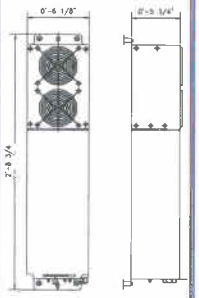
1-17

ION-M19P

ANDREW ION-19P IS A MULTI-BAND MULTI-OPERATOR REMOTE UNIT WITH VARIOUS EXTENSION UNITS. IT IS USED IN CONJUNCTION WITH A MASTER UNIT IN THE ION OPTICAL DISTRIBUTION SYSTEM. THIS SYSTEM TRANSPORTS MULTIPLE FREQUENCY BANDS SIMULTANEOUSLY (1900 MHZ AND 1700/2100 MHZ). PROVIDING A COST-EFFECTIVE SOLUTION FOR DISTRIBUTING CAPACITY FROM ONE OR MORE BASE STATIONS

ELECTRICAL	
POWER SUPPLY	
MAINS POWER, VAC	85 TO 264
	113 OR 230
POWER CONSUMPTION, WATTS	350
OPTICAL	
CONNECTORS	E2000/APC 8°
OPTICAL RETURN LOSS, DB	>55 MINIMUM
FIBER TYPE, MM	SINGLE MODE E9/125
OPTICAL LINK BUDGET, DB	0 TO 10
COMPOSITE INPUT POWER	
@ OTRC MASTER BOX, DBM	
1900MHZ	+3 COMPOSITE
1700/2100 MHZ	+5 COMPOSITE
INTERFACE	
BTS BOX	
NUMBER OF CONNECTORS	
1900MHZ	4
1700/2100 MHZ	4
SYSTEM OPTIMIZED FOR BTS POWER, DBM	43
ANTENNA PORT	
CONNECTOR	N FEMALE
OUTPUT POWER	SEE BAND SPECIFICATION
1900 MHZ	
FREQUENCY RANGE, MHZ	
UPLINK	1850 TO 1915
DOWNLINK	1930 TO 1995
OUTPUT POWER PER CARRIER, DBM	
NUMBER OF CARRIERS	1 / 8
DBM	43 / 40 / 37 / 34
TDMA/ EDGE	43 / 40 / 37 / 34
CDMA/EV-DO	43 / 40 / 37 / 34
WCDMA/HSDPA	43 / 40 / 37 / 34
SPURIOUS EMISSION	<-13 DBM / 1MHZ
DL OUTPUT TOLERANCE OVER FREQUENCY, DB	±1
DL OUTPUT TOLERANCE OVER TEMPERATURE, DB	±0.5
INPUT IOP	
IOP3 OPTIMIZED	-18
NOISE FIGURE OPTIMIZED	-16
NOISE FIGURE, DB	
IOP3 OPTIMIZED	11
NOISE FIGURE OPTIMIZED	8
1700/2100 MHZ (IN EXTENSION UNIT)	
FREQUENCY RANGE, MHZ	
UPLINK	1710 TO 1755
DOWNLINK	2110 TO 2155
OUTPUT POWER PER CARRIER, DBM	
CDMA/EV-DO	WCDMA/UMTS/HSDPA
+43	+43 @ 1 CARRIER
+40	+40 @ 2 CARRIERS
+37	+37 @ 4 CARRIERS
+34	+34 @ 8 CARRIERS
SPURIOUS EMISSION	<-13 DBM / 1 MHZ
ADJACENT CHANNEL POWER, DBC	-48
DL OUTPUT TOLERANCE OVER FREQ., DB	+1
DL OUTPUT TOLERANCE OVER TEMP, DB	+0.5
INPUT IOP	
IOP3 OPTIMIZED	-7
NOISE FIGURE OPTIMIZED	-16

* APPLICABLE TO SINGLE MODULATION MODE ONLY
** WITH ACTIVE COOLING



ION-M19P MULTI-BAND, MULTI-OPERATOR REMOTE OPTICAL SYSTEM

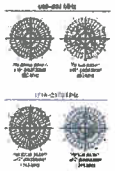
SCALE NTS — REPEATER EQUIPMENT DIMENSIONS — A

KATHREIN SCALA DIVISION

840 10510 840 10511
Dualband 700 MHz X-pol Omni Antenna

Kathrein's dual band antennas are ready for 3G and 4G applications, covering all existing wireless bands as well as all spectrum under consideration for future systems.
- Wide band operation
- Exceptional intermodulation characteristics.
- High strength fiberglass radome

General specifications.
Frequency range 698-894 MHz/1710-2170 MHz
Gain 698-894 MHz 5 dBi (with 3-5 dB nulls, typical)/1710-2170 MHz 8 dBi (with 8-8 dB nulls, typical)
VSWR <1.5:1
Impedance 50 ohms
Intermodulation (2x20w) IM3 <-150 dBc
Polarisation +45° upper and lower band-45° upper and lower band
Connector 4 x 7-16 DIN female
Isolation intrasystem >30 dBinterasystem >40 dB (698-894 // 1710-2170 MHz)
Maximum input power 698-894 MHz 250 watts (at 50°C)/1710-2170 MHz 200 watts (at 50°C)
Radome color Brown or gray
Weight 45 lb (20.4 kg)
Height 24 inches (609 mm)
Radome diameter 16 inches (407 mm)
Wind load at 93 mph (150kph) Side 32 lbf (138 N)
Wind survival rating* 100 mph (160 kph)
Shipping dimensions 32 x 20 x 19 inches (813 x 508 x 483 mm)
Shipping weight 52 lb (23.6 kg)
Mounting Designed to be mounted on top of a utility pole using a custom mounting bracket supplied by the customer
See reverse for order information

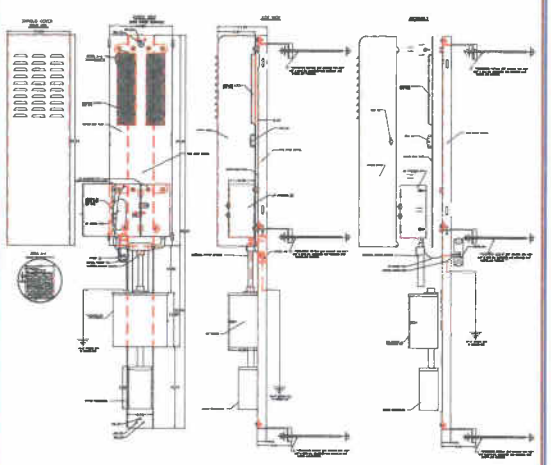


* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-8500 Fax: (541) 779-3991

Email: communications@kathrein.com Internet: www.kathrein-scala.com

SCALE NTS — ANTENNA SPECIFICATIONS — B



SCALE NTS — SHROUD SPECIFICATIONS (SH014) — C

Pole-Top Extension for Wood Poles

Wood Pole-Top Extension

Notes:

1. This unit meets General Order (G.O.) 95 requirements for strength in Class 3 through Class 6 poles and therefore may be used to support equipment on these poles. It may be used on large class poles, but may not support equipment on them.

2. The unit may be guyed

3. The bracket is made to fit poles with diameters of 8" to 11". Therefore, depending upon the actual pole-top diameter, to fit poles of class 3 and smaller, a bracket adaptor may be required.

4. Units are supplied with the wood bayonet assembled.

5. A pole step kit is required.

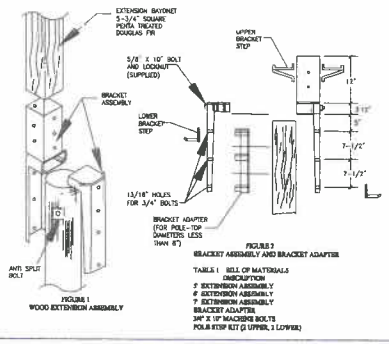
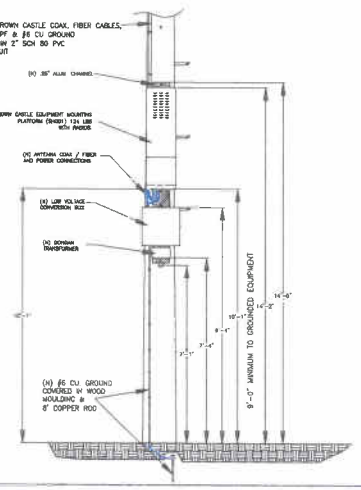


FIGURE 1
WOOD EXTENSION ASSEMBLY

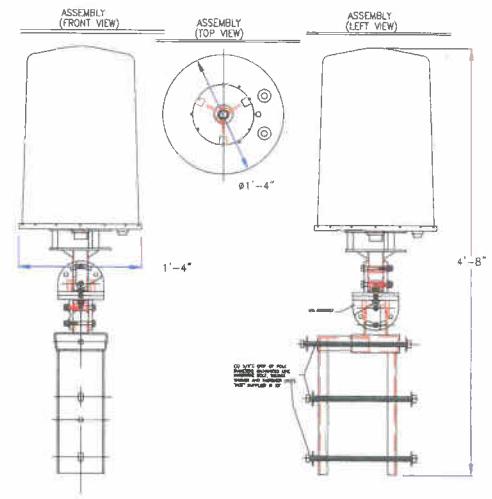
FIGURE 2
BRACKET ASSEMBLY AND BRACKET ADAPTER

TABLE 1 BILL OF MATERIALS
DESCRIPTION
5' EXTENSION ASSEMBLY
6' EXTENSION ASSEMBLY
7' EXTENSION ASSEMBLY
BRACKET ADAPTER
3/4" X 10" MACHINE BOLTS
POLE STEP KIT (2 UPPER, 2 LOWER)

SCALE NTS — POLE TOP EXT. / BRACKET ASSEMBLY — D



SCALE NTS — REPEATER EQUIPMENT AND MOUNTING CHASSIS CONFIGURATION — E



SCALE N/A — ANTENNA MOUNTING BRACKETS — F

UTILITY POLE EQUIPMENT TYPICALS

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
MODE VRZ_FB12
941 DAY VALLEY RD.
APTOS, CA 95003

CURRENT ISSUE DATE: 12/13/2012

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC.
13341 Temescal Cyn. Rd.
Corona, CA. 92883
PHONE: (951) 471-1919

PLANS APPROVED BY:
CROWN

REP.

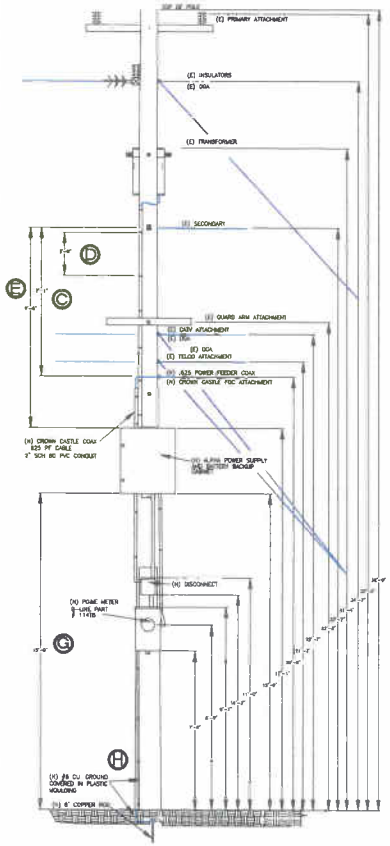
COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE MODE VRZ_FB12

SHEET NUMBER: 4
REVISION: 0
4 OF 6

1-18

MAKE READY
N/A
NEW CONSTRUCTION
INSTALL POWERING EQUIPMENT ACCORDING TO PRINT. PG&E TO SET NEW TRANSFORMER AND REFRAME AS NEEDED. HEIGHT OF TRANSFORMER TO BE DETERMINED BY PG&E.
NOTES:
TOP OF POLE: 38'-0" PRIMARY H.O.A: 37'-9" TRANSFORMER H.O.A: 31'-4" SECONDARY H.O.A: 27'-7" CATV H.O.A: 22'-7" TELCO H.O.A: 21'-3" PROPOSED CROWN CASTLE H.O.A: 20'-6"



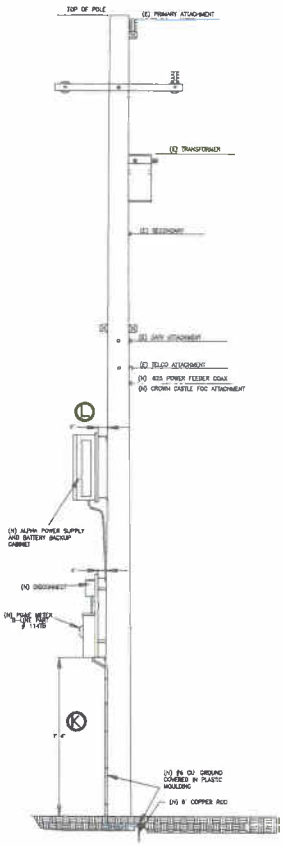
- **A** – 72" MIN. CLEARANCE BETWEEN SECONDARY POWER AND CLOSEST LEVEL OF ANTENNA ASSEMBLY.
- **B** – STEP POLE TOP EXTENSION AS PER DETAIL DWG.
- **C** – 72" MIN CLEARANCE REQ'D.
- **D** – 24" SPACING MAX.
- **E** – 72" MIN. TO SECONDARY LEVEL.
- **F** – 12" MIN. SPACING FOR EQUIP TO CURB.
- **G** – 15 MIN. (MAY BE REDUCED TO 9' WHEN NOT EXPOSED TO TRAFFIC).
- **H** – GROUND INSTALLED BY COMM COMPANY (INCLUDES 8' COPPER ROD).
- **I** – 24" MIN. FROM CENTER OF POLE.
- **J** – 24" MIN. CLEARANCE REQ'D.
- **K** – 7' MIN. / 8' MAX. REQ'D.
- **L** – 4" MIN. CLEARANCE BETWEEN EQUIPMENT AND POLE.

SCALE 3/8"=1' | UTILITY POLE DETAIL | POLE# N/T | LOOKING WEST | A

Call Before you Dig!

811

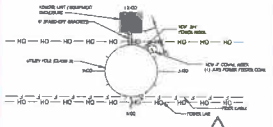
Know what's below.
Call before you dig.
Call 811 Before you Dig!



SCALE 3/8"=1' | UTILITY POLE DETAIL | POLE# N/T | LOOKING SOUTH | B

SCALE N.T.S. | SITE POLE PICTURE | C

POLE WILL BE STEPPED IN ACCORDANCE TO GO95 STANDARDS IN RESPECT TO CLIMBING SPACE
REMOTE EQUIPMENT @ 12:00
1-3/4" SCH 80 CROWN CASTLE RISER @ 1:00
1-2" SCH 80 CROWN CASTLE RISER @ 1:00



POLE# N/T

SCALE N.T.S. | RISER POLE DETAIL | D

Enclosure Specifications

Dimensions	4 Battery	8 Battery
Width (mm)	24.5"	31.75"
Height (mm)	30.5"	37.25"
Depth (mm)	14.5"	16.50"
Weight (lb.)	350-165	110-360
Finish	[illegible]	

SCALE N.T.S. | POWER SUPPLY ENCLOSURE | E

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
NODE VRZ_F812
961 DAY VALLEY RD,
APTOS, CA 95003

CURRENT ISSUE DATE: 12/13/2012

PERMIT SUBMISSION

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC.
13341 Temescal Cyn. Rd
Corona, CA. 92883
PHONE: (951) 471-1819

PLANS APPROVED BY:
CROWN
REP.

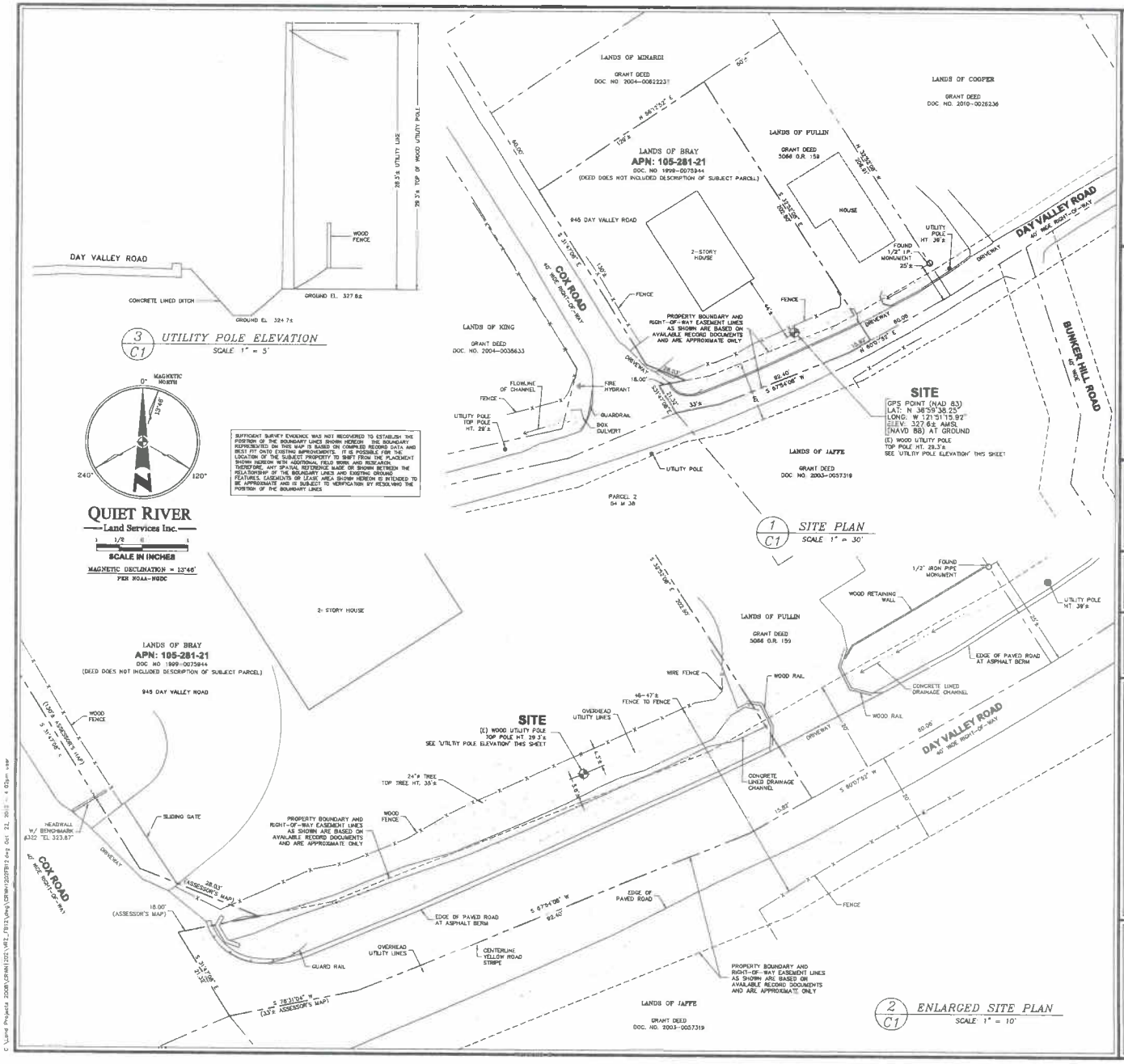
COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE NODE VRZ_F812

SHEET NUMBER: 5 | REVISION: 0

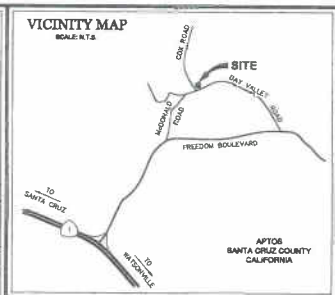
5 OF 6

UTILITY POLE POWERING EQUIPMENT PROFILES



VICINITY MAP

SCALE: N.T.S.



SITE DATA

OWNER'S NAME: WILLIAM AND THERESA BRAY
OWNER'S ADDRESS: 945 DAY VALLEY ROAD
APTOS, CA 95003

ASSESSOR'S PARCEL NUMBER(S): 105-281-21

NET AREA OF UNDERLYING PARCEL(S): PUBLIC RIGHT-OF-WAY

NET AREA OF LEASE AREA: N/A

HEIGHT OF BUILDING/TOWER: 29.3 ± A.G.L. TO TOP OF EXISTING UTILITY POLE

LAT: N 36°59'38.25" LONG: W 121°51'15.92" (NAD 83)

SITE GROUND ELEVATION: 327.6± AMSL (NAVD 88) AT BASE OF UTILITY POLE.

BASIS OF ELEVATIONS: GLOBAL POSITIONING SYSTEM (GPS). (SEE NOTE 2)

BASIS OF BEARINGS:
SANTA CRUZ COUNTY ASSESSOR'S PARCEL MAP NO 105 PAGE 28, AND BEST FIT WITH EXISTING IMPROVEMENTS

FEMA FLOOD ZONE DESIGNATION

County: SANTA CRUZ Effective Date MAY 16, 2012
Community-Panel Number 060087C-0380-E
The Flood Zone Designation for this site is

X Areas determined to be outside the 0.02% annual chance floodplain

D Areas in which flood hazards are undetermined, but possible

TITLE REPORT

NO TITLE REPORT FURNISHED. EXCEPTIONS TO TITLE AND RESERVATIONS THEREFROM COULD NOT BE DETERMINED. BOUNDARY INFORMATION SHOWN IS COMPILED FROM AVAILABLE RECORD DATA.

PROPERTY DESCRIPTION

PROPERTY SITUATED IN TOWN OF APTOS, COUNTY OF SANTA CRUZ, STATE OF CALIFORNIA, AS GENERALLY SHOWN UPON THIS PLAN.

LEASE AREA LEGAL DESCRIPTION

N/A

LEGEND

APN	ASSESSOR'S PARCEL NUMBER		ASPHALT
CP	CONTROL POINT		CONCRETE
EL	ELEVATION		CONTROL POINT
FH	FIRE HYDRANT		FOUND MONUMENT
FND.	FOUND		GPS POINT
HT.	HEIGHT	1/2"	PARAPET/ROOF ELEVATIONS
MON.	MONUMENT	12.3	SPOT ELEVATION
(M-M)	MONUMENT TO MONUMENT		TEMPORARY BENCHMARK
P.O.B.	POINT OF BEGINNING		
P.O.C.	POINT OF COMMENCEMENT		
PP	POWER POLE		
(TYP.)	TYPICAL		

CROWN CASTLE

Crown Castle
1700 DEXTER AVE. SUITE 200
SEATTLE, WA 98109

REVISIONS

DATE	DESCRIPTION	INITIAL
10/22/12	90% ISSUE	MAS

PLANS PREPARED BY

QUIET RIVER
Land Services Inc.
11501 Dublin Boulevard, Suite 200
Dublin, CA 94568
(925) 734-6788 Phone

GENERAL NOTES

1.) This is not a boundary survey. This is a specialized topographic map with property lines and easements being a graphic depiction of various information gathered from preliminary title reports, back-up documents of record, maps and available monuments found during the field survey. No property monuments were set. No title research was performed by Quiet River Land Services, Inc.

2.) The latitude, longitude and elevation shown hereon was derived from post-processed L1/L2 data collected using Navstar Global Positioning System (GPS) and a Topcon Hiperlite Receiver. Topcon specifications report half-meter level accuracy (horizontally) when data is properly collected and processed. (Elevation = ±3.0 feet)

3.) Unless otherwise noted, no underground utility locating service company was contacted prior to the map being prepared. Therefore, there may be non-visible or obscure utilities existing on the property not shown on the map - so CALL BEFORE YOU DIG

4.) Any electronic digital media provided by Quiet River Land Services, Inc to our client is a courtesy and is not to be reproduced, distributed, sold, altered, revised, edited or amended without the express written consent of an Officer of Quiet River Land Services, Inc. Further, only the final stamped, signed and dated original "hard copy" version of our survey or map is considered to be our legally recognized product.

SURVEYOR'S STATEMENT

DATE OF FIELD SURVEY: 10/15/12

I, the undersigned, a Registered Professional Land Surveyor licensed under the laws of the State of California do hereby state that the information, measurements, easements, record boundary lines, bearings and distances as shown hereon are based upon a field survey as dated above and upon items of public record and data contained in a title report, as referenced. Furthermore, the Latitude and Longitude coordinates are reported in NAD 83 Datum and are accurate to within ±20 feet horizontally, and the ground elevation, reported in NAVD 1988 Datum, is within ±3 feet vertically. The coordinate values and elevations are within the 1-A Accuracy Code designation as listed in the A.S.C.E. Information Sheet 31 003 and are accurate to the best of my knowledge and belief

SIGNATURE DATE

VRZ_FB-12
FREEDOM BOULEVARD

945 DAY VALLEY ROAD
APTOS, CA 95003

SANTA CRUZ COUNTY

LS1
OF 1 SHEET

REVISION 1

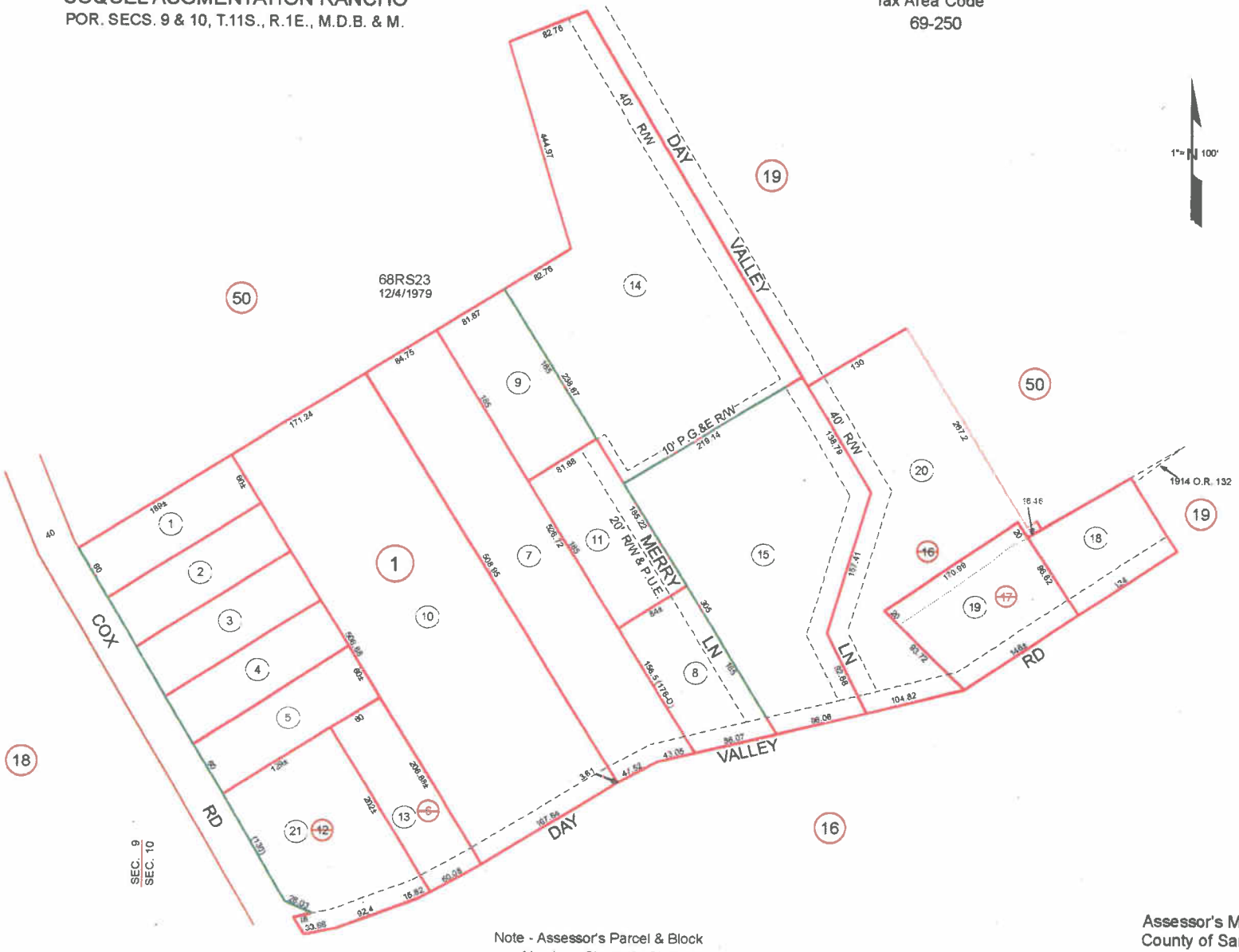
CRWN1202-012

SOQUEL AUGMENTATION RANCHO

POR. SECS. 9 & 10, T.11S., R.1E., M.D.B. & M.

Tax Area Code
69-250

105-28



Note - Assessor's Parcel & Block
Numbers Shown in Circles.

Assessor's Map No. 105-28
County of Santa Cruz, Calif.
June 1998

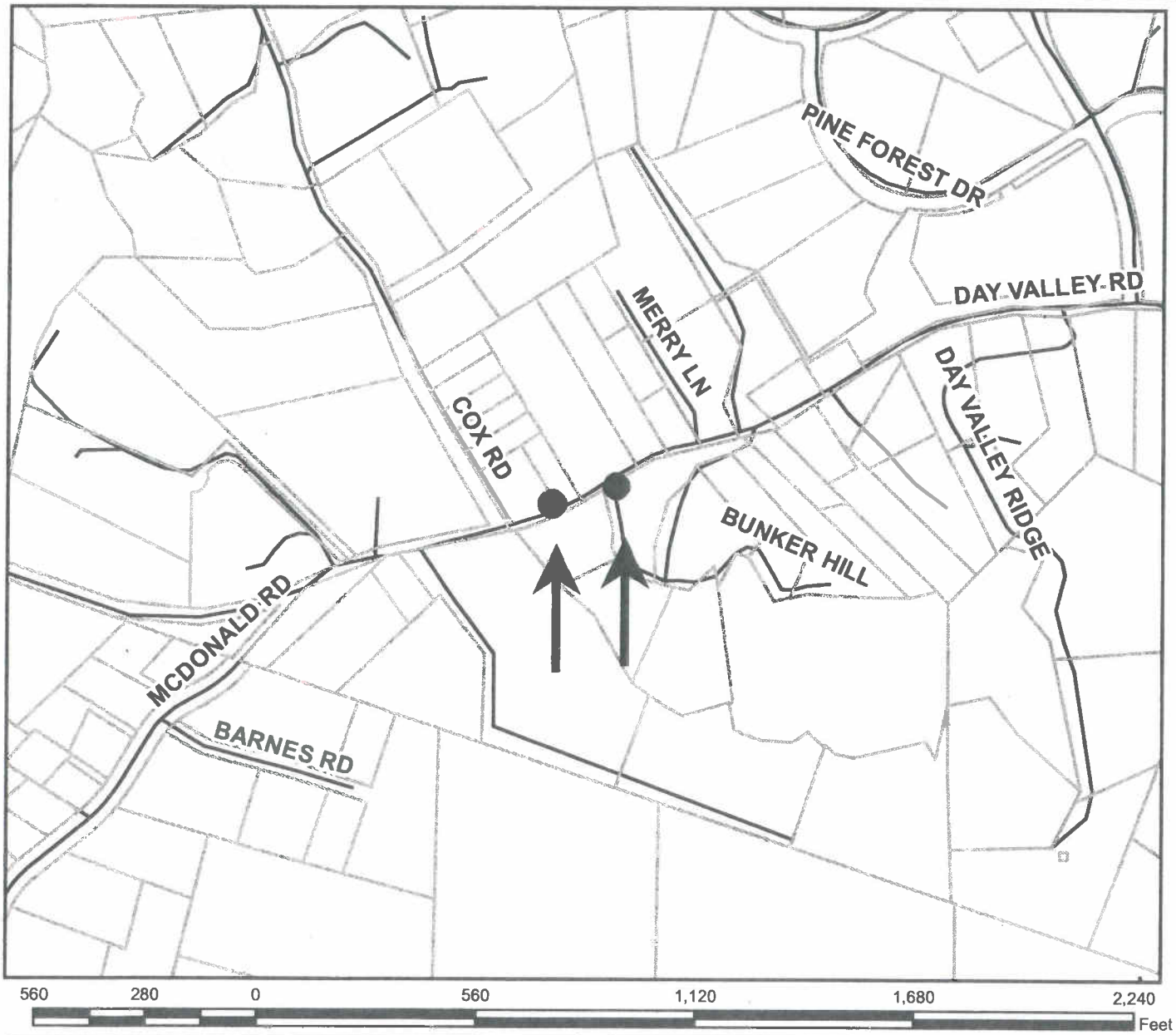
FOR TAX PURPOSES ONLY

THE ASSESSOR MAKES NO GUARANTEE AS TO MAP ACCURACY NOR ASSUMES ANY LIABILITY FOR OTHER USES NOT TO BE REPRODUCED ALL RIGHTS RESERVED.
© COPYRIGHT SANTA CRUZ COUNTY ASSESSOR 1998

Electronically redrawn 6/19/98 KSA
Rev. 10/30/1 mvm (changed page no's.)
Rev 7/2/08 CB (Added Day Valley Ln)
Rev 8/7/12 CB (Removed St & PGE Ease over 1-09 as per 68RS23 and deeds)

plnO28

Location Map



LEGEND

- Cell Site Location
- Assessors Parcels
- Streets

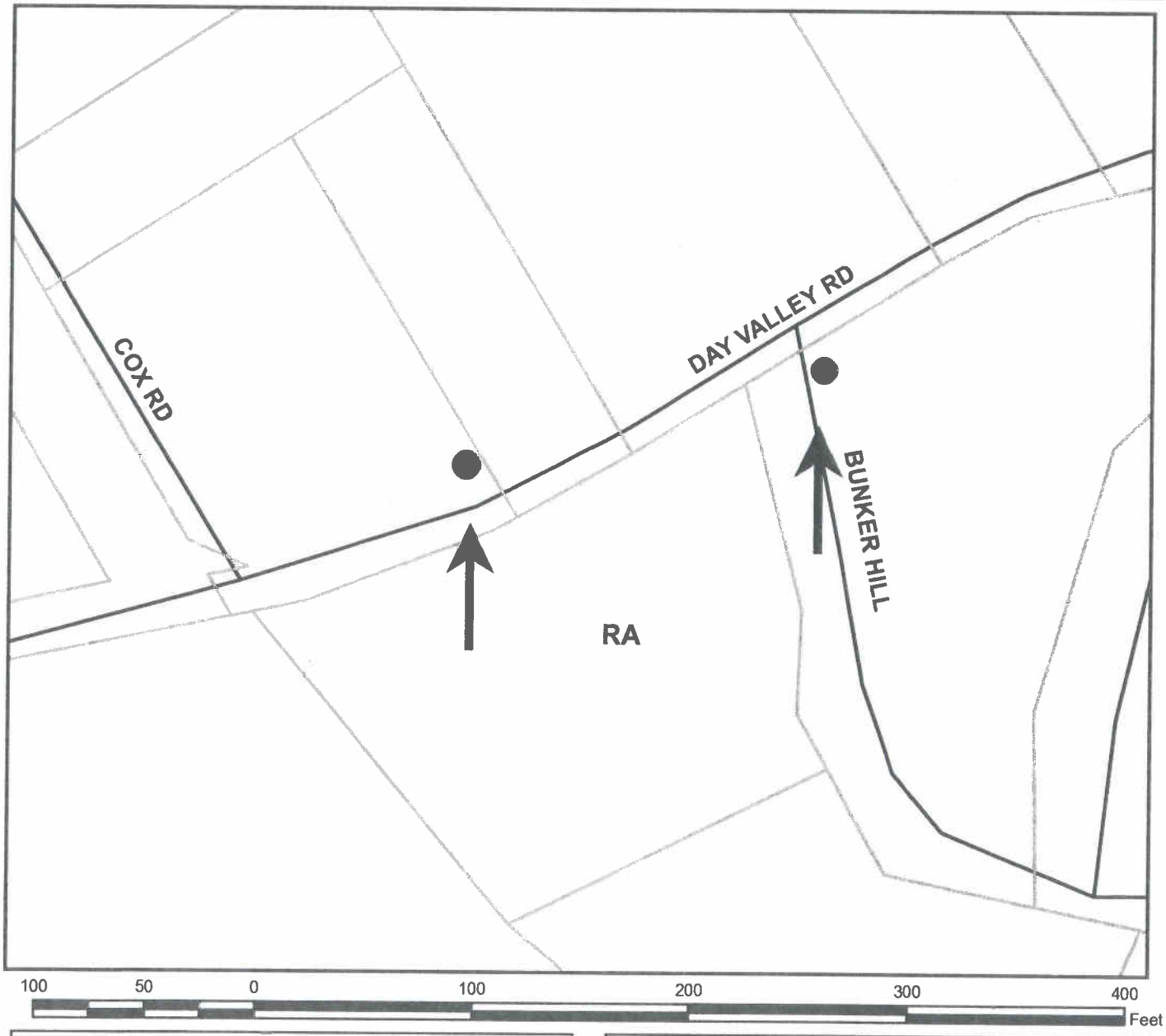
N
W E
S

Map Created by
County of Santa Cruz
Planning Department
March 2013

EXHIBIT E

pln028

Zoning Map



LEGEND

- Cell Site Location
- Assessors Parcels
- Streets
- AGRICULTURE RESIDENTIAL

N
W E
S

Map Created by
County of Santa Cruz
Planning Department
March 2013

EXHIBIT E

plnO28

General Plan Designation Map

LEGEND

- Cell Site Location
- Assessors Parcels
- Streets
- Residential-Suburban

N
W E
S

Map Created by
County of Santa Cruz
Planning Department
March 2013

EXHIBIT 1

pln028

Freedom Blvd Node Locations

EXHIBIT E

CROWN CASTLE

Freedom **Site # VRZ FB12** **Aerial Map**

961 Day Valley Road
Aptos, CA 95003

3/4/13

Applied Imagination 510 914-0500

EXHIBIT F

CROWN CASTLE

Freedom **Site # VRZ FB12** **Looking East from Day Valley Road**

961 Day Valley Road
Aptos, CA 95003

6/12/13

View #1

Applied Imagination 510 914-0500

EXHIBIT 1

CROWN CASTLE

Freedom **Site # VRZ FB12** **Looking West from Day Valley Road**

961 Day Valley Road
Aptos, CA 95003

View #2

6/21/13

Applied Imagination 510 914-0500

EXHIBIT F

JERROLD T. BUSHBERG Ph.D., DABMP, DABSNM, FAAPM
♦HEALTH AND MEDICAL PHYSICS CONSULTING♦

7784 Oak Bay Circle Sacramento, CA 95831
(800) 760-8414–jbushberg@hampc.com

Bhavani Yella
Crown Castle
890 Tasman Drive
Milpitas, CA 95035

May 20, 2013

Introduction

At your request, I have reviewed the technical specifications and calculated the maximum potential radiofrequency, (RF), power density from the proposed Crown Castle (CC) omni Distributed Antenna System (DAS) sites proposed for the right-of-way in Aptos, CA. A DAS is a network of spatially separated antenna sites called "nodes" connected to a common source that provides wireless service within a geographic area. DAS antennae are typically installed near the top of light standards or on utility poles. The idea is to split the transmitted signal among several antenna sites, separated in space so as to provide coverage over the same area as a single antenna but with reduced total power and improved reliability. Thus a single antenna radiating at high power is replaced by a group (i.e., network) of low-power antennas to cover the same area. Some of the other advantages of DAS include the ability to provide service for multiple wireless carriers without the need to have separate antenna sites for each carrier at each location and the ability to place the antennae on existing vertical structures such as light or utility poles.

These proposed DAS nodes will utilize one omni antennae mounted on the top of utility poles. The antenna specified is Kathrein antennae model #840-10510. The maximum effective radiated power (ERP) from the omni antennae will be up to 43.65 watts at approximately 775 MHz utilizing LTE transmission technology; 34.67 watts at approximately 850 MHz and 77.62 watts at approximately 1,900 MHz utilizing CDMA/EVDO transmission technology. The distance from the antenna center to the ground will be at least 27 feet. A list of the proposed DAS node locations and an example of the site configuration are shown in attachment one. The antenna specification details are depicted in attachment two. This analysis represents the worst case RF exposure of any of the proposed utility pole mounted omni DAS node locations.

Calculation Methodology

Calculations at the level of the antenna were made in accordance with the cylindrical model recommendations for near-field analysis contained in the Federal Communications Commission, Office of Engineering and Technology Bulletin 65 (OET 65) entitled "Evaluating Compliance with FCC-Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields." RF exposure calculations at ground level were made using equation 10 from the same OET document. Several assumptions were made in order to provide the most conservative or "worst case" projections of power densities. Calculations were made assuming all channels were operating simultaneously at their maximum design effective radiated power. Attenuation (weakening) of the signal that would result from surrounding foliage or buildings was ignored. Buildings or other structures can reduce the signal strength by a factor of 10 (i.e., 10 dB) or more depending upon the construction material.

EXHIBIT G

In addition, for ground level calculations, the ground or other surfaces were considered to be perfect reflectors (which they are not) and the RF energy was assumed to overlap and interact constructively at all locations (which they would not) thereby resulting in the calculation of the maximum potential exposure. In fact, the accumulations of all these very conservative assumptions, will significantly overestimate the actual exposures that would typically be expected from such a facility. However, this method is a prudent approach that errs on the side of safety.

RF Safety Standards

The two most widely recognized standards for protection against RF field exposure are those published by the American National Standards Institute (ANSI) C95.1 and the National Council on Radiation Protection and measurement (NCRP) report #86. The NCRP is a private, congressionally chartered institution with the charge to provide expert analysis of a variety of issues (especially health and safety recommendations) on radiations of all forms. The scientific analyses of the NCRP are held in high esteem in the scientific and regulatory community both nationally and internationally. In fact, the vast majority of the radiological health regulations currently in existence can trace their origin, in some way, to the recommendations of the NCRP.

All RF exposure standards are frequency-specific, in recognition of the differential absorption of RF energy as a function of frequency. The most restrictive exposure levels in the standards are associated with those frequencies that are most readily absorbed in humans. Maximum absorption occurs at approximately 80 MHz in adults. The NCRP maximum allowable continuous occupational exposure at this frequency is 1,000 $\mu W/cm^2$. This compares to 2,933 $\mu W/cm^2$ at cellular frequencies and 5,000 $\mu W/cm^2$ at PCS frequencies that are absorbed much less efficiently than exposures in the VHF TV band.

The traditional NCRP philosophy of providing a higher standard of protection for members of the general population compared to occupationally exposed individuals, prompted a two-tiered safety standard by which levels of allowable exposure were substantially reduced for "uncontrolled " (e.g., public) and continuous exposures. This measure was taken to account for the fact that workers in an industrial environment are typically exposed no more than eight hours a day while members of the general population in proximity to a source of RF radiation may be exposed continuously. This additional protection factor also provides a greater margin of safety for children, the infirmed, aged, or others who might be more sensitive to RF exposure. After several years of evaluating the national and international scientific and biomedical literature, the members of the NCRP scientific committee selected 931 publications in the peer-reviewed scientific literature on which to base their recommendations. The current NCRP recommendations limit continuous public exposure at cellular frequencies (e.g., ~820MHz) to 550 $\mu W/cm^2$ and to 1,000 $\mu W/cm^2$ at PCS frequencies (~1,900 MHz).

The 1992 ANSI standard was developed by Scientific Coordinating Committee 28 (SCC 28) under the auspices of the Institute of Electrical and Electronic Engineers (IEEE). This standard, entitled "IEEE Standards for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz" (IEEE C95.1-1991), was issued in April 1992 and subsequently adopted by ANSI. A revision of this standard (C95.1-2005) was completed in October 2005 by SCC 39 the IEEE International Committee on Electromagnetic Safety. Their recommendations are similar to the NCRP recommendations for the maximum permissible exposure (MPE) to the public PCS frequencies (950 $\mu W/cm^2$ for continuous exposure at 1,900 MHz) and incorporates the convention of providing for a greater margin of safety for public as compared with occupational exposure. Higher whole body exposures are allowed for brief periods provided that no 30 minute time-weighted average exposure exceeds these aforementioned limits.

EXHIBIT G

On August 9, 1996, the Federal Communications Commission (FCC) established a RF exposure standard that is a hybrid of the current ANSI and NCRP standards. The maximum permissible exposure values used to assess environmental exposures are those of the NCRP (i.e., maximum public continuous exposure at cellular and PCS frequencies of 550 $\mu W/cm^2$ and 1,000 $\mu W/cm^2$ respectively). The FCC issued these standards in order to address its responsibilities under the National Environmental Policy Act (NEPA) to consider whether its actions will "significantly affect the quality of the human environment." In as far as there was no other standard issued by a federal agency such as the Environmental Protection Agency (EPA), the FCC utilized their rulemaking procedure to consider which standards should be adopted. The FCC received thousands of pages of comments over a three-year review period from a variety of sources including the public, academia, federal health and safety agencies (e.g., EPA & FDA) and the telecommunications industry. The FCC gave special consideration to the recommendations by the federal health agencies because of their special responsibility for protecting the public health and safety. In fact, the MPE values in the FCC standard are those recommended by EPA and FDA. The FCC standard incorporates various elements of the 1992 ANSI and NCRP standards which were chosen because they are widely accepted and technically supportable. There are a variety of other exposure guidelines and standards set by other national and international organizations and governments, most of which are similar to the current ANSI/IEEE or NCRP standard, figure one.

The FCC standards "Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation" (Report and Order FCC 96-326) adopted the ANSI/IEEE definitions for controlled and uncontrolled environments. In order to use the higher exposure levels associated with a controlled environment, RF exposures must be occupationally related (e.g., wireless company RF technicians) and they must be aware of and have sufficient knowledge to control their exposure. All other environmental areas are considered uncontrolled (e.g., public) for which the stricter (i.e., lower) environmental exposure limits apply. All carriers were required to be in compliance with the new FCC RF exposure standards for new telecommunications facilities by October 15, 1997. These standards applied retroactively for existing telecommunications facilities on September 1, 2000.

The task for the physical, biological, and medical scientists that evaluate health implications of the RF data base has been to identify those RF field conditions that can produce harmful biological effects. No panel of experts can guarantee safe levels of exposure because safety is a null concept, and negatives are not susceptible to proof. What a dispassionate scientific assessment can offer is the presumption of safety when RF-field conditions do not give rise to a demonstrable harmful effect.

Summary & Conclusions

All CC utility pole DAS nodes listed in attachment one, operating with the characteristics as specified above and observing an three foot public exclusion zone directly in front of and at the same elevation as the antenna, will be in full compliance with FCC RF public and occupational safety exposure standards. These transmitters, by design and operation, are low-power devices. Even under maximal exposure conditions in which the antenna is transmitting at its greatest design basis ERP, the maximum exposure at the elevation of the antenna will not result in RF exposures in excess of the FCC public RF safety standard at three or more feet from the surface of antenna, (see appendix A-1). The maximum RF exposure at ground level will not be in excess of 1.3% of, (i.e., 76 times lower than), the FCC public safety standard, (see appendix A-2).

A chart of the electromagnetic spectrum and a comparison of RF power densities from various common sources is presented in figures two and three respectively in order to place exposures from DAS wireless systems in perspective. RF exposure in the neighborhood served by this and other DAS sites are very low due

EXHIBIT G

to three main factors. First, as previously stated, DAS is a relatively low-power technology. The maximum power into the antennae will be less than 50.72 watts. In addition, DAS sites utilize antenna that focus the RF energy in the vertical plane toward the horizon, (i.e., parallel with the ground at the level of the antenna), thus only a very small percentage of the RF energy is emitted directly down toward the ground. This is similar to a lighthouse beacon that sends the majority of its light out toward the horizon with very little reaching the base of the lighthouse or people living nearby. Finally, as shown on the graph in appendix A-2, as one gets farther away from the site, the change in RF exposure intensity becomes more uniform with distance. Eventually there is a very rapid and consistent decrease in exposure with distance. Like all forms of electromagnetic energy, including light, the decrease in exposure at this point is proportional to the square of the increased distance. Thus, if the exposure at this point was 1% of the public exposure standard and one simply moved 10 times further away, (all other conditions being the same), the exposure would be 10^2 or 100 times less than before (i.e., 0.01% of the public exposure standard).

It is also important to realize that the FCC maximum allowable exposures are not set at a threshold between safety and known hazard but rather at 50 times below a level that the majority of the scientific community believes may pose a health risk to human populations. Thus, the previously mentioned maximum ground level exposure from these sites represents a "safety margin" from this threshold of potentially adverse health effects of more than 3,840 times.

Given the low levels of radiofrequency fields that would be generated from these CC antenna installations and given the evidence on RF biological effects in a large data base, there is no scientific basis to conclude that harmful effects will attend the utilization of these proposed wireless telecommunications facilities. This conclusion is supported by a large number of scientists that have participated in standard-setting activities in the United States who are overwhelmingly agreed that RF radiation exposure below the FCC exposure limits has no demonstrably harmful effects on humans. An RF notice sign, containing appropriate contact information and indicating the stay back distance beyond which the RF exposures do not exceed the public maximum permissible exposure, should be placed near the antenna (see appendix A-3).

These findings are based on my professional evaluation of the scientific issues related to the health and safety of non-ionizing electromagnetic radiation and my analysis of the technical specification as provided by CC. The opinions expressed herein are based on my professional judgement and are not intended to necessarily represent the views of any other organization or institution. Please contact me if you require any additional information.

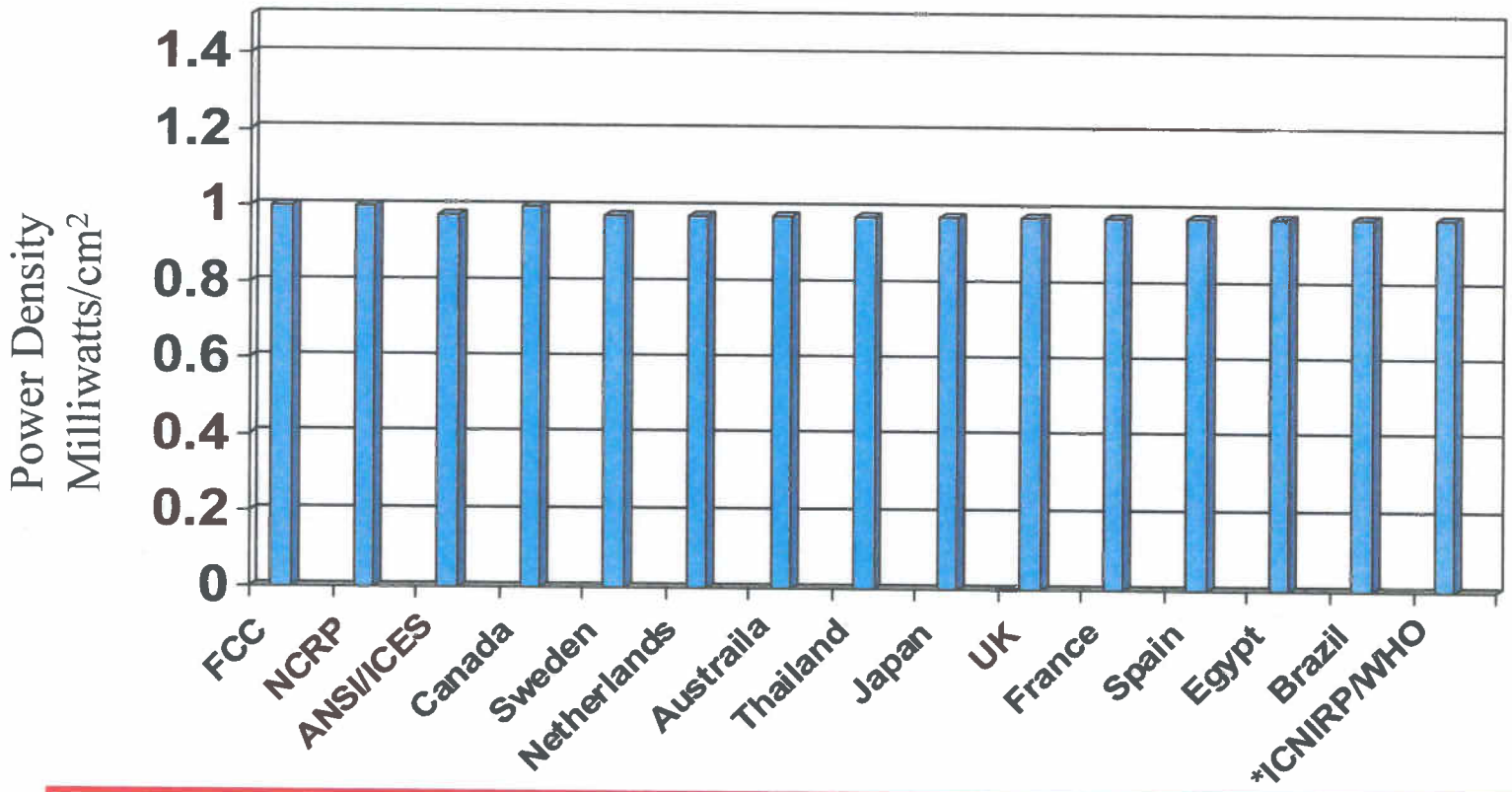
Sincerely,

Jerrold T. Bushberg Ph.D., DABMP, DABSNM
Diplomate, American Board of Medical Physics (DABMP)
Diplomate, American Board of Science in Nuclear Medicine (DABSNM)
Fellow, American Association of Physicists in Medicine (FAAPM)

Enclosures: Figures 1-3; Attachment 1,2; Appendices A1-A3 and Statement of Experience.

EXHIBIT G

National and International Public RF Exposure Standards (DAS @ 1,950 MHz)



*International Commission on Non-Ionizing Radiation Protection (ICNIRP) Public Safety Exposure Standard. ICNIRP standard recommended by the World Health Organization (WHO). Members of the ICNIRP Scientific Committee were from:

- Australia
- Finland
- France
- Germany
- Hungary
- Italy
- Sweden
- Japan
- United Kingdom
- United States

Figure 1

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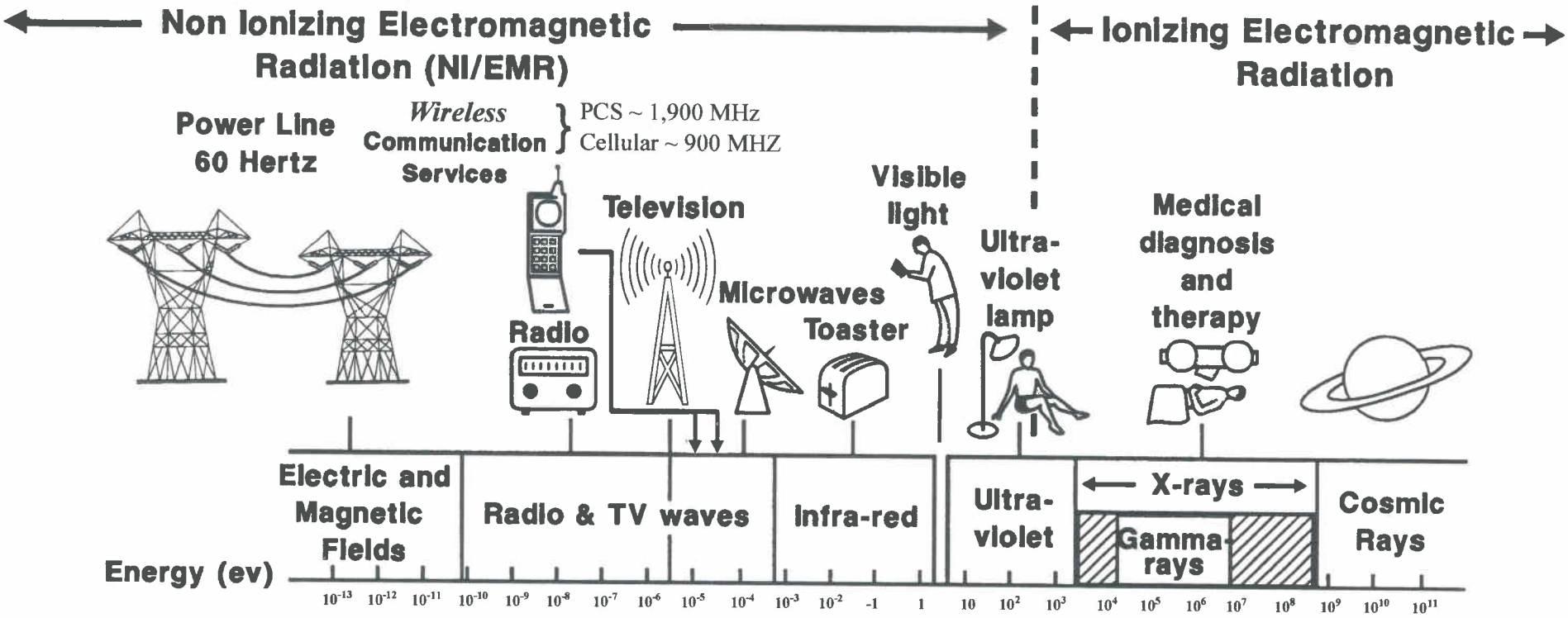
EXHIBIT G



The Electromagnetic Spectrum

Figure 2

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Exhibit 4

Typical Exposure from Various Radio Frequency / Microwave Sources

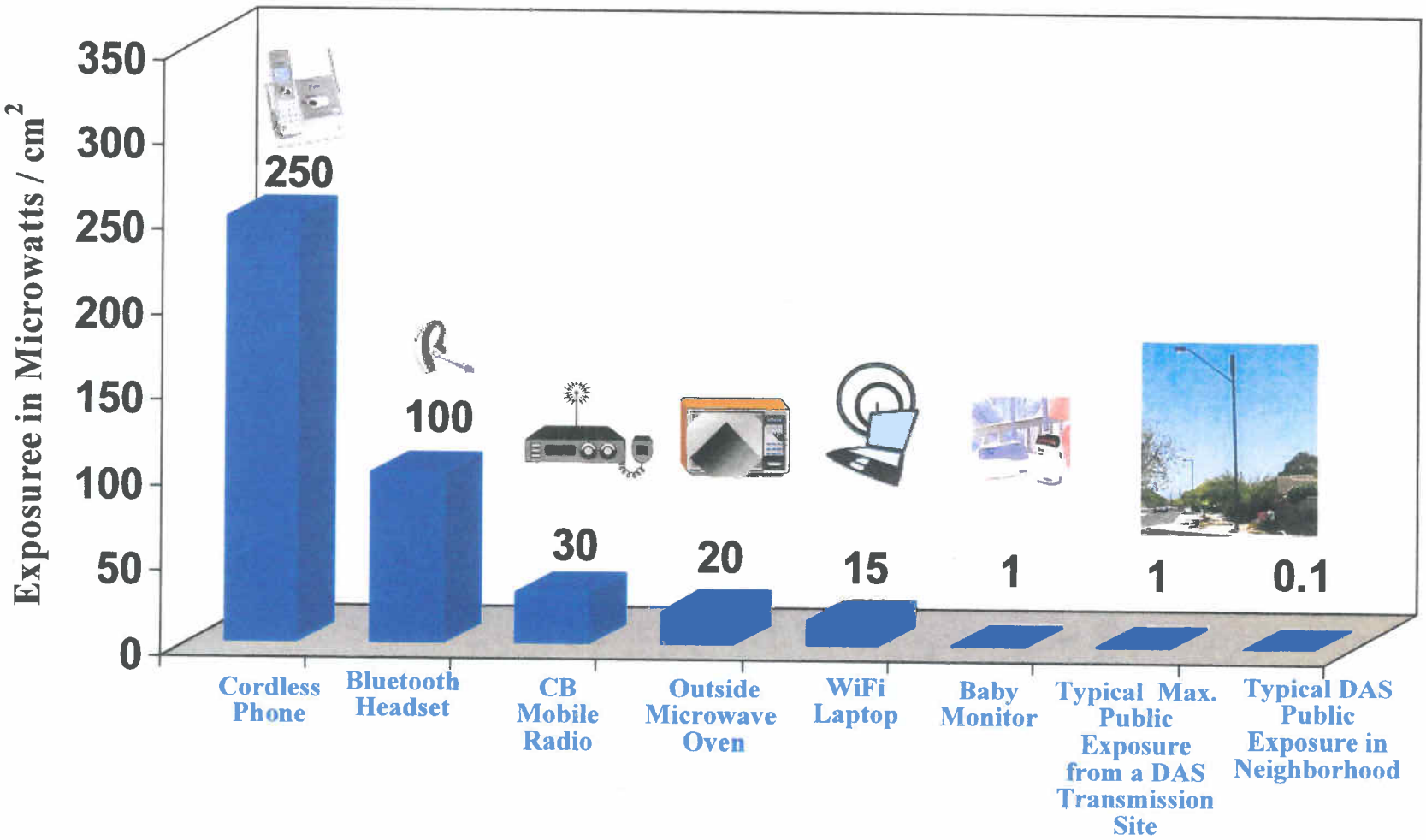

Figure 3

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EXHIBIT 4

Attachment 1

List of Proposed Utility Pole Omni Antenna DAS Node Locations and Example of Proposed Utility Pole Mounted Omni Antenna

EXHIBIT G

Configuration #1:Omni Antennae				
Node ID	**Antenna**	**Structure Type**	**Location**	**Centerline (ft)**
VRZ_FB01	Kathrein Scala - 840 10510	Utility pole	5288 Freedom Boulevard, Aptos, CA	41'-6"
VRZ_FB02	Kathrein Scala - 840 10510	Utility pole	5101 Freedom Blvd Aptos, CA 95003	36'-5"
VRZ_FB03	Kathrein Scala - 840 10510	Utility pole	1701-1705 Day Valley Rd Aptos, CA 95003	51-'6"
VRZ_FB04	Kathrein Scala - 840 10510	Utility pole	1400-1428 Day Valley Rd, Aptos, CA 95003	42'
VRZ_FB05	Kathrein Scala - 84010525	Utility pole	1200-1286 Day Valley Rd, Aptos, CA 95003	33'-10 1/2"
VRZ_FB06	Kathrein Scala - 84010525	Utility pole	400-698 Cll Del Sol, Aptos, CA 95003	46'-6 ½"
VRZ_FB07	Kathrein Scala - 840 10510	Utility pole	757-785 Day Valley Rd,Aptos, CA 95003	30'-7"
VRZ_FB08	Kathrein Scala - 840 10510	Utility pole	293-343 McDonald Rd, Aptos, CA 95003	27'

EXHIBIT G

NOTE

NOTES

CROWN CASTLE

FREEDOM
NODE VRZ_FB09
FREEDOM BLVD/McDONALD RD, APTOS, CA 95003

Call Before you Dig!

811

Know what's below.
Call before you dig.
Call 811 Before you Dig!

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 THE AREAS GOVERNING CODES

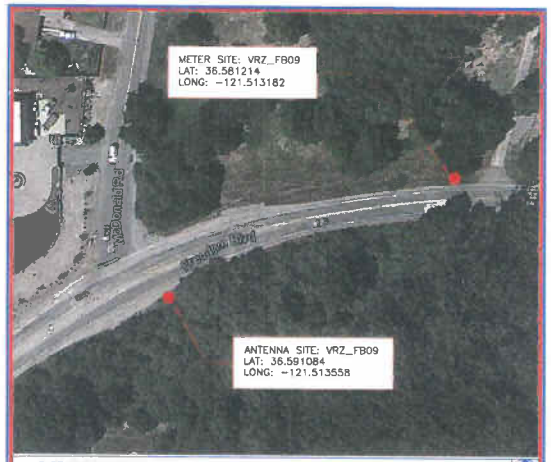
1. STATE ADMINISTRATIVE CODE
2. STATE BUILDING CODE
3. ANSI/EIA-222-F LIFE SAFETY CODE NFPA-101-1995
4. STATE MECHANICAL CODE
5. STATE PLUMBING CODE
6. STATE ELECTRIC CODE
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

CODE COMPLIANCE

PROPERTY INFORMATION

CUSTOMER	CROWN CASTLE
PROJECT	FREEDOM BLVD
NODE	VRZ_FB09
LATITUDE	36.581084
LONGITUDE	-121.513558
STREET ADDRESS	FREEDOM BLVD/McDONALD RD
CITY, STATE	APTOS CA 95003
POLE# / TYPE	N/A / WOOD POLE
RAD CENTER / ANTENNA HEIGHT	30'-3" TO RAD CENTER 31'-3" TO TOP OF ANTENNA
ANTENNA TYPE	KATHREIN SCALA - 84010510
AZIMUTH FOR ANTENNA	N/A
POWER TO POLE	(N) LOW VOLTAGE
POLE ACCESS	STREET SIDE
POLE LOCATION & DESCRIPTION	C/O OF McDONALD RD & FREEDOM BLVD

PROJECT SUMMARY



VICINITY MAP

SHEET	DESCRIPTION	REV.
1	TITLE SHEET	0
2	SITE PLAN	0
3	UTILITY POLE EQUIPMENT PROFILES	0
4	UTILITY POLE EQUIPMENT TYPICALS	0
5	UTILITY POLE POWERING	0
6	SITE SURVEY	0

SHEET INDEX

THE PROJECT CONSISTS OF THE INSTALLATION AND OPERATION OF WIRELESS EQUIPMENT AND ANTENNAS FOR CROWN CASTLE ON EXISTING WOOD UTILITY POLES

PROJECT DESCRIPTION

INSTALL NEW WIRELESS EQUIPMENT AND ANTENNAS AND ALL ASSOCIATED BRACKETS IN ACCORDANCE TO CONSTRUCTION SPECIFICATIONS, REARRANGE ANY EXISTING FACILITIES IN ACCORDANCE TO GOVERNING CONSTRUCTION GUIDELINES

PROJECT SCOPE

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME

GENERAL CONTRACTOR NOTES

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 934-1580

PROJECT INFORMATION:

FREEDOM
NODE VRZ_FB09
FREEDOM BLVD/McDONALD RD
APTOS, CA 95003

CURRENT ISSUE DATE: 5/3/13

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:

HP COMMUNICATIONS INC.
3341 Temescal Cyn Rd
Corona, CA 92883
PHONE: (951) 277-1919

PLANS APPROVED BY:

CROWN

REP:

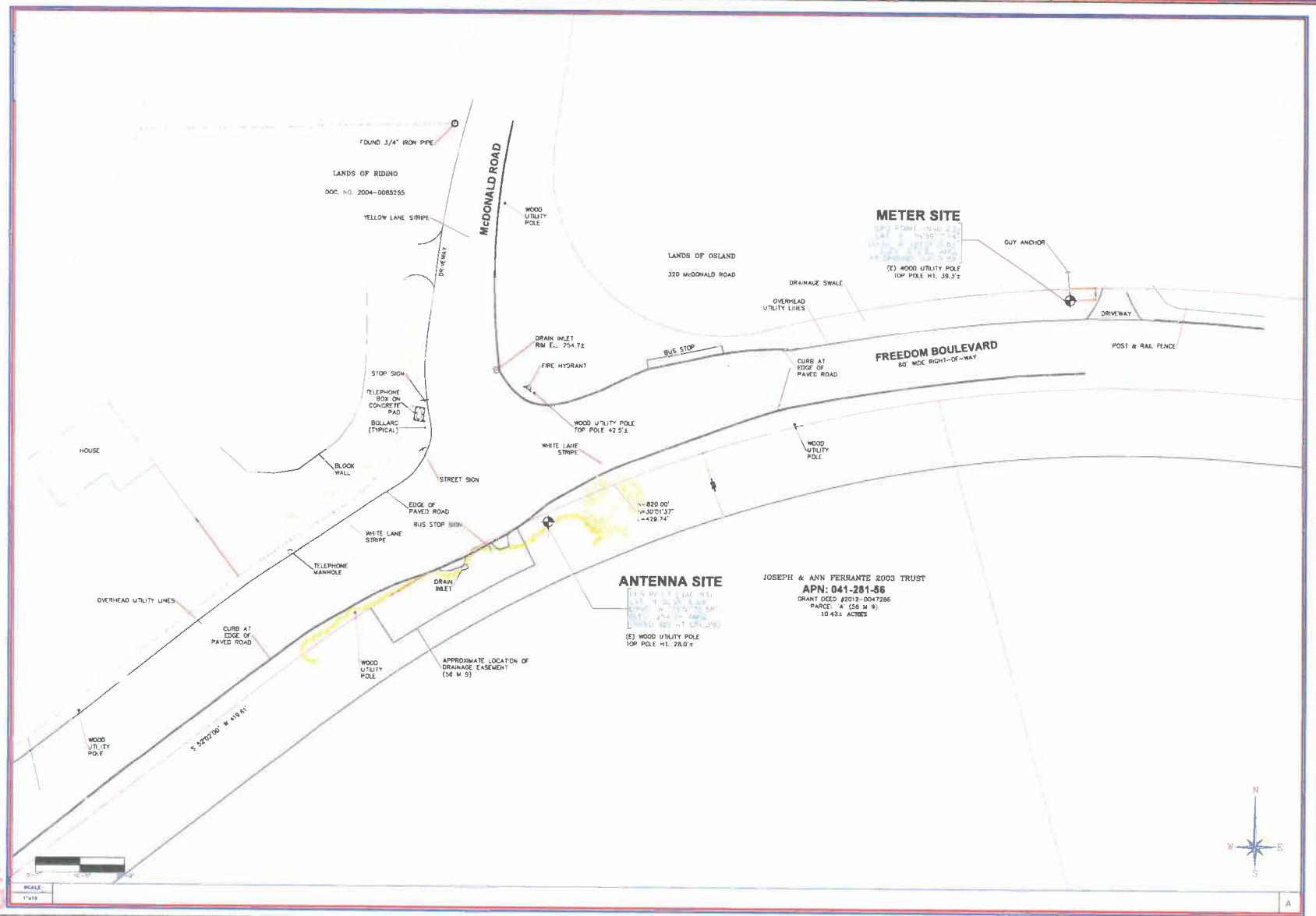
COMMENTS:

SHEET TITLE:

CROWN CASTLE
POLE PROFILE NODE VRZ_FB09

1 | 0
1 OF 5

EXHIBIT G



SITE PLAN

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
NODE VRZ_FB09
FREEDOM BLVD/McDONALD RD
APTOS, CA 95003

CURRENT ISSUE DATE:
5/3/13

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC.
1334 Ignacio Cyn Rd
Corona CA 92883
PHONE (951) 471-1919

PLANS APPROVED BY:
CROWN
REP:

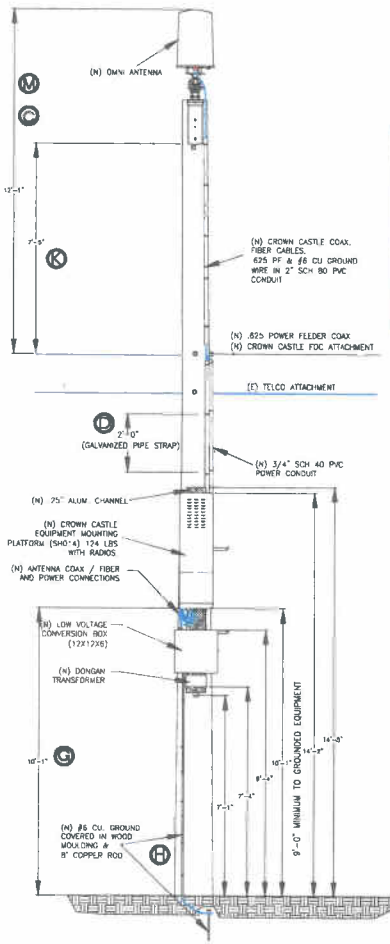
COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE NODE VRZ_FB09

2 0
2 OF 5

EXHIBIT C

"PROFILES ARE DRAWN VERTICAL FOR PRESENTATION AND DO NOT REFLECT ACTUAL CONDITIONS"



MAKE READY
STEP POLE ACCORDING TO GO-95 STANDARDS.

NEW CONSTRUCTION
CROWN CASTLE TO ATTACH NEW ANTENNA @ 28'-0"

NOTES:

TOP OF POLE 28' 0"
(N) ANTENNA RAD CENTER 30'-3"
(N) CROWN CASTLE F.O.C. 19'-0"
(E) TELCO ATTACHMENT H.O.A 17'-8"

ANTENNA OUTPUT DOES NOT EXCEED GENERAL POPULATION EXPOSURE LIMITS.

RF EMISSION PLACARDS / SIGNAGE MEETING THE FCC REQUIREMENTS SHALL BE IN A LOCATION VISIBLE FROM CLIMBING SPACE AND BE AFFIXED TO THE POLE NO LOWER THAN 9'-0" ABOVE GROUND LINE & NO HIGHER THAN 3'-0" BELOW THE ANTENNA.

PLACARDS / SIGNAGE ARE UVA RESISTANT AND SHALL BE ATTACHED TO THE POLE WITH GALVANIZED NAILS OR GALVANIZED SCREWS.

A – 48" MIN. CLEARANCE BETWEEN SECONDARY POWER AND LOWEST POINT OF ANTENNA ASSEMBLY.

B – POLE TOP EXTENSION UPPER AND LOWER BRACKET STEPS ARE TO BE INSTALLED WITH THE POLE TOP EXTENSION BRACKET ASSEMBLY. STEPS ARE NOT TO BE INSTALLED ON WOOD EXTENSION BAYONET.

C – 48" MIN CLEARANCE REQ'D.

D – 24" SPACING MAX. (GALVANIZED PIPE STRAP)

E – 72" MIN. TO SECONDARY LEVEL.

F – 12" MIN. SPACING FOR EQUIP TO CURB.

G – 15' MIN. (MAY BE REDUCED TO 9' WHEN NOT EXPOSED TO TRAFFIC).

H – GROUND INSTALLED BY COMM COMPANY (INCLUDES 8' COPPER ROD).

I – 24" MIN. FROM CENTER OF POLE

J – 24" MIN. CLEARANCE REQ'D.

K – 7' MIN. / 6' MAX. REQ'D.

L – 4" MIN. CLEARANCE BETWEEN EQUIPMENT AND POLE.

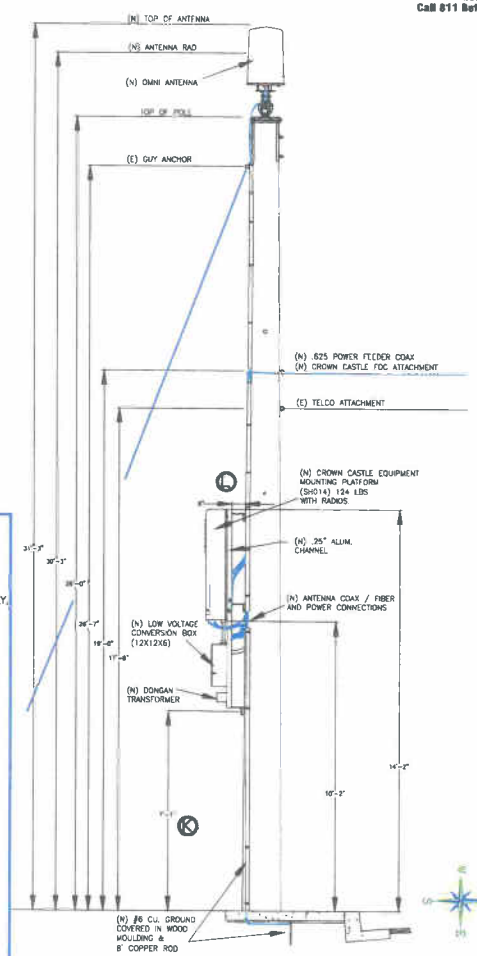
M – PROTECTIVE COVERING MUST EXTEND A MINIMUM OF 3'-0" BEYOND ENERGIZED 0-750 VOLTS.

N – POLE STEPS TO BE INSTALLED FROM 8'-6" ABOVE GRADE TO CROWN CASTLE ATTACHMENT.

SCALE: 1/2" = 1'-0"	UTILITY POLE DETAIL	POLE# N/A	LOOKING NORTH	A

"PROFILES ARE DRAWN VERTICAL FOR PRESENTATION AND DO NOT REFLECT ACTUAL CONDITIONS"

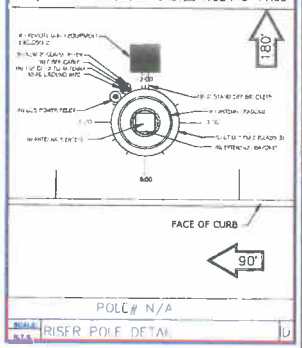
Call Before you Dig! 811 Know what's below. Call before you dig. Call 811 Before you Dig!



SCALE: 1/2" = 1'-0"	UTILITY POLE DETAIL	POLE# N/A	LOOKING WEST	B

SCALE: N.T.S.	SITE POLE PICTURE	C

POLE WILL BE STEPPED IN ACCORDANCE TO GO95 STANDARDS IN RESPECT TO CLIMBING SPACE.
REMOTE EQUIPMENT @ 12:00
1-2" SCH 80 CROWN CASTLE RISER @ 11:30
1-3/4" SCH 40 CROWN CASTLE RISER @ 11:00



SCALE: N.T.S.	POLE# N/A RISER POLE DETAIL	D

UTILITY POLE EQUIPMENT PROFILES

CROWN
890 TASMAN DRIVE
MILPITAS, CA. 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
NODE VRZ FB09
FREEDOM BLVD/McDONALD RD
APTOS, CA 95003

CURRENT ISSUE DATE: 5/3/13

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC
1334 Tomescal Cyn Rd
Corona, CA. 92883
PHONE: (951) 471-1919

PLANS APPROVED BY:
CROWN
REP:

COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE NODE VRZ_FB09

3 | 0
3 OF 5

1-40

EXHIBIT G

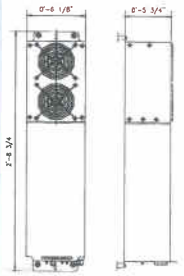
ION-M19P

ANDREW ION-19P IS A MULTI-BAND MULTI-OPERATOR REMOTE UNIT WITH VARIOUS EXTENSION UNITS. IT IS USED IN CONJUNCTION WITH A MASTER UNIT ON THE ION OPTICAL DISTRIBUTION SYSTEM. THIS SYSTEM TRANSPORTS MULTIPLE FREQUENCY BANDS SIMULTANEOUSLY (1900 MHZ AND 1700/2100 MHZ), PROVIDING A COST-EFFECTIVE SOLUTION FOR DISTRIBUTING CAPACITY FROM ONE OR MORE BASE STATIONS.

ELECTRICAL	
POWER SUPPLY:	
MAINS POWER, VAC	88 TO 264 115 OR 230
POWER CONSUMPTION, WATTS	260
OPTICAL	
CONNECTORS	F2000/APC 8°
OPTICAL RETURN LOSS, DB	45 MINIMUM
FIBER TYPE, MM	SINGLE MODE (9/125
OPTICAL LINK BUDGET, DB	0 TO 10
COMPOSITE INPUT POWER	
@ 3TRX MASTER BOX, DBM	
1900MHZ	+3 COMPOSITE
1700/2100 MHZ	+5 COMPOSITE
WIDEBAND	
BTS SIDE	
NUMBER OF CONNECTORS	
1900MHZ	4
1700/2100 MHZ	
SYSTEM OPTIMIZED FOR BTS POWER, DBM	33 43
ANTENNA PORT	
CONNECTOR	N FEMALE
OUTPUT POWER	SEE BAND SPECIFICATION
1900 MHZ	
FREQUENCY RANGE, MHZ	
UPLINK	1850 TO 1915
DOWNLINK	1930 TO 1995
OUTPUT POWER PER CARRIER*, DBM	
NUMBER OF CARRIERS	1 2 4 8
DBM	+43 40 37 34
CDMA/EVDO	+43 40 37 34
CDMA/EV-DO	43 40 37 34
WCDMA/HSDPA	+43 40 37 34
SPURIOUS EMISSION	<-13 DBM / 1 MHZ
DL OUTPUT TOLERANCE OVER FREQUENCY, DB	+1
DL OUTPUT TOLERANCE OVER TEMPERATURE, DB	+0.5

INPUT IOP	
IOP3 OPTIMIZED	-12
NOISE FIGURE OPTIMIZED	-18
NOISE FIGURE, DB	
IOP3 OPTIMIZED	11
NOISE FIGURE OPTIMIZED	6
1700/2100 MHZ (W EXTENSION UNIT)	
FREQUENCY RANGE, MHZ	
UPLINK	1710 TO 1755
DOWNLINK	2110 TO 2155
OUTPUT POWER PER CARRIER*, DBM	
CDMA/EV-DO	WCDMA/UMTS/HSDPA
+43	+43 @ 1 CARRIER
+40	+40 @ 2 CARRIERS
+37	+37 @ 4 CARRIERS
+34	+34 @ 8 CARRIERS
SPURIOUS EMISSION	<- 13 DBM / 1 MHZ
ADJACENT CHANNEL POWER, DBC	-48
DL OUTPUT TOLERANCE OVER FREQ, DB	+1
DL OUTPUT TOLERANCE OVER TEMP, DB	+0.5
INPUT IOP3, DBM	
IOP3 OPTIMIZED	-12
NOISE FIGURE OPTIMIZED	-18

* APPLICABLE TO CDMA MODULATION MODE ONLY
** WITH ACTIVE COOLING



ION-M19P MULTI-BAND, MULTI-OPERATOR REMOTE OPTICAL SYSTEM

SCALE: N.T.S. — REPEATER EQUIPMENT DIMENSIONS — A

KATHREIN SCALA DIVISION

840 10510 840 10511
Dualband 700 MHz X-pol Omni Antenna

Kathrein's dual band antennas are ready for 3G and 4G applications, covering all existing wireless bands as well as all spectrum under consideration for future systems.
- Wide band operation
- Exceptional intermodulation characteristics
- High strength fiberglass radome.

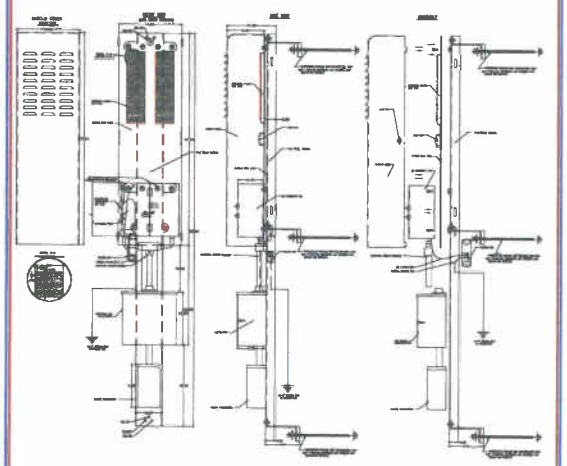
General specifications:
Frequency range 698-894 MHz/1710-2170 MHz
Gain 698-894 MHz 5 dBi (with 3-5 dB nulls, typical)1710-2170 MHz 8 dBi (with 6-8 dB nulls, typical)
VSWR <1.5:1
Impedance 50 ohms
Intermodulation (2x20w) IM3: <-150 dBc
Polarization +45° upper and lower band -45° upper and lower band
Connector 4 x 7-16 DIN female
Isolation intersystem >30 dBintersystem >40 dB (698-894 // 1710-2170 MHz)
Maximum input power 698-894 MHz 250 watts (at 50°C)1710-2170 MHz 200 watts (at 50°C)
Radome color Brown or gray
Weight 45 lb (20.4 kg)
Height 24 inches (609 mm)
Radome diameter 18 inches (457 mm)
Wind load at 93 mph (150kph) Side 32 lbf (1.38 N)
Wind survival rating* 100 mph (160 kph)
Shipping dimensions 22 x 20 x 19 inches (813 x 508 x 483 mm)
Shipping weight 50 lb (23.6 kg)
Mounting Designed to be mounted on top of a utility pole using a custom mounting bracket supplied by the customer.
See reverse for order information.

* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-8500 Fax: (541) 779-3991

Email: communications@kathrein.com Internet: www.kathrein-scala.com

SCALE: N.T.S. — ANTENNA SPECIFICATIONS — B



SCALE: N.T.S. — SHROUD SPECIFICATIONS (SH014) — C

Pole-Top Extension for Wood Poles

Wood Pole-Top Extension

Notes

1. This unit meets General Order (G.O.) 95 requirements for strength in Class 3 through Class 6 poles and therefore may be used to support equipment on these poles. It may be used on large class poles, but may not support equipment on them.

2. The unit may be guyed

3. The bracket is made to fit poles with diameters of 8" to 11". Therefore, depending upon the actual pole-top diameter, to fit poles of class 3 and smaller, a bracket adaptor may be required.

4. Units are supplied with the wood bayonet assembled.

5. A pole step kit is required.

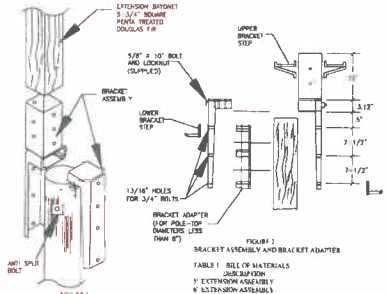
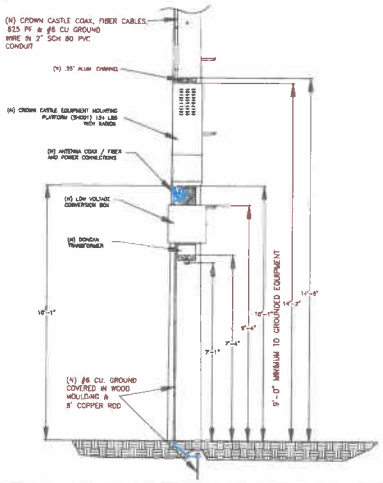


FIGURE 1
WOOD EXTENSION ASSEMBLY

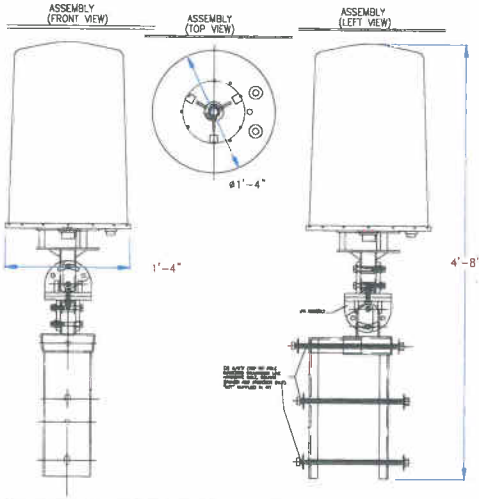
FIGURE 2
BRACKET ASSEMBLY AND BRACKET ADAPTER

TABLE 1 BILL OF MATERIALS
DESCRIPTION
5' EXTENSION ASSEMBLY
5' EXTENSION ASSEMBLY
" EXTENSION ASSEMBLY
BRACKET ADAPTER
3/4" X 10" MACHINE BOLTS
POLE STEP KIT (1 UPPER, 2 LOWER)

SCALE: N.T.S. — POLE TOP EXT / BRACKET ASSEMBLY — D



SCALE: N.T.S. — REPEATER EQUIPMENT AND MOUNTING CHASSIS CONFIGURATION — E



SCALE: N.T.S. — ANTENNA MOUNTING BRACKETS — F

UTILITY POLE EQUIPMENT TYPICALS

CROWN
890 TASMAN DRIVE
MILPITAS, CA 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:
FREEDOM
MODE VRZ FB09
FREEDOM BLVD/McDONALD RD
APTOS, CA 95003

CURRENT ISSUE DATE: 5/3/13

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:
HP COMMUNICATIONS INC.
13341 Temescal Cyn Rd
Corona, CA 92883
PHONE: (951) 471-1919

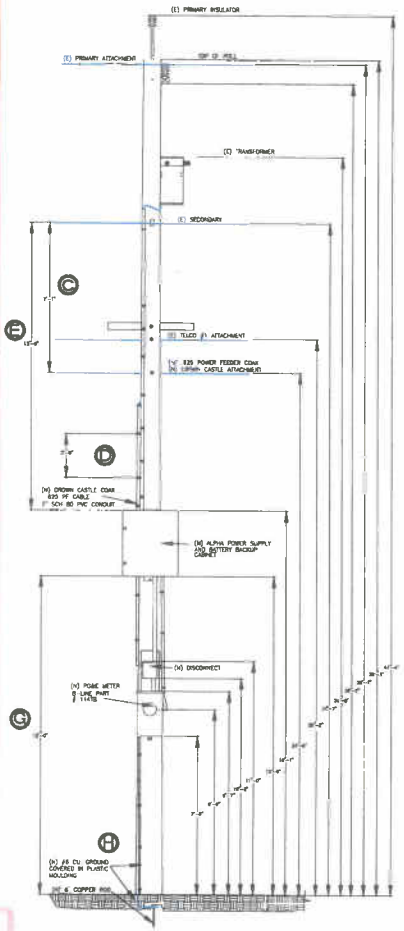
PLANS APPROVED BY:
CROWN
REP:

COMMENTS:

SHEET TITLE:
CROWN CASTLE
POLE PROFILE MODE VRZ_FB09

4 | 0
4 OF 5

"PROFILES ARE DRAWN VERTICAL FOR PRESENTATION AND DO NOT REFLECT ACTUAL CONDITIONS"



MAKE READY
N/A
NEW CONSTRUCTION
INSTALL POWERING EQUIPMENT ACCORDING TO PRINT. PG&E TO SET NEW TRANSFORMER AND REFRAME AS NEEDED. HEIGHT OF TRANSFORMER TO BE DETERMINED BY PG&E.
NOTES:
TOP OF INSULATOR: 41'-4"
TOP OF POLE: 39'-3"
PRIMARY H.O.A: 39'-1"
TRANSFORMER H.O.A: 34'-8"
SECONDARY H.O.A: 31'-7"
TELCO H.O.A: 26'-2"
PROPOSED CROWN CASTLE H.O.A: 24'-6"

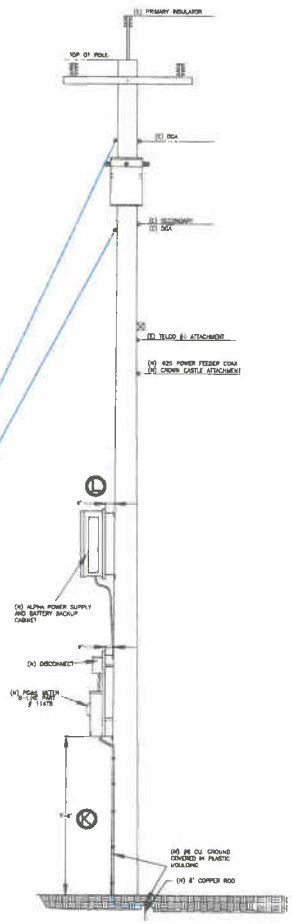
- **A** – 72" MIN. CLEARANCE BETWEEN SECONDARY POWER AND CLOSEST LEVEL OF ANTENNA ASSEMBLY.
- **B** – STEP POLE TOP EXTENSION AS PER DETAIL DWG.
- **C** – 72" MIN CLEARANCE REQ'D.
- **D** – 24" SPACING MAX.
- **E** – 72" MIN. TO SECONDARY LEVEL.
- **F** – 12" MIN. SPACING FOR EQUIP TO CURB.
- **G** – 15' MIN. (MAY BE REDUCED TO 9' WHEN NOT EXPOSED TO TRAFFIC).
- **H** – GROUND INSTALLED BY COMM COMPANY (INCLUDES 8' COPPER ROD).
- **I** – 24" MIN. FROM CENTER OF POLE
- **J** – 24" MIN. CLEARANCE REQ'D.
- **K** – 7' MIN. / 8' MAX. REQ'D.
- **L** – 4" MIN. CLEARANCE BETWEEN EQUIPMENT AND POLE.

UTILITY POLE DETAIL | POLE# N/T | LOOKING NORTH | A

Call Before you Dig!

Know what's below. Call before you dig. Call 811 Before you Dig!

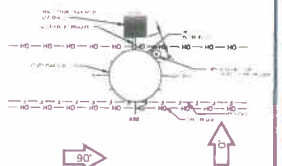
"PROFILES ARE DRAWN VERTICAL FOR PRESENTATION AND DO NOT REFLECT ACTUAL CONDITIONS"



UTILITY POLE DETAIL | POLE# N/T | LOOKING EAST | B

SITE POLE PICTURE | C

POLE WILL BE STEPPED IN ACCORDANCE TO GO95 STANDARDS IN RESPECT TO CLIMBING SPACE
REMOTE EQUIPMENT @ 12:00
1-3/4" SCH 80 CROWN CASTLE RISER @ 1:00
1-2" SCH 80 CROWN CASTLE RISER @ 1:00



RISER POLE DETAIL | D

POWER SUPPLY ENCLOSURE | E

UTILITY POLE POWERING EQUIPMENT PROFILES

CROWN
890 TASMAN DRIVE
MILPITAS, CA 95035-7439
PHONE: (408) 954-1580

PROJECT INFORMATION:

FREEDOM
NODE VRZ_FB09
FREEDOM BLVD/McDONALD RD
APTOS, CA 95003

CURRENT ISSUE DATE: 5/3/13

PERMIT SUBMISSION:

REV.	DATE	DESCRIPTION	BY

PLANS PREPARED BY:

HP COMMUNICATIONS INC.
1334 Temescal Glen Rd
Corona, CA 92883
PHONE: (951) 471-1919

PLANS APPROVED BY:

CROWN

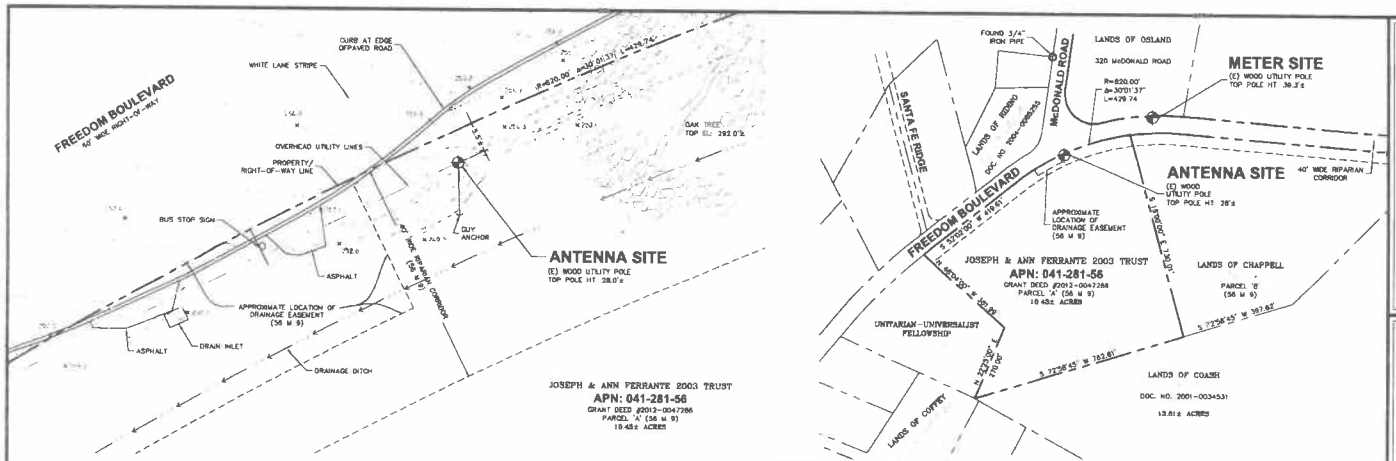
P.E.P.

COMMENTS:

SHEET TITLE:

CROWN CASTLE
POLE PROFILE NODE VRZ_FB09

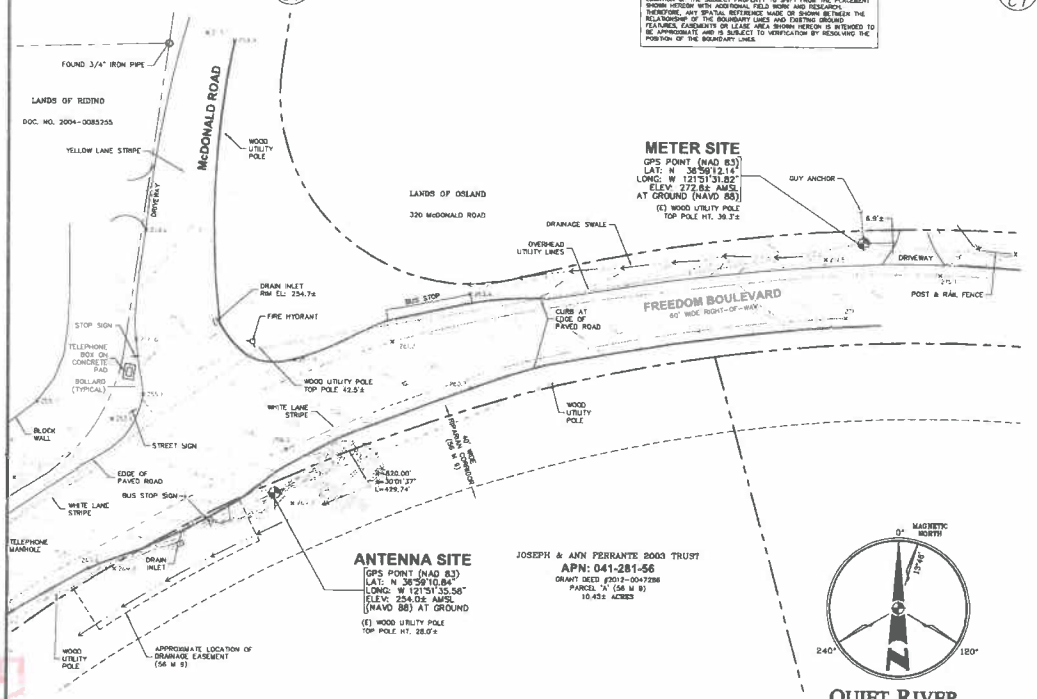
5 | 0 | 5 OF 6



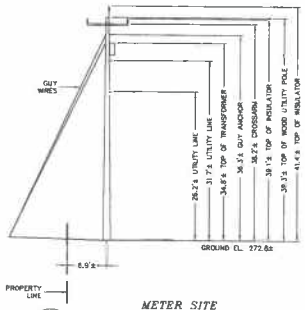
3 C1 ENLARGED SITE PLAN
SCALE: 1" = 10'

1 C1 OVERALL SITE PLAN
SCALE: 1" = 200'

SUFFICIENT SURVEY EVIDENCE WAS NOT RECOVERED TO ESTABLISH THE POSITION OF THE BOUNDARY LINES SHOWN HEREON. THE BOUNDARY REPRESENTED ON THIS MAP IS BASED ON COMPILED RECORD DATA AND BEST FIT INTO EXISTING IMPROVEMENTS. IT IS POSSIBLE FOR THE LOCATION OF THE SUBJECT PROPERTY TO SHIFT FROM THE PLACEMENT SHOWN HEREON WITH ADDITIONAL FIELD WORK AND RESEARCH. THEREFORE, ANY SPATIAL REFERENCE MADE OR SHOWN BETWEEN THE PROPERTY LINE(S) OR BOUNDARY LINES AND EXISTING GROUND FEATURES, EASEMENTS OR LEASE AREA SHOWN HEREON IS INTENDED TO BE APPROXIMATE AND IS SUBJECT TO VERIFICATION BY RESOLVING THE POSITION OF THE BOUNDARY LINES.



2 C1 SITE PLAN
SCALE: 1" = 30'

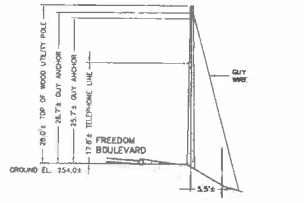


4 C1 METER SITE UTILITY POLE ELEVATION
SCALE: 1" = 10'

QUIET RIVER
Land Services Inc.

SCALE IN INCHES
1/2 0 1

MAGNETIC DECLINATION = 13°48'
PER NOAA-NGDC



5 C1 ANTENNA SITE UTILITY POLE ELEVATION
SCALE: 1" = 10'

VICINITY MAP

SCALE: N.T.S.

SITE DATA

OWNER'S NAME: JOSEPH A. FERRANTE AND ANN SOLARI FERRANTI 2003 TRUST
OWNER'S ADDRESS: 260 LORE WAY
SANTA CRUZ, CA 95060

ASSESSOR'S PARCEL NUMBER(S): 041-281-56

NET AREA OF UNDERLYING PARCEL(S): 10.43± ACRES

NET AREA OF LEASE AREA: N/A

HEIGHT OF BUILDING/TOWER: 28.0'± A.G.L. TO TOP OF EXISTING UTILITY POLE.

ANTENNA SITE - LAT: N 36°59'10.84" LONG: W 121°51'35.56" (NAD 83)

METER SITE - LAT: N 36°59'12.14" LONG: W 121°51'31.82" (NAD 83)

SITE GROUND ELEVATION: 254.0± AMSL (NAVD 88) AT BASE OF ANTENNA SITE POLE

BASIS OF ELEVATIONS: GLOBAL POSITIONING SYSTEM (GPS). (SEE NOTE 3)

BASIS OF BEARINGS:
RECORD OF SURVEY MAPS RECORDED ON BOOK 47 OF MAPS AT PAGES 72-73, RECORDS OF SANTA CRUZ COUNTY, AND BEST FIT WITH EXISTING IMPROVEMENTS.

FEMA FLOOD ZONE DESIGNATION

County: SANTA CRUZ Effective Date: MAY 18, 2012
Community-Panel Number: 060087C-0350-E
The Flood Zone Designation for this site is:

X Areas determined to be outside the 0.2% annual chance floodplain.
D Areas in which flood hazards are undetermined, but possible.

TITLE REPORT

NO TITLE REPORT FURNISHED. EXCEPTIONS TO TITLE AND RESERVATIONS THEREFROM COULD NOT BE DETERMINED. BOUNDARY INFORMATION SHOWN IS COMPILED FROM AVAILABLE RECORD DATA.

PROPERTY DESCRIPTION

PROPERTY SITUATED IN TOWN OF APTOS, COUNTY OF SANTA CRUZ, STATE OF CALIFORNIA, AS GENERALLY SHOWN UPON THIS PLAN.

LEASE AREA LEGAL DESCRIPTION

N/A

LEGEND

APN:	ASSESSOR'S PARCEL NUMBER		ASPHALT
CP	CONTROL POINT		CONCRETE
EL.	ELEVATION		
FH	FIRE HYDRANT		CONTROL POINT
FND.	FOUND		FOUND MONUMENT
HT	HEIGHT		
MON.	MONUMENT		GPS POINT
(M-M)	MONUMENT TO MONUMENT	R 13.3 / R 12.3	PARAPET/ROOF ELEVATIONS
P.O.B	POINT OF BEGINNING		
P.O.C.	POINT OF COMMENCEMENT	x 12.3	SPOT ELEVATION
PP	POWER POLE		
(TYP.)	TYPICAL		TEMPORARY BENCHMARK

CROWN CASTLE

Crown Castle
1100 DEXTER AVE. SUITE 200
SEATTLE, WA 98109

REVISIONS

DATE	DESCRIPTION	INITIAL
11/05/12	90% ISSUE	MAS
4/25/13	100% COMPLETE - ADDITIONAL TOPO	MAS

PLANS PREPARED BY

QUIET RIVER
Land Services Inc.
11501 Dublin Boulevard, Suite 200
Dublin, CA 94568
(925) 734-6788 Phone

GENERAL NOTES

1.) This is not a boundary survey. This is a specialized topographic map with property lines and easements being a graphic depiction of various information gathered from preliminary title reports, back-up documents of record, maps and available monuments found during the field survey. No property monuments were set. No title research was performed by Quiet River Land Services, Inc.

2.) The latitude, longitude and elevation shown hereon was derived from post-processed L-1/L-2 data collected using Navstar Global Positioning System (GPS) and a Topcon Hiperlite Receiver. Topcon specifications report half-meter level accuracy (horizontally) when data is properly collected and processed. (Elevation = ±3.0 feet.)

3.) Unless otherwise noted, no underground utility locating service company was contacted prior to this map being prepared. Therefore, there may be non-visible or obscure utilities existing on the property not shown on this map - so CALL BEFORE YOU DIG.

4.) Any electronic digital media provided by Quiet River Land Services, Inc. to our client is a courtesy and is not to be reproduced, distributed, sold, altered, revised, edited or amended without the express written consent of an Officer of Quiet River Land Services, Inc. Further, only the final stamped, signed and dated original "hard copy" version of our survey or map is considered to be our legally recognized product.

SURVEYOR'S STATEMENT

DATE OF FIELD SURVEY: 10/30/12

I, the undersigned, a Registered Professional Land Surveyor licensed under the laws of the State of California do hereby state that the information, measurements, assessments, record boundary lines, bearings and distances as shown hereon are based upon a field survey on actual values and upon items of public record and data contained in a title report, as referenced. Furthermore, the Latitude and Longitude coordinates are reported in NAD 83 Datum and are accurate to within ±20 feet horizontally, and the ground elevation, reported in NAVD 1988 Datum, is within ±3 feet vertically. The coordinate values and elevations are within the 1-A Accuracy Code designation as listed in the A.S.A.C. Information Sheet #1-003 and are accurate to the best of my knowledge and belief.

SIGNATURE DATE

VRZ_FB-09
FREEDOM BOULEVARD

260 LORE WAY
APTOS, CA 95003

SANTA CRUZ COUNTY

LS1
OF 1 SHEET

REVISION 2
CRWN1202-09

P:\CRWN1202\VRZ_FB09\dwg\CRWN1202FB09-13.dwg Apr 25, 2013 - 3:33pm mashwarts

EXHIBIT C

Attachment 2

Antenna Specifications

EXHIBIT G

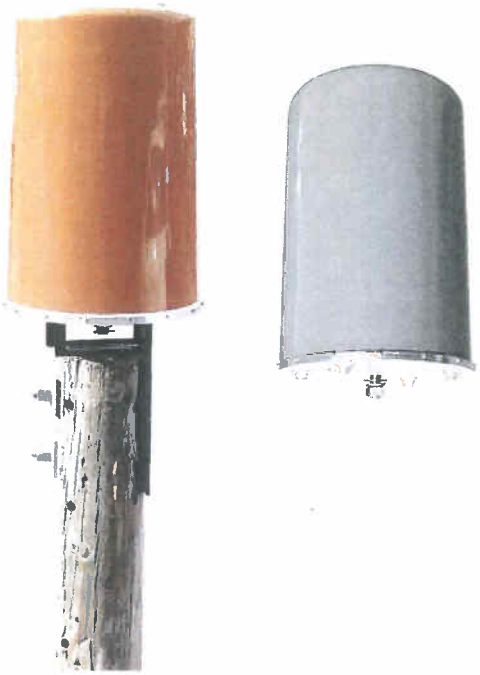
KATHREIN
SCALA DIVISION

840 10510 840 10511

Dualband 700 MHz X-pol Omni Antenna

Kathrein's dual band antennas are ready for 3G and 4G applications, covering all existing wireless bands as well as all spectrum under consideration for future systems.

- Wide band operation.
- Exceptional intermodulation characteristics.
- High strength fiberglass radome.

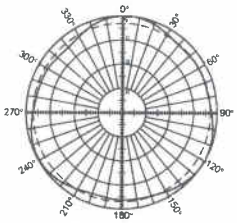


General specifications:

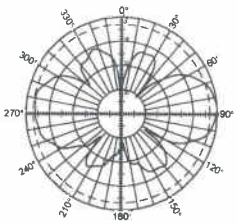
Frequency range	698–894 MHz 1710–2170 MHz
Gain 698–894 MHz 1710–2170 MHz	5 dBi (with 3–5 dB nulls, typical) 8 dBi (with 6–8 dB nulls, typical)
VSWR	<1.5:1
Impedance	50 ohms
Intermodulation (2x20w)	IM3: <-150 dBc
Polarization	+45° upper and lower band -45° upper and lower band
Connector	4 x 7-16 DIN female
Isolation intrasystem intersystem	>30 dB >40 dB (698–894 // 1710–2170 MHz)
Maximum input power 698–894 MHz 1710–2170 MHz	 250 watts (at 50°C) 200 watts (at 50°C)
Radome color	Brown or gray
Weight	45 lb (20.4 kg)
Height	24 inches (609 mm)
Radome diameter	16 inches (407 mm)
Wind load Side	at 93 mph (150kph) 32 lbf (138 N)
Wind survival rating*	100 mph (160 kph)
Shipping dimensions	32 x 20 x 19 inches (813 x 508 x 483 mm)
Shipping weight	52 lb (23.6 kg)
Mounting	Designed to be mounted on top of a utility pole using a custom mounting bracket supplied by the customer.

See reverse for order information.

698–894 MHz

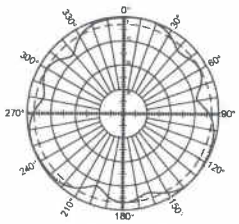


Horizontal pattern
±45°-polarization
880 MHz

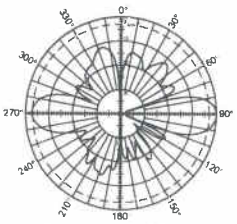


Vertical pattern
±45°-polarization
880 MHz

1710–2170 MHz



Horizontal pattern
±45°-polarization
1945 MHz



Vertical pattern
±45°-polarization
1945 MHz

*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

TÜV
11202-FRO/a

RoHS
Lead-Free

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

EXHIBIT G

Appendix A-1

RF EXPOSURE AT ANTENNA LEVEL

EXHIBIT G

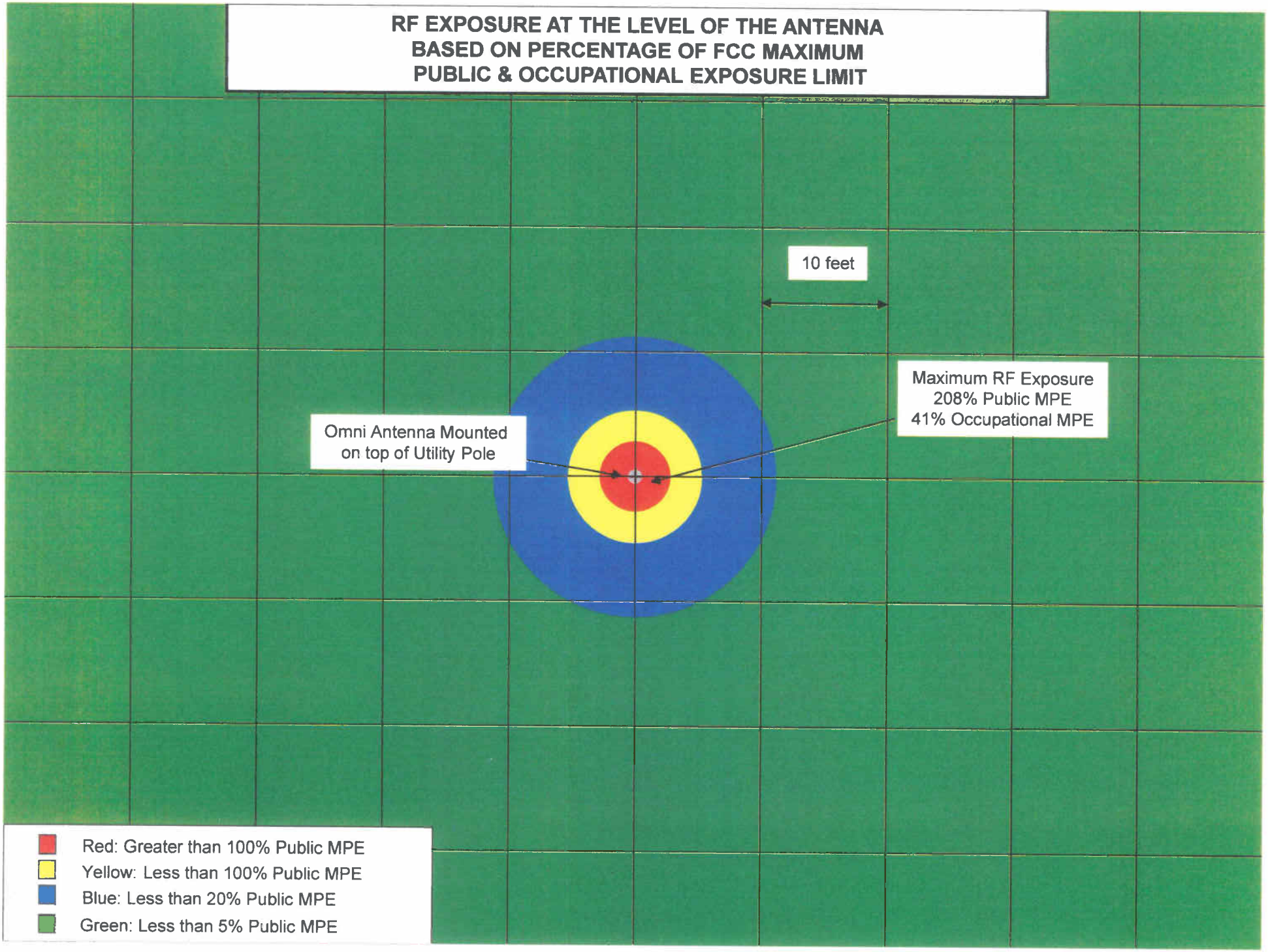

RF EXPOSURE AT THE LEVEL OF THE ANTENNA
BASED ON PERCENTAGE OF FCC MAXIMUM
PUBLIC & OCCUPATIONAL EXPOSURE LIMIT
10 feet
Maximum RF Exposure
208% Public MPE
41% Occupational MPE
Omni Antenna Mounted
on top of Utility Pole
Red: Greater than 100% Public MPE
Yellow: Less than 100% Public MPE
Blue: Less than 20% Public MPE
Green: Less than 5% Public MPE

EXHIBIT G

Appendix A-2

RF EXPOSURE AT GROUND LEVEL

EXHIBIT G

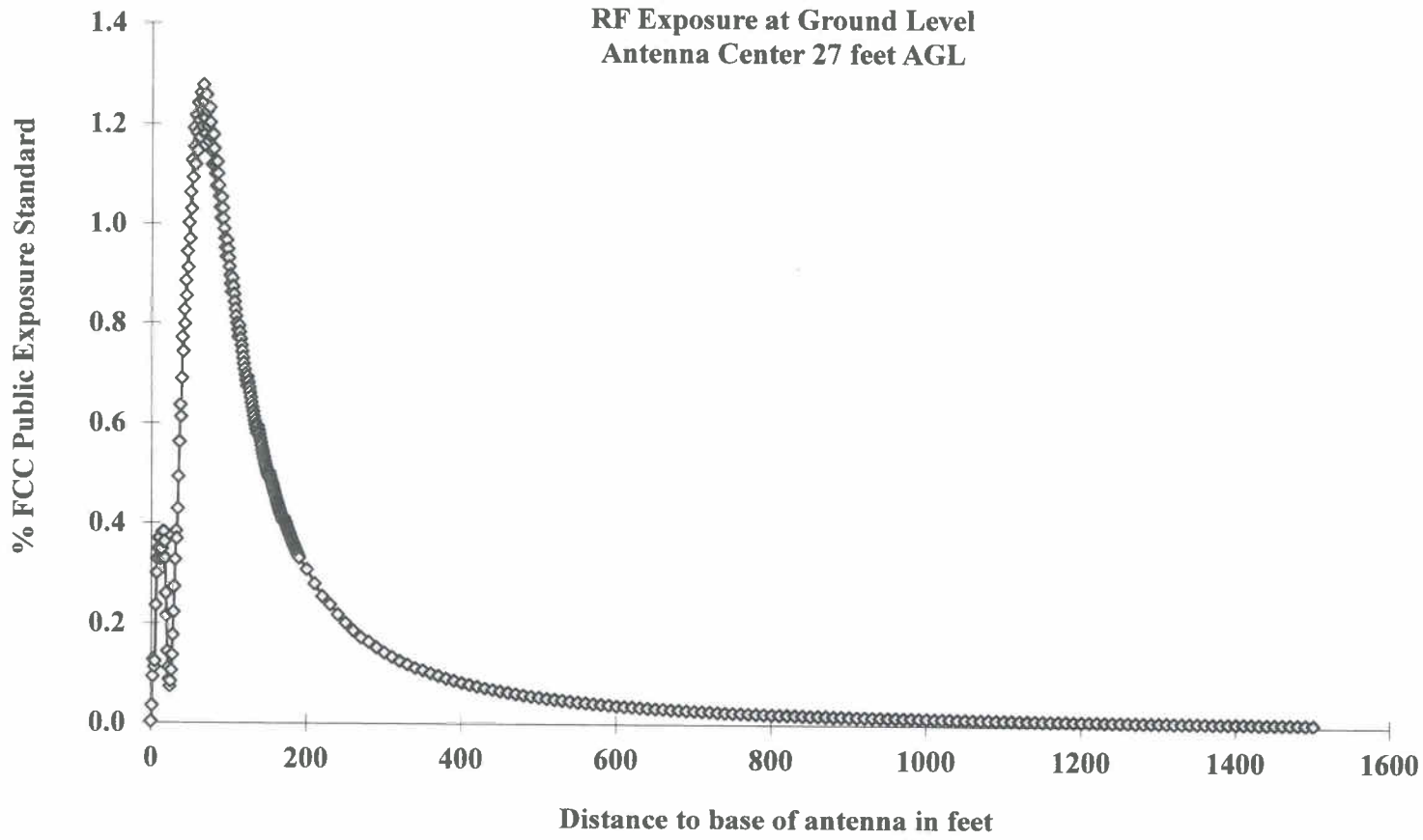

RF Exposure at Ground Level
Antenna Center 27 feet AGL
% FCC Public Exposure Standard
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
200
400
600
800
1000
1200
1400
1600
Distance to base of antenna in feet

EXHIBIT G

Appendix A-3

RF NOTICE SIGN

EXHIBIT G

NOTICE

The radio frequency (RF) emissions at this site have been evaluated for potential RF exposure to personnel who may need to work near these antennae.

RF EXPOSURE AT 3 FEET OR CLOSER TO THE FACE OF THE ANTENNA MAY EXCEED THE FCC PUBLIC EXPOSURE STANDARD AND THUS ONLY QUALIFIED RF WORKERS MAY WORK IN THIS 3 FOOT EXCLUSION ZONE. OTHERS WHO NEED TO WORK IN THE EXCLUSION ZONE SHOULD CALL: 1-866-639-8460 FOR INSTRUCTIONS PRIOR TO COMMENCING WORK. REFER TO: FREEDOM NODE VRZ_FB09.

Reference: Federal Communications Commission (FCC) Public Exposure Standard. OET Bulletin-65, Edition 97-01, August 1997.

EXHIBIT G

STATEMENT OF EXPERIENCE

Jerrold Talmadge Bushberg, Ph.D., DABMP, DABSNM, FAAPM
(800) 760-8414 jbushberg@hampc.com

Dr. Jerrold Bushberg has performed health and safety analysis for RF & ELF transmissions systems since 1978 and is an expert in both health physics and medical physics. The scientific discipline of Health Physics is devoted to radiation protection, which, among other things, involves providing analysis of radiation exposure conditions, biological effects research, regulations and standards as well as recommendations regarding the use and safety of ionizing and non-ionizing radiation. In addition, Dr. Bushberg has extensive experience and lectures on several related topics including medical physics, radiation protection, (ionizing and non-ionizing), radiation biology, the science of risk assessment and effective risk communication in the public sector.

Dr. Bushberg's doctoral dissertation at Purdue University was on various aspects of the biological effects of microwave radiation. He has maintained a strong professional involvement in this subject and has served as consultant or appeared as an expert witness on this subject to a wide variety of organizations/institutions including, local governments, school districts, city planning departments, telecommunications companies, the California Public Utilities Commission, the California Council on Science and Technology, national news organizations, and the U.S. Congress. In addition, his consultation services have included detailed computer based modeling of RF exposures as well as on-site safety inspections. Dr. Bushberg has performed RF & ELF environmental field measurements and recommend appropriate mitigation measures for numerous transmission facilities in order to assure compliance with FCC and other safety regulations and standards. The consultation services provided by Dr. Bushberg are based on his professional judgement as an independent scientist, however they are not intended to necessarily represent the views of any other organization.

Dr. Bushberg is a member of the main scientific body of International Committee on Electromagnetic Safety (ICES) which reviews and evaluates the scientific literature on the biological effects of nonionizing electromagnetic radiation and establishes exposure standards. He also serves on the ICES Risk Assessment Working Group that is responsible for evaluating and characterizing the risks of nonionizing electromagnetic radiation. Dr.Bushberg was appointed and is serving as a member of the main scientific council of the National Council on Radiation Protection and Measurements (NCRP). He is also the Senior Scientific Vice-President of the NCRP and chairman of the NCRP Board of Directors. Dr. Bushberg has served as chair of the NCRP committee on Radiation Protection in Medicine and he continues to serve as a member of this committee as well as the NCRP scientific advisory committee on Non-ionizing Radiation Safety. The NCRP is the nation's preeminent scientific radiation protection organization, chartered by Congress to evaluate and provide expert consultation on a wide variety of radiological health issues. The current FCC RF exposure safety standards are based, in large part, on the recommendations of the NCRP. Dr. Bushberg was elected to the International Engineering in Medicine and Biology Society Committee on Man and Radiation (COMAR) which has as its primary area of responsibility the examination and interpreting the biological effects of non-ionizing electromagnetic energy and presenting its findings in an authoritative and professional manner. Dr. Bushberg also served for several years as a member of a six person U.S. expert delegation to the international scientific community on Scientific and Technical Issues for Mobile Communication Systems established by the FCC and the FDA Center for Devices and Radiological Health.

Dr. Bushberg is a full member of the Bioelectromagnetics Society, the Health Physics Society and the Radiation Research Society. Dr. Bushberg received both a Masters of Science and Ph.D. from the Department of Bionucleonics at Purdue University. Dr. Bushberg is a fellow of the American Association of Physicists in Medicine and is certified by several national professional boards with specific sub-specialty certification in radiation protection and medical physics. Prior to coming to California, Dr. Bushberg was on the faculty of Yale University School of Medicine.

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